2013 FAI F3A World Championships
Team Canada -Technical Report

Altitude Effects

The contest was held in the town of Henly on Klip just south of Johannesburg, SA. The altitude at the site was 5300ft but the pressure altitude due to climatic conditions was as high is 6200ft on some days. This increase in altitude for most of the competitors introduced the need for re-trimming and set up changes if any of the original feel and performance of the airplane was to be retained.

On our first few practice flights, we found the ailerons and elevator very sensitive despite feeling that the model was producing less lift. Additional expo and/or reduced travel was the solution and in some case a minor rearwards shift in CG to compensate for the heavy feel inverted. Generally, rudder rates and expo required less changes however tail drop to maintain altitude during knife-edge manoeuvres was more noticeable at altitude.

Snap rolls at high altitudes were quicker with easier entries and exits however spin entries become more critical and very difficult to initiate without a simultaneous wing drop. This relatively easy manoeuvre became the focus of practice in many cases to reduce the probability of zeroing the spin during the competition rounds. Wings with reduced tips like those on the Axiome simultaneously improved the snaps and exacerbated tip stall tendencies.

Additional effort required to manage speed in all areas of the pattern was immediately obvious. Down-lines required additional braking, 50% more in some cases, and horizontal passes needed throttle curve changes to avoid blasting through the sequence. Pitch reduction for props complemented the need to reduce speed. 13 inches was the most popular pitch selection. Quite a bit of effort was required to get our flight times up to the 7-minute mark. As a positive by-product of the altitude, P sequence power consumption typically dropped to 2900mAhrs for a sequence that pushed all of the box limits.

T-Cans

Virtually all monoplanes featured Canalyzers varying in size from 8in spans as seen on the original Osmose T-can to the very large version seen on CPLR's Galactik. The Canalyzer greatly increases the effectiveness of the rudder and was an essential part of the monoplane at altitude. Designers all chose to compromise on the induced coupling in favor of the additional rudder effectiveness.

CPLR's Galactik Canalyzer is almost large enough to be considered another wing, pushing the monoplane design to the limit.

Retracts

Brian Hebert introduced retracts into his version of the pattern bi-plane. The design has a cleaner envelope and likely less mixing due to drag induced by the gear. However, full gear doors were not used so large openings for the wheel wells on the underside of the lower wing may have affected the trim, set up and overall design compromises in other ways.

Aero tweaks

There was no shortage of creative airframe tweaks designed to improve or augment flight characteristics that may have been compromised by altitude.

Silvestri's Hera S sported these additional removable mini-wings and inboard wing fences to add the lift lost at 6000ft. Silvestri argues that the aircraft requires no pitch trim with the addition of these devices when moving from sea level to 6000ft.

Flared rudders and wing fences were used on many models but this year we also found the flare added to elevators. Hatta's Galaxy outboard elevators were flared to add drag to the aircraft. Flaring of the inboard elevator introduced loss of vertical performance according to the designer and was eliminated in the production aircraft.

The Russian competitor added an interesting double split speed brake. The deployment of the brake is coordinated with low throttle.

Biplanes vs Monoplanes

Of the eight finalists, only CPLR's Galactik and Andrew Jesky's Proteus were monoplanes, although both had large canalyzers pushing the very definition of monoplane to the limit. The greater rudder authority of the biplanes at altitude combined with slower speed characteristics presented well, particularly for the F and Unknown sequences. However, during the very windy days they appeared to be a greater challenge to maintain speed and heading.

The biplane dominated the finals with just two monoplanes in the field.

The most popular monoplane was easily the Axiome and the Citrin was the dominant bi-plane; both are Oxia products and flew exceptionally well.

Overwhelmed by Oxia planes at the practice site. Oxia was easily the most popular manufacturer of airframes.

Glow vs Electric

Only seven of the twenty-seven semi-finalist (26%) ran glow motors, all being YS170, 175 and prototype 185s in the case of Onda and Christophe. The top two, Onda and Christophe, obviously executed their sequences with great authority demonstrating the ability of the latest YS monster. However, in several cases the other YS motors did appear to struggle in the wind whereas the standard electric systems ran by the majority of the field never looked down on power. Perhaps the altitude contributed to equalizing the field or even giving the edge to the e-systems.

Contra Systems

The Brenner Sharp Contra Systems were used by several pilots including Robin Trumpp, Silvestri Sebastian, Joseph Szczur and the German Junior, Philip Rennatshauser used a prototype Plettenberg system. In most cases, the system appeared to lack penetrating power on the very windy days and forced the pilot to fly relatively small and very slow sequences which presented poorly or as a minimum provided an additional challenge for the pilot. The Plettenberg system was the exception

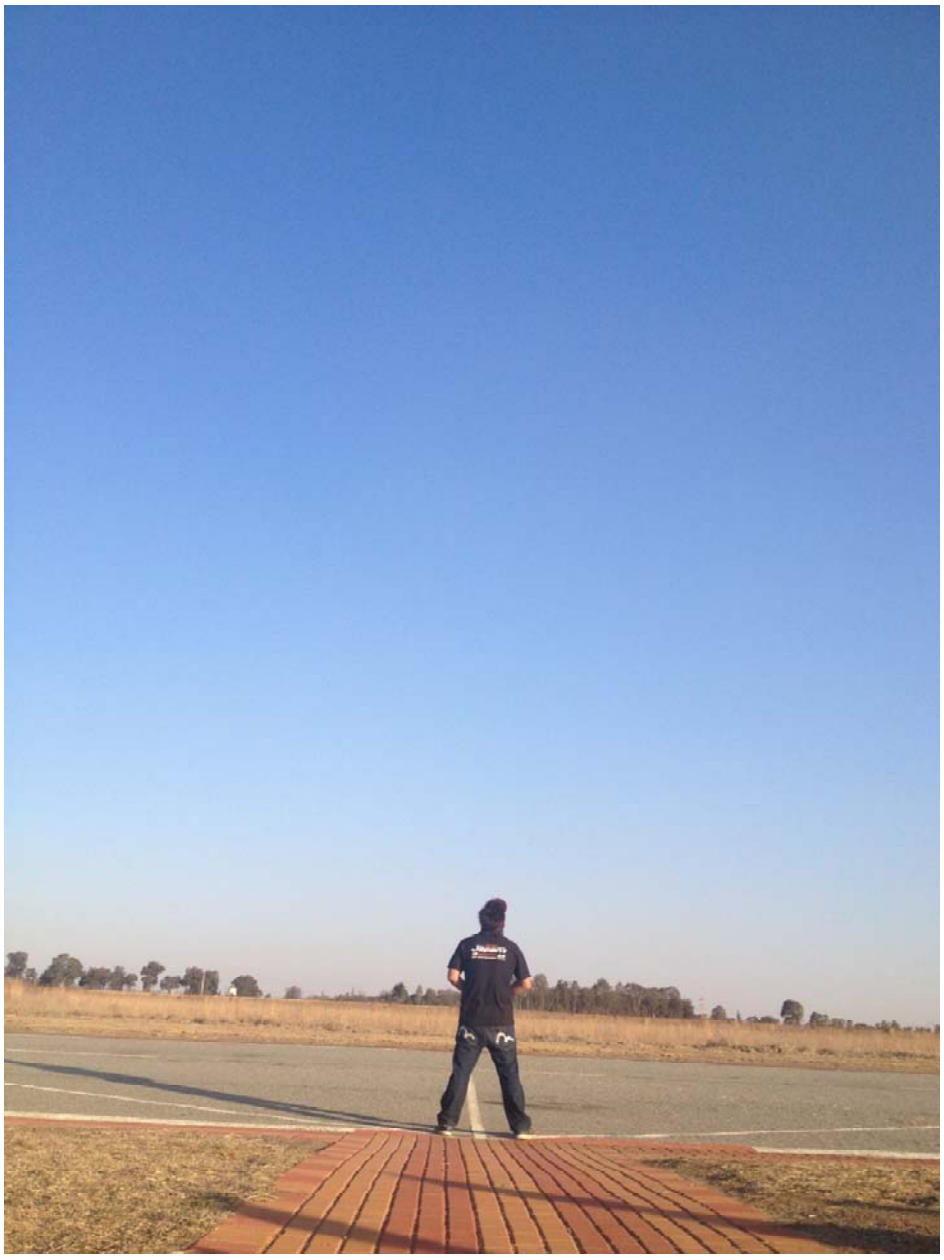
and retained adequate penetrating power. The added power consumption of the other systems also resulted in a 'dead stick' for Silvestri at the end of his unknown flight due to battery failure. It was evident that these systems are better suited to calm to moderate wind conditions.

Robin Trumpps Brenner contra powered Mytho S Pro

Philip Rennatshauser's Plettenberg prototype contra

Flying styles

Although the windy, high altitude conditions encouraged a faster, bigger flying format, the successful styles demonstrated a higher baseline to clear the turbulent air while maintaining an upper line that did not exceed the 60 degree upper box limit. To achieve this, CPLR, Shulman, Jesky and Onda all flew between the 160 and 185m mark for most of their rounds and truncated their up-lines to stay within the upper box limit. Slow flights were not typical of the top four; however, 7-minute flights for Preliminary rounds were still achieved even on windy days by flying large manoeuvres.



Onda flew large sequences usually between 160 and 180m out depending on the wind.

Snap rolls

The 2013 WC saw the return of more stringent snap roll judging with slower rotation and a clear or even dramatised pitch break before the rotation being rewarded with higher scores. Fast snaps, even with fairly clear pitch breaks did not typically score well.

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Innovation

The Trigantic by Gerhard Mayer takes innovation in pattern design to a new level. This aircraft was meticulously designed and built to fit the extremely slow and close style that Gerhard Mayer is now well known for. The design complexities involved with a tri-plane make this aircraft difficult to disassemble and as a result, Gerhard transported the model fully built. Despite its huge size the aircraft weighs just over 4500gms. Battery installation was a complex process involving the removal of the battery tray through a front chin cowl. A look inside reveals the tremendous attention to design details required for such a large aircraft to make weight, let alone finish around 4500gms. The aircraft is powered by a Plettenburg Advance motor turning a custom 23 inch prop. We marvelled at Gerhard's ability to pilot this aircraft slowly through the F sequence even on the windiest days.