



RE-TURBOCHARGED

CONTINENTAL is developing an STC to put a factory-turbocharged 550 in your normally aspirated SR22 Turbo. Among its many advantages, the engine will be certified to run on unleaded avgas. **BY ROBERT GOYER**

If you own an SR22, Continental Motors wants your business. Well, it wants more of it anyway, so it is in the process of developing an STC to put a factory-turbocharged Continental engine in existing normally aspirated and turbocharged Cirrus SR22s.

As you know, Continental and Cirrus Aircraft are not new to each other. Since its inception, Cirrus has chosen Continental engines for its SR20 and SR22 single-engine airplanes. But when it launched the turbocharged version of the SR22 a couple of years ago, Cirrus went with a turbocharger system developed by aftermarket specialist Tornado Alley installed on a normally aspirated Continental IO-550 engine.

Continental seemed able to live

with the arrangement, though it's hard to imagine it was very happy about it. But with the economic downturn and the subsequent steep drop in new airplane sales — and the new engine sales that they create — the aftermarket has become more important than ever. This changing sales picture was surely a factor in Continental's decision to launch an aftermarket SR22 mod.

I recently flew Continental's developmental SR22 outfitted with the TSIO-550-G model engine. Continental plans to begin selling the STC to SR22 owners within the next few months. Pricing has yet to be announced, but the company says that it will be in line with its existing new engine prices and it's 10 pounds lighter than the Tornado

Alley engine. And Continental is already working to certify the engine for operation on unleaded fuel, so future compatibility with 94UL will be assured. Continental says that the installation is a "drop-in" affair with minimal downtime, and the TSIO-550 can be outfitted with an air-conditioner.

Because the installation can be done in either a normally aspirated or Turbo model, there likely will be a few different kinds of customer for the mod, including those who want to take a normally aspirated SR22 and get turbocharged power out of it, and those who want to trade the existing aftermarket-turbocharged IO-550 with a Continental factory engine. Either way, Continental says the proposition makes a lot of sense.

Turbo vs. Turbo

When Cirrus introduced the Turbo version of its already popular SR22 a few years back, the launch was greeted with enthusiasm by the Cirrus community, which had been asking for a turbo model since shortly after the SR22 was

born. The SR22 was already a swift and technologically advanced personal transportation airplane, a good 180-knot cruiser with a comfy interior and lots of available safety features.

So the idea of adding turbocharging for greater power at higher altitudes sounded like a recipe for sales success, which is exactly how it worked out. Impressed by the performance of the new model, hundreds of existing Cirrus owners made the upgrade to turbo power. The shared ownership company I fly with, PlaneSmart Aviation, was so taken by the new model that it swapped out its six-airplane fleet of normally aspirated SR22s for G3 Turbos.

Cirrus is known for doing things differently, and when it did the Turbo, it did that differently too. The normal route would have been to put a factory-turbocharged version of the same engine on the SR22. After all, Continental has been making the TSIO-550 for decades.

Instead, Cirrus decided to go a different route, adding the Tornado Alley mod to the Continental IO-550 that was already going into every SR22. The system is a fairly conventional approach to turbocharging, with twin intercoolers and “turbonormalizing.” Tornado Alley has been installing the mod into a variety of high-performance singles for years.

While it was an unconventional move, Cirrus had good reasons for going with Tornado Alley. Cirrus said the Tornado Alley mod would give owners good power, great fuel efficiency, smooth running and simple operation.

And in practice, that’s pretty much how it has turned out. I’ve been flying a Cirrus G3 Turbo since shortly after its inception, and it does offer excellent cruise performance on relatively low fuel flows. I regularly see around 200 knots in the mid-teens on just more than 17 gph.

Moreover, fuel and engine management are as easy as they say. Typically, pilots will use just a couple of power settings for an entire flight. It’s almost as good as faDEC, which is what Cirrus was shooting for.

There have been issues with the handful of SR22 Turbos that I’ve flown, in addition to ongoing problems with sensors not specifically related to the airplane or engine. It’s not at all uncommon for a CHT probe to mysteriously spike while the others stay cool. But the engines in my experience tend to run hot. Granted, I fly high most of the time — which is the whole idea, right? — and I live in a hot place. Still, the temps on the



At 16,500 feet (18,000 density altitude), we were indicating just over 200 knots true on 15 gph. The TSIO-550 engine was running smooth and cool.

Tornado Alley installation trend hot. In the summer months here in Texas, I often can’t cruise in the nonoxygen altitudes without having to reduce the fuel flow to reduce power and, hence, cool the engine.

And while it varies from airplane to airplane, I’ve also encountered rough running at the suggested power setting in the high teens, though the suggested remedies, reducing fuel flow and using the pump, generally smooth things out.

Let me stress that, all things consid-

ered, the Tornado Alley installation is a satisfying turbo experience, and the performance of the SR22 and its ease of operation are very good.

The TSIO-550 Way

However, Continental sees things a different way and wants to sell Cirrus owners a factory-turbocharged engine when it’s time for overhaul.

When I had the chance to fly Continental’s SR22, I was extremely impressed with its smooth engine performance, from its excellent power output to its improved speeds and cool operation. While the exact details are a bit hard to arrive at in a three-hour flight, the overall impression was clear.

Much of the flight, I should point out, was flown on the rarest commodity in general aviation: actual unleaded avgas. (See page 60 for that story.)

Continental’s Keith Chatten showed up in Austin in the company’s SR22 to go flying on one of the hottest days of the year.

After Keith showed me an effective method for starting the engine, still hot from its flight in from Mobile, Alabama, we taxied out across the blistering ramp for the 17L. Takeoff acceleration was clearly quicker than in the stock airplane, thanks to the higher manifold pressure available, 34 inches, and the climb was impressive too,

though we were light, with just more than two hours of fuel in the tanks.

At 16,500 feet we were seeing better than 210 knots true with a whopping fuel flow of 35 gallons of fuel per hour. Despite the high power output, the hottest cylinder was 360 degrees, 50 degrees below the start of the yellow arc. At that same altitude at a more reasonable economy setting of 15.6 gph, 2,470 rpm and 31 inches of manifold pressure, we were seeing 190 knots true and even lower CHTs. All

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of these figures are better than I would have seen in the stock SR22 Turbo.

Now, admittedly, it was hard to compare the two airplanes. For the first part of our test, we were running on 94UL, which produces less power, so less heat. Still, at lower altitudes the engine was producing well more than 100 percent power (an odd sight on the Avidyne MFD) of the Tornado Alley engine.

Would it run hotter on 100LL, on which it can produce more power? The answer seemed to be no. Despite the fact that it was about as hot a day as you'll see in central Texas, the TSIO-550 ran cool even after we added 100LL to the tabs at our fuel stop, giving us a mixture of fuel a little more than one-third 94UL and just under two-thirds 100LL. (I'll leave it to Peter Garrison in a future Technicalities column to figure out the octane rating and fuel characteristics of the subsequent fuel mixture.)

Suffice it to say that the airplane ran cool the rest of the way home.

And just as important, it ran very

smoothly even when we reduced the mixture below 14 gph at a mid-cruise power setting. So the claims of smoother operation with the Tornado Alley system seem dubious.

There is no denying, however, that the fly-by-numbers engine management is easier in the Tornado Alley engine.

Another advantage, perhaps the chief one, of the TSIO-550 is its better margins between normal operation and

This is what pre-production batches of 94UL look like — clear — at least for now.



detonation, because the factory model's cylinders have lower compression (7.5:1 vs. 8.5:1) than the normally aspirated version. This allows a wider, more flexible range of approved power settings. So what you lose in simplicity of operation you make up for in options.

In truth, the comparison between the Cirrus-installed Tornado Alley system and Continental's factory TSIO-550 is largely moot. There are few Turbo airplanes in the fleet that have amassed enough time to be ready for overhaul. Even PlaneSmart's Turbos, which get flown a lot more than single-owner airplanes, have an average of around 600 hours of total flight time on them.

The more likely scenario for the near future will be owners of normally aspirated SR22s swapping a higher-time IO-550 for a factory-turbocharged engine. Considering the availability of the airplanes on the used market and the current excellent prices, it's an option that makes a lot of financial sense if turbo power is the goal. The performance speaks for itself.

>>> Flying a Big-Bore Engine Without the Lead

MY TEST FLIGHT IN Continental Motors' developmental SR22 was among the most unusual and interesting of my career. That was in part because I was testing a major mod of an airplane in which I have a lot of flying experience, and in part because I was glimpsing into the future by flying a big-bore-powered airplane using unleaded fuel.

The airplane I flew was topped off with 94UL in Mobile, Alabama, that morning. By the time it made it out to Austin, Texas, we still had a couple of hours of unleaded fuel, enough to see how the TSIO-550 performed on 100-No-Lead before adding 100LL for the remainder of the flight.

The worry has always been that heavily breathing engines like the turbocharged 550 would be the acid test for unleaded fuel, but today the prospects are far less scary.

When it comes to aviation piston

engines, lead is magical stuff. It keeps the temps down, internal parts lubricated and the octane nicely boosted. But current guidelines call for an end to 100LL by 2017, which is much closer than you might imagine.

Luckily, Continental believes that it can live with that deadline and is taking what it calls a "two-pronged" approach to the problem, coming up with modifications to its gas piston models while actively (albeit quietly) developing piston engines capable of burning jet-A — yes, diesels.

Continental President Rhett Ross tells me that the company will be ready for the unleaded change. Continental's team believes that with some workable changes to the valve seats in some models and to the combustion and ignition systems in others, and with no changes to some models, its gas piston engines will be compatible with the new fuel. Of course, because 94UL is lower in octane than 100LL, its

potential energy will be lower across the board, regardless of whose engine the future fuel is being used to power.

That said, the performance of the SR22 I flew on 94UL was impressive. Not only did it produce a good deal more power on takeoff and in climb on 94UL than the factory SR22 does on 100LL, but it also ran cooler, even at power settings in the high teens.

There are a lot of questions to be answered here, and one of them is how 94UL will do on a hot day at high altitude and a high power setting. The answer for us was "great." Had we climbed into the 20s (which we did not do), the book likely would have required some limitations on power settings to maintain the required detonation margins, says Continental's Keith Chatten.

According to Ross, the company has a plan to have its engines ready for 94UL when the time comes, and the TSIO-55 will be among the first to get approval. ✈