Comparing the Corvalis TTx, Corvalis TT (Columbia 400) and Cirrus SR22T G3

Stats & Weights

	Corvalis TTx	Corvalis TT	Cirrus SR22T G3 Model
Engine	TSIO-550-C	TSIO-550-C	TSIO-550-K
Horsepower	310	310	315
Manifold Hg"	35.5	35.5	37.5
Max RPM	2600	2600	2500
Usable Fuel	102	102[1]	92
Gross Weight	3600	3600	3400
Useful Load	1000	1050	1000
Garmin G2000	Standard	N/A	N/A
Garmin G1000	N/A	Standard[2]	Standard
SVT	Standard	Standard[3]	Standard
WAAS	Standard	Standard[3]	Standard
ESP	Standard	N/A	Standard[4]
Data Logging	Standard	Standard[3]	Standard
Icing Protection	FIKI OPTION[5]	2 SUPPLEMENTAL OPTIONS[6]	FIKI OPTION
BRS Parachute	N/A	N/A	Standard
AmSafe Seat Belts	N/A	N/A[7]	Standard
Speed Brakes	Standard	Standard	N/A
26G Safety Seats	Standard	Standard[8]	N/A
Utility Category	Standard	Standard	N/A
Built in Oxygen	Standard	Standard	Standard
Max Altitude	25,000	25,000	25,000
Seating Capacity	4	4	4

The power output between the two aircraft is similar. The TTx accomplishes the power with lower manifold pressure and higher RPM while Cirrus makes power with a higher manifold pressure and lower RPM. The Cirrus combination results in a quieter takeoff power setting but increases internal cylinder pressures. High internal cylinder pressures result in excess pressure on the valves, potentially increasing valve guide wear. This has been the Achilles' heel of the engine. I fear the Cirrus power combinations will aggravate the problem.

The TTx is a much stronger airframe. While Cirrus calls it overbuilt, I'd rather have the TTx in severe turbulence than the Cirrus.

[1] For aircraft serial numbers 41799 and earlier, 98 gallons of usable fuel. A redesign of the "slosh box" allowed for more usable fuel.
[2] Serial Numbers 41562 and earlier are equipped with the Avidyne Entegra avionics system.
[3] Standard on 2008 and newer. Can be retrofitted down to SN 41563.
[4] 2011 and newer models.
[5] Ability to install non-FIKI Thermawing post delivery.
[6] TKS and Kelly Aerospace Thermawing Options
[7] STC for AmSafe Seat Belts is rumored
[8] 41563 and on.

Performance

	Corvalis TTx	Corvalis TT	Cirrus SR22T G3 Model
Max Cruise KTAS	235	235	214
Typical Cruise KTAS	223	223	214
Takeoff (50' Obstacle)	1900	1900	1267
Takeoff Ground Roll	1200	1200	822
Typical Rate of Climb	1450	1450	1300
Time to Climb to 25K	20 minutes	20 minutes	26 minutes
Typical Cruise Range	1100	1100	850
V_{NE}	230 KIAS	230 KIAS	200 KIAS
V_{NO}	181 KIAS	181 KIAS	177 KIAS
V_{O}	138 KIAS	138 KIAS	133 KIAS
V_{FE} First Notch of Flaps[9]	127 KIAS	127 KIAS	119 KIAS
V_{FE} Full Flaps[10]	117 KIAS	117 KIAS	104 KIAS
Stall Speed – Landing	59 KIAS	59 KIAS	62 KIAS
Stall Speed – Clean	72 KIAS	72 KIAS	73 KIAS
Landing	1260	1260	1411

When analyzing the above numbers, you'll note how much stronger the TTx is when compared to the Cirrus especially when you look at the V_{NE} speeds. Right away you will notice that TTx has a 30 knot advantage in the most stressed category.

You'll also note that the Cirrus gets off the ground and climbs to 50 feet faster. This is because the Cirrus has a larger wing than the TTx. The Cirrus has a bit more low speed lift initially, but once they are both off the ground and climbing, the TTx runs away. The TTx will also climb at a higher indicated airspeed than the Cirrus giving the aircraft improved cooling and forward visibility.

Regarding the wing sizes, the Cirrus has an aspect ratio of 10.12 while the TTx's aspect ratio is 9.08. The TTx has to work a little bit harder to produce the same amount of lift. With the shorter wingspan on the TTx, it's working with a smaller cylinder of air and ultimately has a little bit more induced drag than the Cirrus. That's why the Cirrus gets off the ground faster. But once the TTx gets airflow over its wing, the game is over.

The TTx' higher indicated airspeeds are also more ATC friendly; ATC tends to vector you in tight when in a TTx, because the TTx can carry high airspeeds in the terminal environment. The TTx can also carry these higher airspeeds because it's easier for the aircraft to slow down. With the TTx' speed brakes standard and a higher flap deployment speed, it's extremely easy to carry 170 KIAS to the outer marker on an ILS approach and slow down to your V_{REF} speed on short final. Controllers love this. The Cirrus can slow down quickly as well since the prop on the SR22T has significantly more surface area than the TTx which can act as a speed brake when the engine is pulled to idle. The huge downside is that you must pull the power to idle to benefit from the prop slowing the aircraft down which becomes a factor in a short final situation.

Solely considering the wing, the Cirrus should have better glide performance, but it doesn't. Glide ratio on the Cirrus is 9.6:1 and the TTx is 13:1. Why? First, that prop the Cirrus has falls to a low pitch (flat) and becomes a giant air brake. Second, the prop on the TTx can be pulled to a high pitch (low RPM) setting, substantially reducing

[9] 12° Flaps for the TTx and 16° Flaps for the Cirrus
[10] 40° Flaps for the TTx and 32° Flaps for the Cirrus

the drag of the wind milling propeller. In addition, the glide speed is 88 on the Cirrus versus 108 for the TTx. Pilots flying the TTx have a higher margin of safety between glide and stall speed. Once the landing field is assured, TTx pilots simply transition to a normal approach speed. The slower airspeeds on the Cirrus during pattern operations have been attributed to the higher than normal stall/spin situations. Assuming maximum landing weight (worse case) when flying the TTx, you have a 50 knot margin between stall on downwind, a 40 knot margin between stall on base and a 30 knot margin between stall on final. Once established on final (maneuvering flight is completed), the pilot should transition to a 1.3 V_{STALL} speed for landing. The TTx is safer in maneuvering flight. This is why Cirrus stresses use of the parachute when the pilot gets in trouble.

It is also important to note that the flap of the TTx also carries 8° more flaps when placed in the full position. This allows for shorter ground rolls and steeper approach. The cool thing is that even with all those flaps hanging out, the TTx will climb better than 500 feet per minute on a go around if the pilot forgets to raise the flaps.

The TTx has amazing flying qualities. They're really second to no piston general aviation aircraft in the normal and utility category. It's incredibly docile and nimble all while maintaining a very high level of stability. That's very rare. Usually when performance and nimble handling characteristics are increased, stability suffers. Not the case with the TTx. Flying the TTx is really flying! You want to hand fly the aircraft, but it's always nice to know that you have the amazing GFC 700 autopilot backing you up. Two common flight quality complaints about the Cirrus are the flight controls and trim system. It is simply not a comfortable airplane to hand fly from an ergonomic standpoint and it's difficult to apply fine trim movements. In short, it lacks a tactical feel when flying the aircraft. With the addition of a control centering spring, you don't get the typical airspeed load feel that you do on other aircraft. I suspect this is another factor in the stall spin hazards facing the Cirrus. In fact, Cirrus sent out a safety alert in 2010 encouraging recurrent training every 6 months, with an emphasis on landing operations.

The Cirrus has an interesting set up for selecting power settings. They have a special linkage between the throttle and prop governor that removes the prop control from the Cirrus. Contrary to many things that you hear, it is not a FADEC system. Cirrus simply has decided the RPM you should be running at a given manifold pressure. Cirrus boasts that it makes engine management easy, and they're right. For an uneducated pilot, the Cirrus engine is easier to manage. With this said, if we give a TTx pilot one setting to fly, it's just as easy to manage the engine. Pilots that want to learn how to properly run their engine have much more flexibility in the TTx.

Let's talk more about safety. Everything on the TTx is designed to eliminate a single point of failure situations. The TTx has four very efficiently designed flap hinges per flap, three aileron hinges, dual wing spars, dual horizontal stabilizer support tubes, dual alternators, dual batteries… you get the picture. To top it off, the TTx has a built in roll cage made of carbon fiber maximizing structural integrity in a crash and protecting the occupants.

The TTx electrical system is also unique to the piston world. The aircraft has no standby batteries, but rather two independent busses, each with an alternator and battery. Both busses have components specifically dedicated to them, however the essential and avionics bus receive power from both busses at all times. In the rare event that one alternator is lost, the aircraft receives an annunciation on the PFD were then the pilot simply selects the "CROSSTIE" switch to the "ON" position and the other alternator covers the entire electrical load. No load shedding necessary. In the unheard of event that both alternators quit working, the pilot has 30 minutes of electrical power to get on the ground.

The Cirrus' parachute. Let's end some of the myths regarding the parachute right now. Many dispute the number of lives saved by the parachute. Cirrus is smart to maximize the numbers however, no one can argue that the parachute has in fact saved lives. It works. That's also the reason that many Cessna 172 and

182 owners have elected to install the BRS on their aircraft. There are also rumors that the parachute allowed Cirrus to bypass the standard spin certification standards. The FAA requested that Cirrus test the SR22 parachute throughout the envelope. This included deployment at V_{NE} and during a one turn spin. Normal spins and recovery were still tested and it will recover from a standard spin, just as the TTx will. But the POH does state that CAPS is the only acceptable method for recovering for spins. While the aircraft can recover from spins, the typical pilot buying the TTx and Cirrus would probably not be able to safely recover. The great thing about the TTx is that it is extremely difficult to even get close to a spin. While demonstrating the TTx into a stall, one can hold on the stop and rolling the wings from 30° to 30° in the opposite direction while in the stall!

The TTx is very comfortable to fly. Some say it's a little more difficult to get into the front seats, and that may be accurate, but once you're in its very comfortable. The seats are amazing. Ergonomics of the stick location in combination with the door arm rests make for very comfortable "fingertip" flying of the TTx. There is a touch more shoulder room in the Cirrus, but only by 1.13 inches. It's pretty negligible. There is also a little more headroom in the Cirrus, only by .7 of an inch. Effective headroom is better in the TTx because the seats sit lower. For those with long torsos, the TTx will be noticeably different. The real test is a 4 hour flight in each aircraft. You'll be much more fatigued in a Cirrus than a Corvalis.

Selling points of the TTx:

1. Most think that the airplane is more aesthetically pleasing.
2. Airframe Strength & Integrity
3. Better low airspeed performance.
4. Much better handling characteristics and flying qualities.
5. More flexible in regards to speeds in the terminal environment.
6. Better fit & finish
7. While the Cirrus may have a few more avionics options than the Corvalis TT (but not the TTx), they Corvalis pilot can get into any airport that the Cirrus can (they can't fly any approaches that we can't).
8. The TTx seats are much more comfortable. 2 hours in Cirrus can be relatively painful. This is because the seats are built for a landing under parachute canopy.
9. More engine power settings resulting from a separate prop control, increasing utility, flexibility and range.