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For Release At 0800 July 27, 2009

Electronic Wastegate *Turbo Density-Normalized*™ Controller

Ada, OK, – Tornado Alley Turbo (TAT) announces the development of their electronically-controlled turbocharger wastegate for the existing fleet of Turbonormalized Cirrus SR22.

The award winning TN SR-22 aircraft can now step aside.

Here comes the *TDN*™ SR-22 !!

This new electronic engine control takes the popular “Turbonormalized” engine option to still another level of enhanced performance. The Turbonormalized Cirrus SR 22 aircraft has long been referred to as “TN SR-22s.” With the addition of this new electronic turbo wastegate controller, the system will manage the mass air flow to the engine to account for both ambient pressure changes and, now, also, extreme ambient temperature conditions.

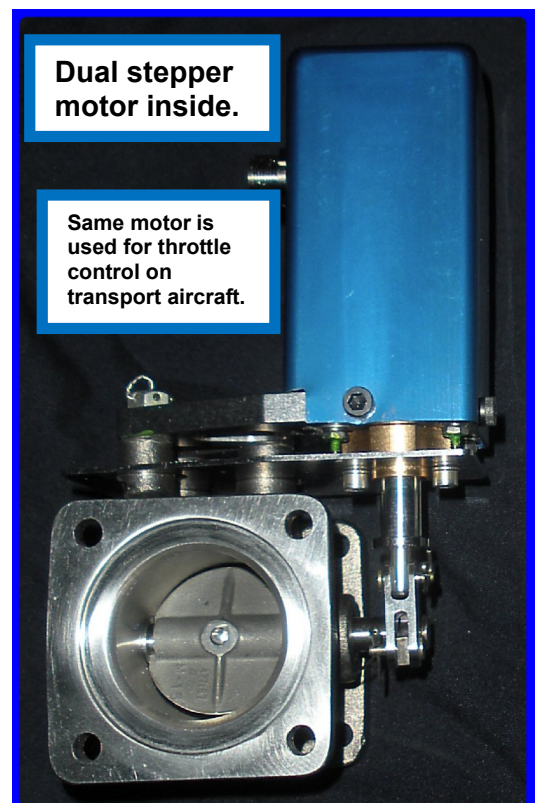
As enhanced with the new controller from Tornado Alley, the previous TN SR-22 aircraft is re-named the *TDN*™ SR-22 aircraft, to signify that the engine is *Turbo Density-Normalized*™.

This electronic engine control, in design and testing for the past several years, has performed flawlessly through extensive flight testing.

After flying and evaluating the *TDN*™ SR-22, one senior OEM airframe executive said, “A lot of pilots are going to want to install this system on their turbonormalized aircraft.”

Owners of TN SR-22 aircraft equipped with this new electronic engine control will enjoy significant performance improvements over the previous TN SR22 aircraft. These performance improvements include more than 7 knots of speed increase during warm and hot weather operation, and as much as a 33% improvement in ROC in the popular LOP climb mode of flight.

Installation of the *TDN*™ system allows the removal of multiple heavy, complex and maintenance intensive components from under the cowl in the traditional turbo system. A weight savings of approximately 3 pounds is achieved with the *TDN*™ system. Among the replaced



components are the existing engine oil pressure driven hydraulic actuator, multiple associated oil lines and fittings and the antiquated aneroid driven manifold pressure controller.

The new **TDN™** system employs an electrically-actuated wastegate and an electronic control with significant new capabilities. It works equally well on all turbocharged piston aircraft as well as the turbonormalized **TDN™** SR-22. The system is the first part of a series of new, modular, electronic engine controls being developed for TAT by General Aviation Modifications, Inc. (GAMI) for use on a wide range of aircraft, including the SR-22, the Cessna T-210, the Cessna 400 series, and many other aircraft in the general aviation fleet.

The new **TDN™** controller brings new capabilities not previously found in the majority of existing turbocharged or turbonormalized aircraft. These new capabilities include:

1. Automatic adjustment of the mass air flow to the engine to compensate for “hot day” conditions. This new capability allows the engine to make standard-day-rated horsepower even under the most extreme hot day conditions. However the system is “smart”. The electronic controller “qualifies” the engine’s operating conditions for the ability to safely restore the full standard day horsepower under challenging environmental conditions.
2. **World Peace™** - Here’s where the **TDN™** controller really shines! This feature, code-named “**World Peace™**”, provides for substantially improved and more efficient LOP operation of the engine by ensuring that there is adequate engine mass air flow to allow the pilot to obtain near maximum continuous engine horsepower even when LOP and even on hot days when LOP. This feature was christened “**World Peace™**” following an in-house contest at Tornado Alley Turbo to name this innovative capability.
3. The new engine management capability results in a “greener” aircraft with enhanced LOP climb rates and at least **7** to as much as **10 KTAS** of additional speed, depending on ambient conditions. The **TDN™** SR-22 will now easily pass its nearest rival, the Cessna Corvalis® in “real world” LOP cruise flight.
4. Improved Fuel Economy- In expanding the envelope for LOP operation, particularly LOP climbs, climb fuel flows can be decreased by close to 50% as compared to traditional ROP climb fuel flows. This capability can save as much as \$75.00/hour in fuel costs during the climb portion of flight to turbo altitudes and provides increased flexibility and aircraft utility through better range and payload options for the pilot.
5. Overboost and Set-up problems are eliminated. The **TDN™** controller eliminates the often frustrating and expensive problems with cold oil and turbo controllers and provides a maintenance-friendly, cockpit-based set up that will make your mechanic smile. Set up is easily achieved with a one-time adjustment on the instrument panel, after which, the MP will “lock-on” without frustrating periodic adjustments.



The **TDN™** system has been developed and tested with over a year of operation in GAMI's state-of-the-art "Carl Goulet Memorial" Engine Test Facility where internal combustion chamber operating parameters are studied and measured. From this testing, GAMI has optimized the power and efficiency of the **TDN™** SR-22 engine package for Tornado Alley. In mid 2006, Cirrus Design chose TAT to provide Cirrus' "Smart Turbo®" which has become the recognized leader in technical merit and performance over all other turbo systems ever installed in general aviation aircraft. To date Cirrus has delivered over 900 TN SR22s flying around the world. That combination of airframe and turbonormalized engine remains as the singular most popular single engine, high performance aircraft being sold today.

TAT will offer the **TDN™** system as an upgrade package as well as on new SR22 aircraft with turbonormalizing installations. The **TDN™** is undergoing the FAA approval process as a Supplemental Type Certificate (STC) modification for turbonormalized Cirrus SR22's. Certification is expected mid-2012.

TAT is currently the manufacturer of multiple STC'd turbonormalizing systems on other aircraft including several popular Beechcraft and Cessna models. These systems are noted for their high efficiency and performance while maintaining excellent temperature control and engine durability. The **TDN™** controller system will also be available for those installations. After certification of those systems is accomplished, look for the **TDN™** system be approved for a large number of factory turbocharged aircraft.

GAMI's Head of Engineering, George Braly, said, "GAMI and TAT take considerable pride in this latest milestone in the companies' continuing development of turbonormalizing technology for the general aviation world. No other turbo control system available in any airframe has been developed to this same high level of performance and ease of operation and maintenance. This new engine controller is the essential foundation for a series of innovative new engine control products that are vital to the future of high performance general aviation piston engine operation."

"Safety is enhanced with this system. The enhanced performance comes with a fully redundant dual channel control system that has been designed from the ground up to be further integrated with GAMI's PRISM electronic ignition system and GAMI's Mixture Magic™ electronic mixture control."

"This unique electronic engine control joins a string of award winning, high-technology products designed and produced by GAMI and TAT, to improve the efficiency and utility of thousands of piston-powered airplanes throughout the world."

"This enhanced design for the TN Cirrus SR-22 is another example of GAMI and Tornado Alley Turbo's continuing commitment to industry-leading research and development for General Aviation," said Tim Roehl, TAT president. "Going back to the Wright Brothers, most significant improvements in aviation have been based upon continuing advances in aircraft powerplants. We truly enjoy the development of this kind of new engine technology for General Aviation."

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