Radio Controlled Soaring Digest

April 2010
Vol. 27, No. 4

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Front cover: Jim Crook prepares to launch his Topaz RES at a Mississippi Valley Soaring Association thermal duration contest in early March. Photo by Chris Lee
Canon EOS-1D, ISO 200, 1/6400 sec., f5, 16mm

Back cover: Siegfried Kaltenbrunner's FVA 10B Rhineland soaring in late evening thermals.
Nikon D700, ISO 2500, 1/500 sec., f11, 220 mm

R/C Soaring Digest

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In the Air

A few random notes this time...

The deadline for this issue seemed to arrive more rapidly than usual, probably due to the arrival of some good flying weather here in the Northwest. We're quite pleased with the variety of materials presented in this issue and hope the authors receive some positive feedback from *RCSD* readers.

A few months back we mentioned the upcoming FAI CIAM meeting and the proposed changes to F3B, F3J, and F3K. The Agenda for this meeting, to be held in Lausanne Switzerland on 15-17 April, is included in this issue.

Dr. Ing. Ferdinando Galè, an aeronautical engineer and author of "Practical Horten," has been building and flying models since 1934. He has authored a number of articles for the Italian *Aeromodellismo* magazine and has also written a number of books related to model aviation, a few of which are published by B2Streamlines <http://www.b2streamlines.com>.

Our sincere thanks to all of the photographers for this issue of *RCSD*. The photos are spectacular, informative, and descriptive, and we definitely appreciate the photographic skills involved.

Time to build another sailplane!

B²

Wihok 60

a plank flying wing

Part 2

a moving center of gravity device

Grégory Pinaud, pinaud.gregory@hotmail.fr

More than one year flew away since I wrote the first article on a homemade plank wing named “Wihok 60” (*RCSD* Vol. 25, No. 12: December 2008).

This silence is actually not the reflection of inactivity in RC glider but on the contrary leads to a long and winding march of trial and error toward the optimization of a dynamic control device for the center of gravity. In the first article describing the aerodynamic concept of both the airfoil and the wing planform, specially designed for speed and slope racing, I indeed shyly mentioned the presence of this device in the plank fuselage since I had not spent enough time in flight to definitively make a well established opinion on the interest of such a device and to share it with the community.

Now, I have learned a lot and will unveil the main step of the story.

First of all, why should we bother with such a device in a plank wing?

Theoretical aspect

Starting from the consideration that during an F3F-like run, the glider spends approximately 30% of the time at very high lift coefficient carrying out sharp turns with generally high bank angle; the rest of the time, low lift and high glide ratio at high speed is needed. The question is can a plank wing be adapted to this kind of flight envelope?

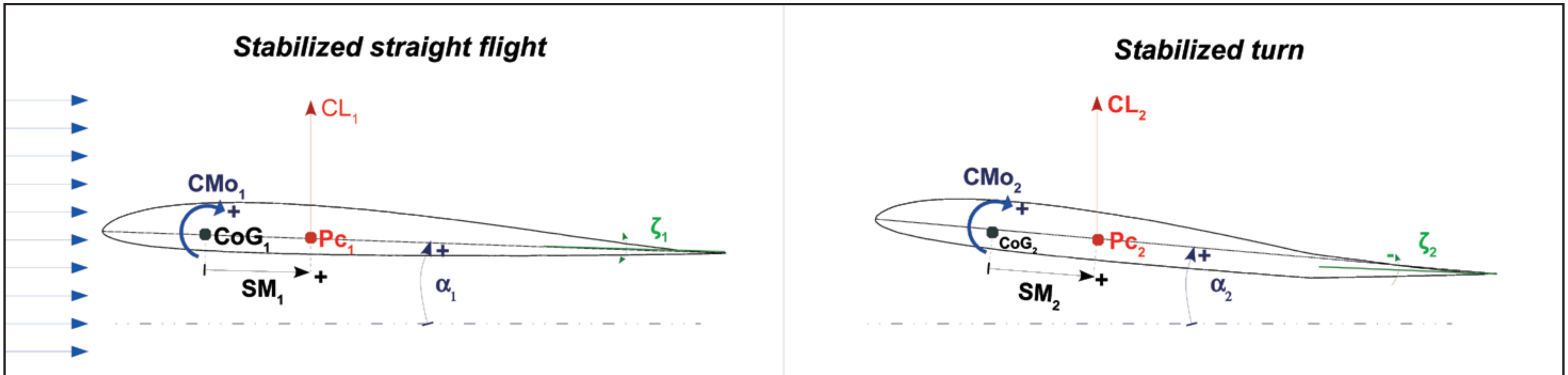


Figure 1

While for the second requirements the answer is obviously yes, the first set is more of a problem and this is the aspect that I outline there my reflection.

For a conventional glider the gain in lift coefficient can be easily achieved by a combination of positive (down) wing flap deflection and negative (up) elevator deflection to compensate the change of wing moment due to a more camber airfoil.

For a plank wing increasing lift means increasing the angle of attack which is a consequence of a larger negative (up) flap (elevator) deflection. Indeed, this new equilibrium state (from a straight flight)is reached for a larger wing positive aerodynamic pitching moment namely for a more reflexed airfoil. This is a bit controversial since reflexed airfoil are generally less efficient that conventional one in relation with lift coefficient angle of attack derivative (Clalfa= dCL/dalfa) at the time you need more lift to minimized the curve radius of the turn.

The figure above (see Figure 1) shows two equilibrium state for a fixed center of gravity position plank wing:

- flying in a straight line at low angle of attack and low lift(on the left)

- and carrying out a stabilized turn at higher angle of attack and consequently at higher lift (on the right).

On the right, for a sharp turn configuration, the wing need more flap negative (up)(elevator) deflection, so that the angle of attack and the lift get higher.

We also have these relations that show the drawbacks of a more reflexed wing (see Figure 2):

$\alpha_1 < \alpha_2$

$CL_1 < CL_2$

$CL\alpha_1 < CL\alpha_2$

$CD_1 < CD_2$

$CD\alpha_1 < CD\alpha_2$

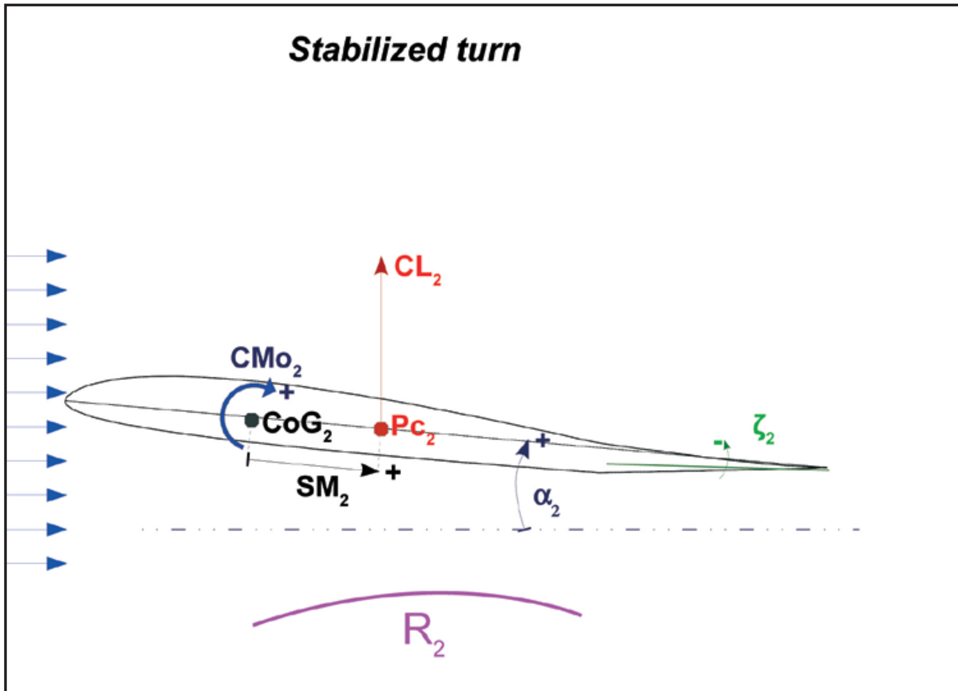
$SM_1 = SM_2(*) \sim 2\text{-}3\ \%$ (*only for Wihok60 by wing platform and airfoil design)

$\zeta_1 = 0° ; \zeta_2 < -2°$

Figure 2

There come the advantage to modify dynamically the position of the center of gravity.

In flight, “Wihok 60” (with fixed center of gravity) shows a good behavior on straight line with no pitch oscillation for a static margin around 2-3% (by considering the measured position of the center of gravity and the theoretical calculated position of the aerodynamic center. The whole flight becomes more



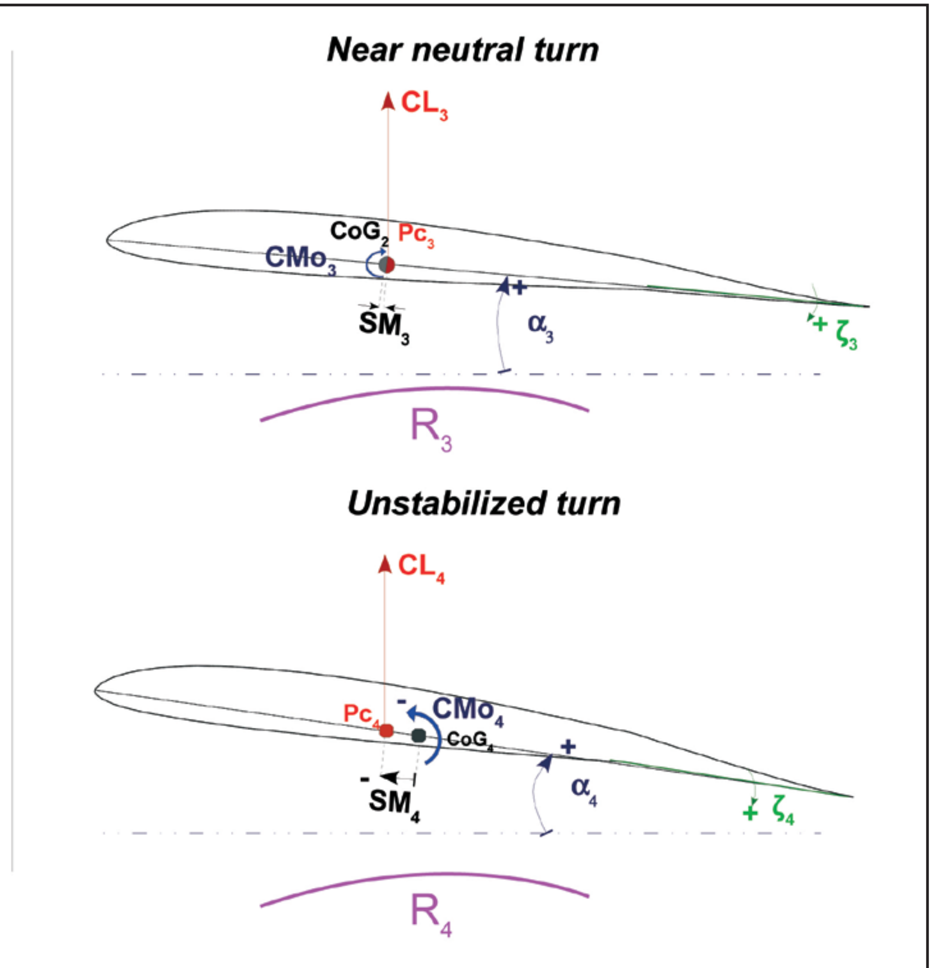


Figure 3

tremendous at lower static margin, the wing being very sensitive to any elevator /flap command.

However, this excess of sensitiveness and handling capabilities was usefull during rapid turn, the wing seem to lost less speed than for a “stable” turn and even seem to accelerate at the end.

Then the idea came to me as an evidence: why not moving back the center of gravity while carrying out a sharp turn mixing the command with the accurate flap deflection: the moving ballast was born.

At first, the idea was to translate back the center of gravity just to get a neutral wing, that is to say to get a null static margin, but getting an “unstable” wing even appeal to me by moving the CoG some millimeter behind the center of pressure. While experimenting such a configuration, one have to be confident in the robustness of the device since technological aspect such as speed and torque of the servo start to play an important role.

The figure above (see Figure 3) shows the evolution of the position of the center of gravity and the corresponding aerodynamic configuration which must be strongly coupled to the ballast device command in order to enhance the efficiency of the whole system. That’s why, since the beginning, the wing platform design and the quadriflap

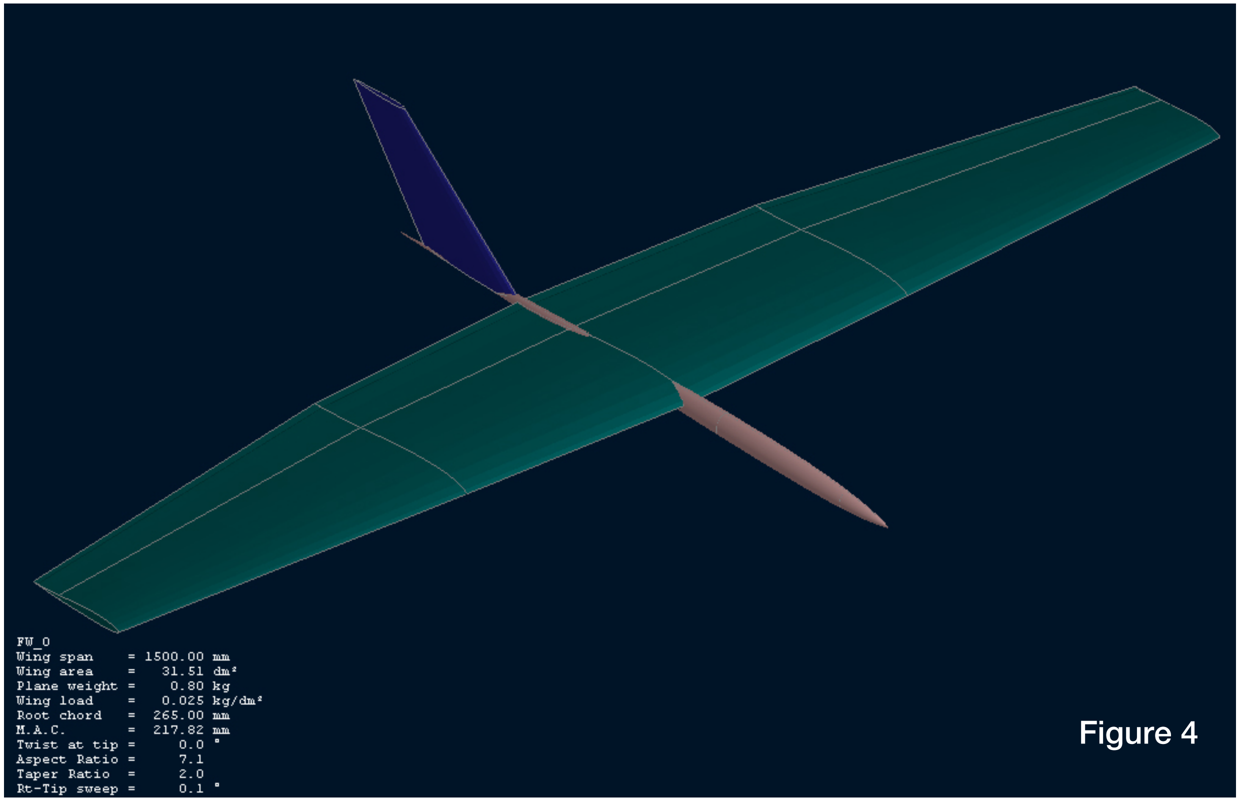


Figure 4

$$\alpha_2 < \alpha_3 < \alpha_4$$
$$CL_2 < CL_3 < CL_4$$
$$Cl\alpha_2 < CL\alpha_3 < CL\alpha_4$$
$$CD_2 < CD_3 \sim CD_4$$
$$Cd\alpha_2 < CD\alpha_3 > CD\alpha_4$$
$$SM_2 \sim 2\text{-}3\,\% > SM_3 \sim 0\% > SM_4 < 0\%$$
$$\zeta_4 > \zeta_3 > \zeta_1 \sim 0° > \zeta_2 \sim -2°$$

Figure 5

configuration have been chosen (see Figure 4).

For these three (inertial-aerodynamic) configurations, the relations presented on the figure below (see Figure 5) demonstrate the advantage of a dynamically moving center of gravity device for a plank wing.

For the configuration number 3, the static margin is nearly null and consequently this “neutral” wing is a bit more efficient than the configuration number 2 because of a larger CLalfa. The turn radius R3 can be significantly reduced in comparison with R2 due to a larger lift acceleration with a quasi equivalent drag coefficient CD3.

Obviously, it appears that the configuration number 4 is highly unstable with it’s negative static margin but the inertial-aerodynamic configuration reveals to be the more efficient. Indeed, the lift acceleration is again increased compared to the configuration number 3 and the turn radius R4 is a bit shorter than R3. The speed loss between the entry and the exit of the turn could even be less than for the configuration number 2, while running on a shorter curve lead to a reduction of time spent in the turn. There is the mean advantage of moving dynamically back the center of gravity.

However, if one leaves the wing in this configuration (number 4) during the entire turn until the exit the wing will never naturally go back to it’s initial angle of attack but on contrary an angle of attack divergence could be observed. Once the turn finished the center of gravity must moved rapidly to the stable configuration (number 1).

Realization of the device.

Looking for the lightest device, I tried at the beginning a kind of “zig-zag” rod driver (see Figure 6) that could maximize the ballast displacement while minimizing the translating mass, always with the goal to get zero static margin that is to say a displacement of 2-3% of the mean

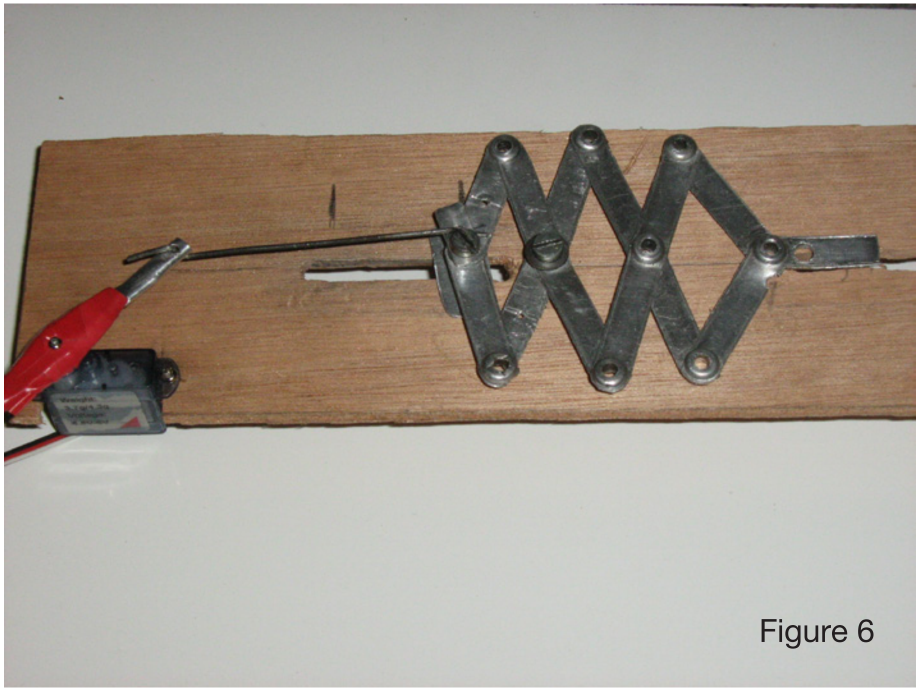


Figure 6

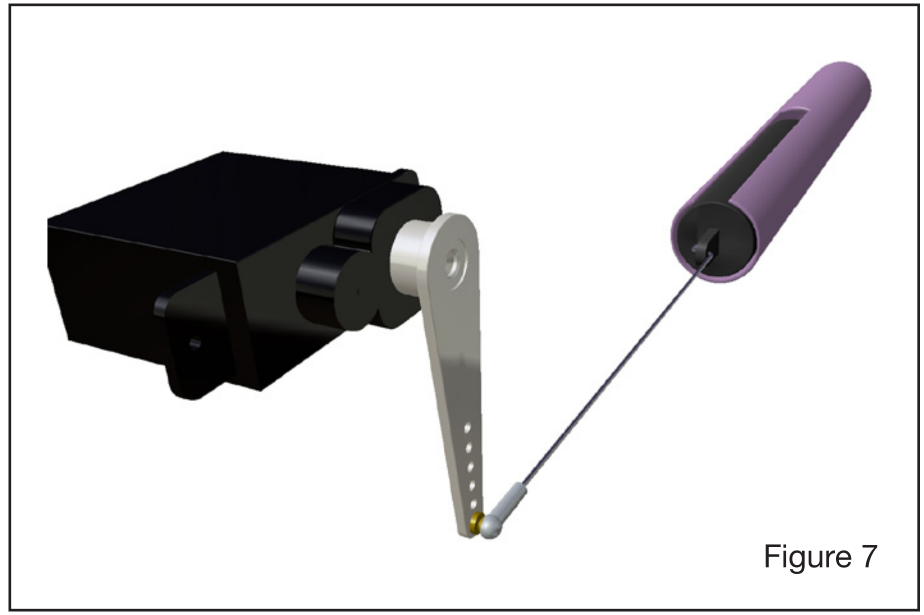


Figure 7

aerodynamic chord. But I rapidly gave up on this kind of device because of its lack of robustness and accuracy.

Since the simplest is the best, I opted for a simple long push rod (~ 65 mm) connected to a sliding lead cylinder (see Figure 7). The movable ballast mass is around 120 g standing exactly at the nominal center of gravity position (for a static margin of 2-3%). In that way, any amount of added lead to the movable ballast won't affect the pitch equilibrium at the stabilized straight line level flight. The actuator is a simple 1.5 kg torque servo controlled by the throttle channel allowing some non-linear electronic mixage with both internal and external flap deflection.

This device allows a full excursion of the ballast of 50 mm which is enough to reach the goal of 2-3% of the mean aerodynamic chord displacement according to the following formula (see Formula 8):

$$\frac{\Delta X_{CoG}}{C_{Aero}} = 100.\frac{\Delta L_{ballast}}{C_{Aero}}\frac{m_{ballast}}{(m_{empty}+m_{ballast})} \leq SM \simeq 2-3\,\%$$

Formula 8

Where:

ΔX_{CoG} stands for the center of gravity maximum longitudinal displacement

C_{Aero} is the mean aerodynamic chord

$\Delta L_{ballast}$ is the maximum longitudinal displacement of the ballast

$m_{ballast}$ is the mass of the movable ballast

m_{empty} is the mass of the glider without ballast

SM is the nominal (without ballast) static margin (in %)


Figure 9

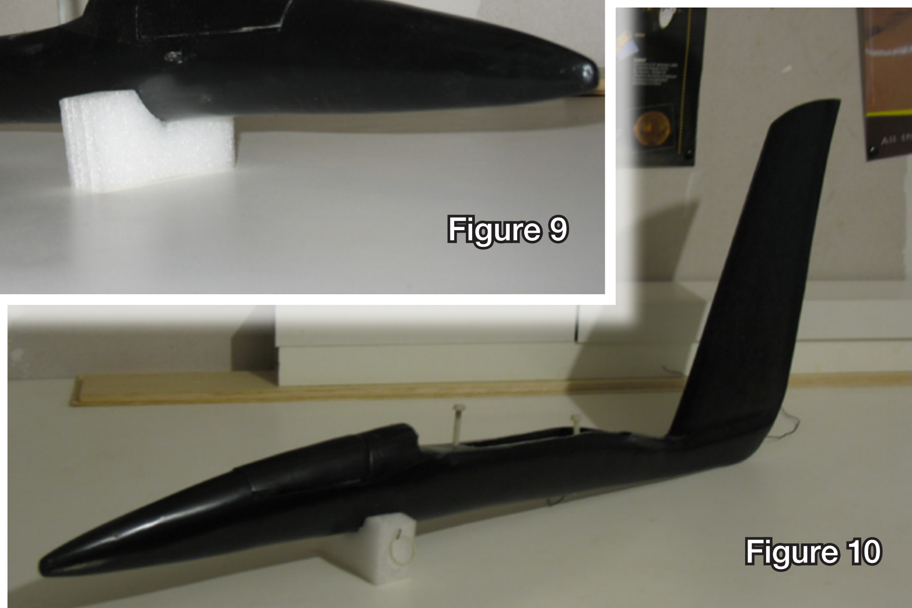


Figure 10


Figure 11

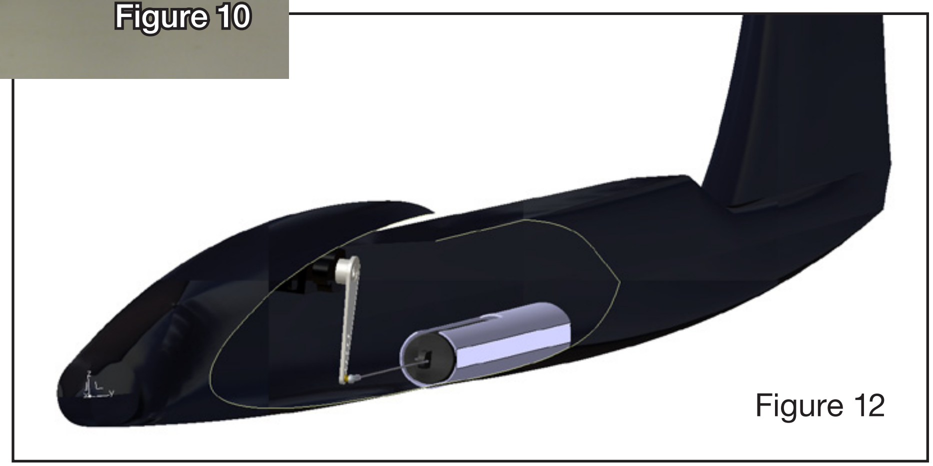


Figure 12

The entire device can be placed in a simple and normal size hollow fiber glass experimental fuselage as shown in the pictures on the previous page (see Figures 9 – 12).

The next pictures show the inside of the fuselage through the opened canopy with the movable ballast device in its neutral position (see Figures 13 and 14). One can notice the end stop wood piece standing in front of the extremity of the push rod in it's neutral position in Figure 13. This part can prevent any damage of the servo gear in case of strong longitudinal deceleration when landing for example.

The last pictures finally show the device in its medium (see Figure 15) and backward (Figure 16) positions.

Sorry not have any movie nor in flight measurement to demonstrate the advantage of such a device on the efficiency of a plank wing; but I can only encourage you experimenting this kind of system to improve the flight quality of our favorite toys.

Of course with this device and all the associated arrangement (such like flap mixing) I thing I have open a door on an unknown territory and I'm sure it's a new way of flying that have to be learn to extract all the potential of an inertial and aerodynamic flexible wing.

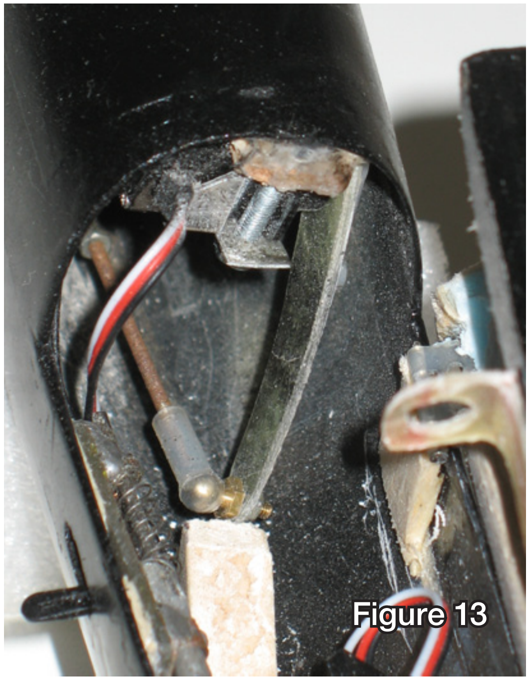


Figure 13

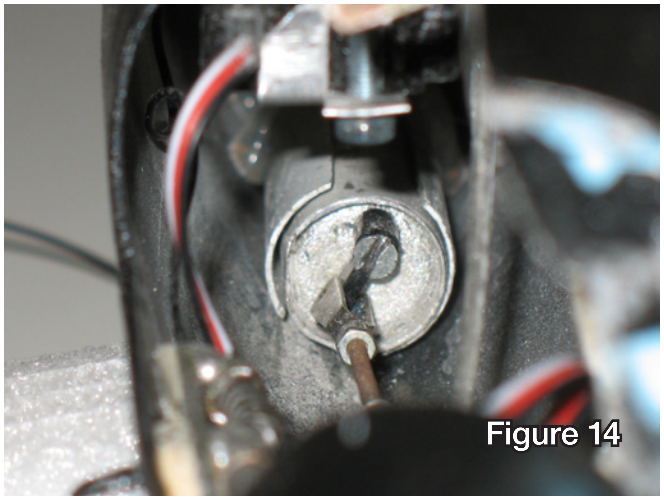


Figure 14

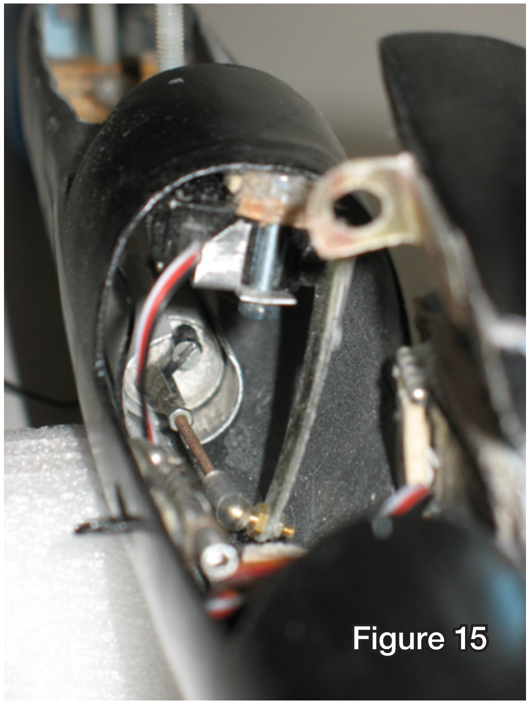


Figure 15

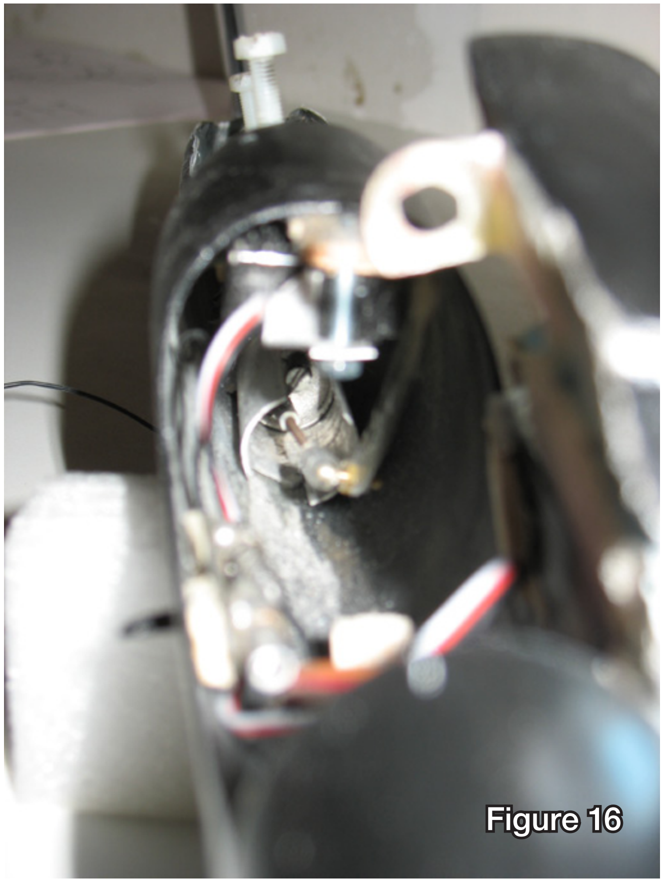


Figure 16

Steerable DVR Color Camera for sailplanes

Peter Carr WW3O, wb3bqo@yahoo.com

Many of us enjoy watching videos on YouTube. The sailplane videos are especially interesting and I've watched quite a few looking for the hidden secrets of thermal flight. The problem is that many of the videos are very blurry. The ones taken from the aircraft also have problems with changing light conditions and pointing angles.

While shopping online for Christmas stuff I found a small Digital Video Recorder on www.amazon.com. This camera uses a very small memory chip to record up to four hours of video in color and with sound. It is the size of a pack of chewing gum, uses an onboard LiPo battery and weights less than an ounce.

I bought the camera and went to WalMart to buy the required memory chip. a Micro SD card. The camera comes with bilingual instructions that are very hard to read. I did a web search for the camera and came up with text that I printed out. That was easier to read.

Once these were in hand I charged the camera from the USB port of the computer and did some test video in the house and out the window. The results were very encouraging.

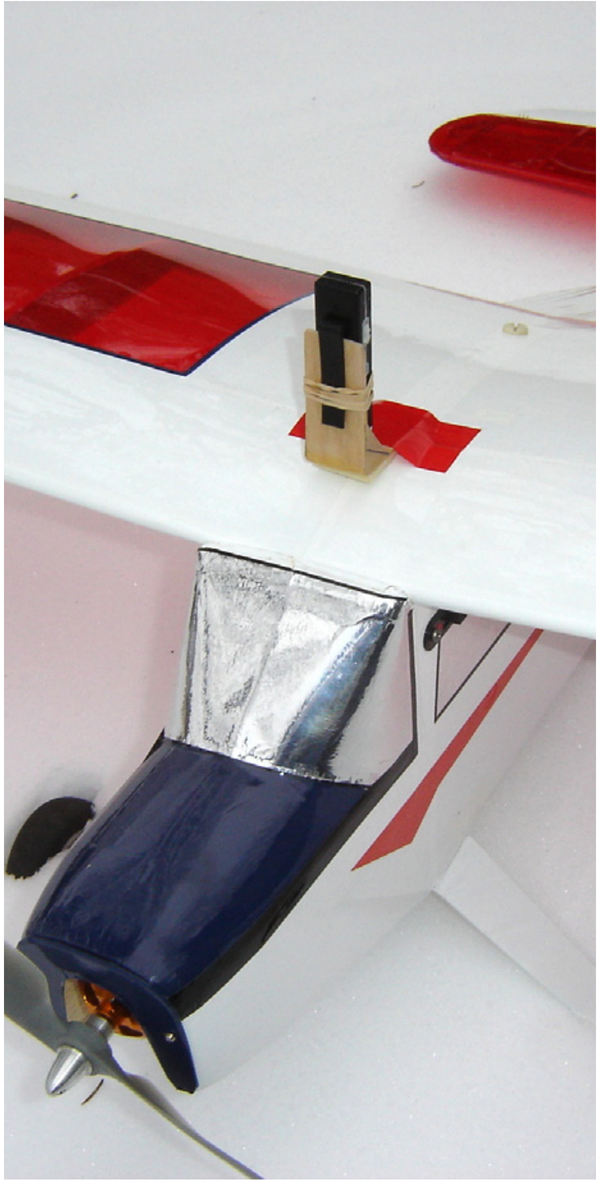
The next step was to make a mount that would hold the camera and attach to the sailplane. That wound up to be a pair of 2.5 inch by 1 inch pieces of 1/16th ply glued to a piece of triangle stock with 1/64th inch plywood for side braces.

The camera has a "pocket" clip which I used to position it on the ply brace. Then I used a small rubber band to further secure the camera. The mount is attached to the top of the wing using some really sticky plastic tape. The wing initially went on a DeBolt Champ electric ship of 55 inch span.

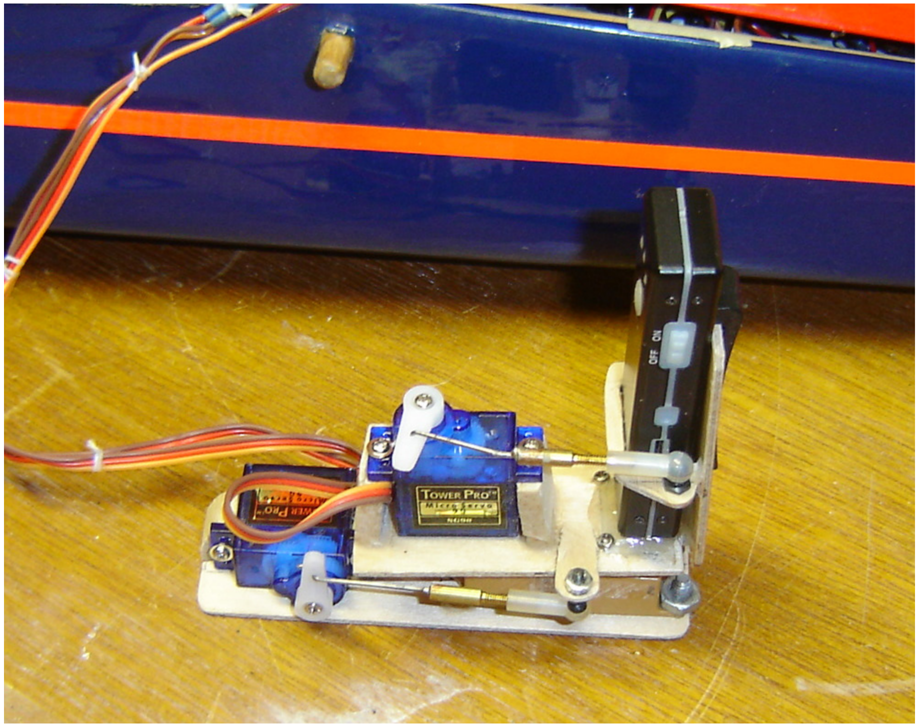
Even though the weather here in Northwest Pennsylvania is terrible this time of year I wanted to test fly the camera. A day came along that was sunny but only about 30 degrees. In addition, there was a fairly thick crust of ice on top of the snow. This made a slightly lumpy runway that still permitted takeoffs and landings.

The resulting video was shot over about five minutes of flying time in a rather gusty 15 mph wind. The little ship was bounced around which makes for interesting viewing while testing the camera and mount. In addition, I was able to qualify the sound recording of the camera which heard both wind noise and the noise of the electric motor quite clearly.

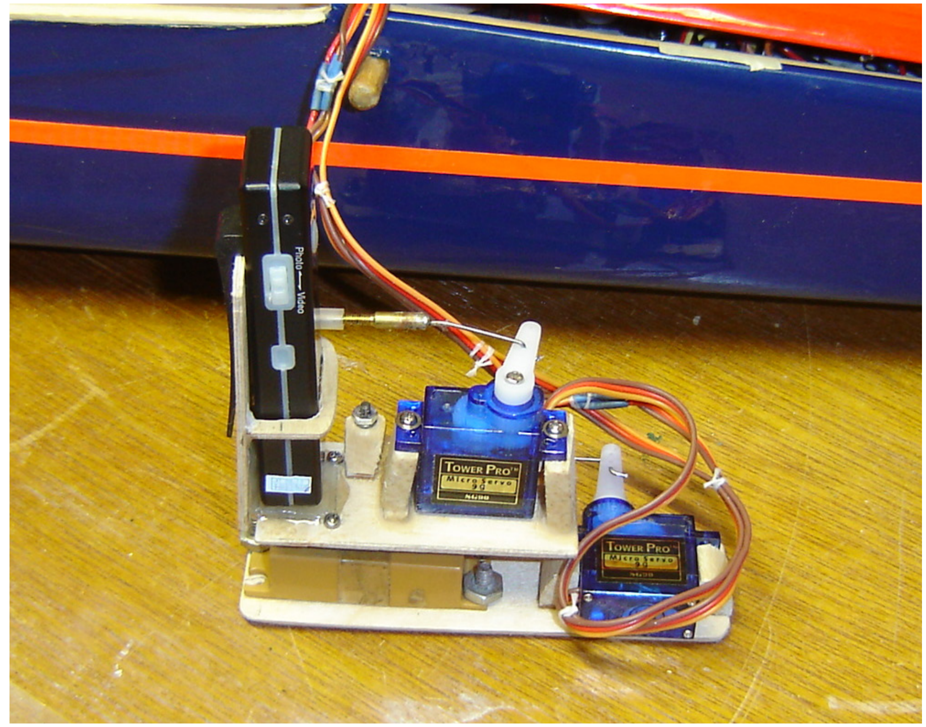
The video is much sharper and clearer than the stuff on YouTube. In addition, the



The camera was initially mounted to the wing on the DeBolt Champ for flight testing. It was high enough so that the prop wasn't visible in the pictures.



The steerable camera mount is complete and ready to attach to the sailplane. The servo on the left is for "pan" control while the other is for "tilt." Ball links were used to prevent binding of the linkage.



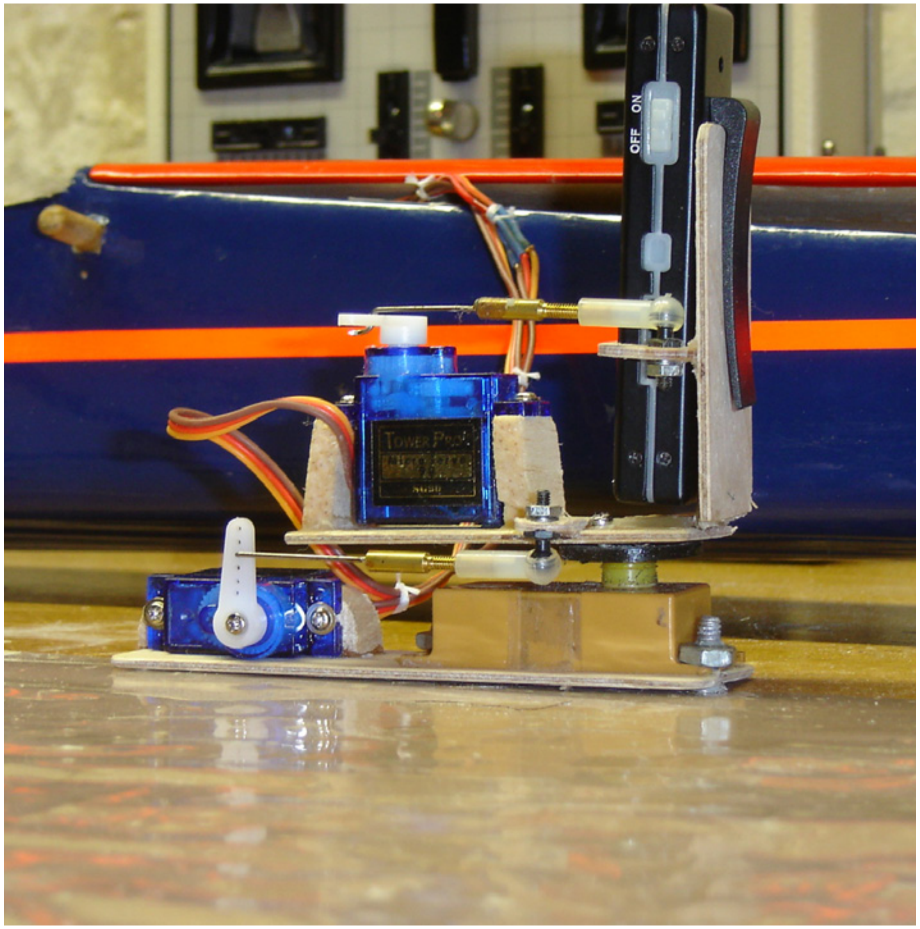
This is the opposite side of the steerable camera assembly. The two servo cables had to be lengthened to reach the receiver. They were then laced together using dental floss.

audio is interesting because it hears wind noise and the changing speed of the electric motor. I was very pleased with the results, especially the reaction of the camera as the Sun passed into view. The video was pretty good but hardly "cutting edge."

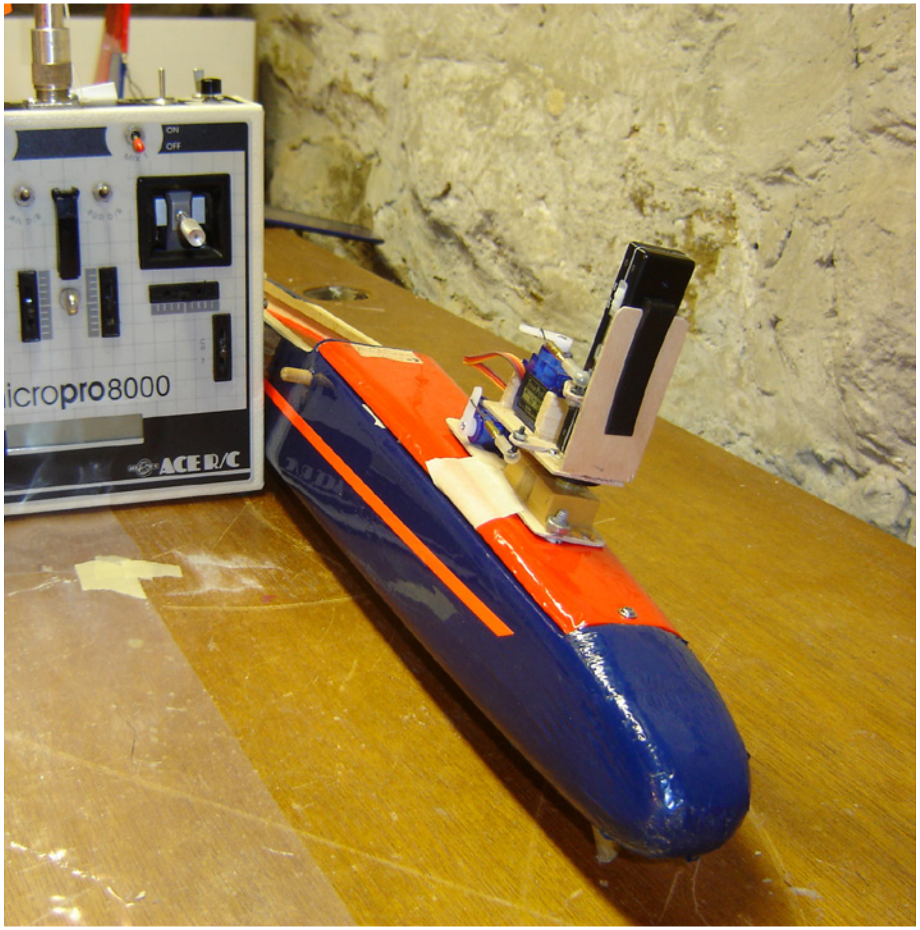
From some experience I've had over in both Iraq and Afghanistan I realized that it normally takes two operators to control an Unmanned Aerial Vehicle (UAV). One person controls the flight of the aircraft while a second person controls the camera, weapons and communications. I wondered if a single person could control everything on the aircraft without being overloaded.

The first step in answering the question was to build a steerable mount for the camera. I checked the www.servocity.com web site which has steerable camera mounts. Their products gave me some good ideas but were for use with much bigger, heavier cameras.

They place the camera and "tilt" frame on top of a fairly hefty servo which then controls the "pan" function. The whole arrangement is tall and heavy and not what I wanted for a sailplane.



Rudder stick on the transmitter controls “pan” while channel 6 controls “tilt.” End point set up on the transmitter make fine camera adjustments easy.



The camera and mount are fairly tall but don’t cause any control problems for the rudder. The tilt control has to be full forward (down) for any part of the nose to be seen in the video.

The steerable mount in the pictures is built from 1/16th ply, uses plastic hinges and the top of a very old Kraft servo. I stripped the gears from the servo case and used the output disc to attach the camera “tilt” platform. The steering servos came from www.headsuprc.com. The site offers excellent equipment and only charges two dollars for shipping no matter what you buy. I mounted a servo behind the swivel arrangement to control the “pan” function. The servo behind the camera controls the “tilt” function. Ball links were used to connect each servo to the corresponding function without binding.

Once the camera control was done it came time to do the “human” engineering. I chose an Olympic II sailplane as the test bird since it flies

easily, is big and stable and would carry the camera weight. It also has a flat canopy which would make taping the camera in place both easy and adjustable. This ship also carries a solar array on the wing so the nose mount would remove the chance of casting a shadow from the camera onto the solar cells.

The transmitter for this ship is a very reliable Ace MicroPro 8000 on 53.3 MHz. Since the OLY II is a three channel bird the rudder stick is not used. I hooked up the “pan” function servo to this stick to move the camera left and right. I used channel 6 on the lower left corner of the transmitter to control the “tilt” of the camera. This isn’t a centering type of control so the camera will stay where it’s pointed.

The result is that, on launch, I can position the camera in the “down” position so I can see the ground while the ship is climbing steeply. Once off the line I can re-center the camera for a normal angle.

Here the camera and steerable mount are taped to the OLY II and ready for flight. It can be moved back or forward to adjust the aircrafts center of gravity. It would be far enough forward not to cast a shadow on the solar panel on the wing.

After launch I can establish a turn, then pan the camera to look down at the ground from either side of the ship. The slow speed of the OLY II is a benefit in all this since I can make adjustments more smoothly.

Bill Kuhlman, Editor of *RCSD,* and I had been e-mailing about this project. We had been using www.dropbox.com for exchanging large files, but it turned out that Vimeo was a better place for long-term storage and general access. Obviously the video could also go to YouTube, and I plan to try using both sites and determine which one produces the best looking video.

In the meantime...

MP4 video from the DeBolt Champ flight with the camera rigidly mounted can be viewed at and downloaded from the Vimeo web site by using the following URL: <http://www.vimeo.com/10264343> (65MB).

MP4 video from an Olympic II flight with the steerable mount can be viewed at and downloaded from the Vimeo web site by using the following URL: <http://www.vimeo.com/10264962> (36MB).

It should be noted that the original videos were recorded in AVI format, 720 x 480 pixels, and were 252MB and 162MB respectively. For uploading to Vimeo, the format was changed to MP4 (H.264), resolution was reduced to 648 x 432, and some compression was applied. The quality of the originals is therefore very much better than what you see through Vimeo.

If you get a video camera flying please think about posting your video as well.

It appears that the use of the rudder stick and channel 6 for camera control will not add too much workload for the pilot.

The very long camera recording time means that entire flights of long duration can be recorded without a problem.

The small size and light weight of the camera and mount will make it usable on ships as small as 2-meters with no significant trim problems.

Resources:
www.amazon.com; Mini DV D004 digital video recorder.

www.servocity.com; Video camera mounts.

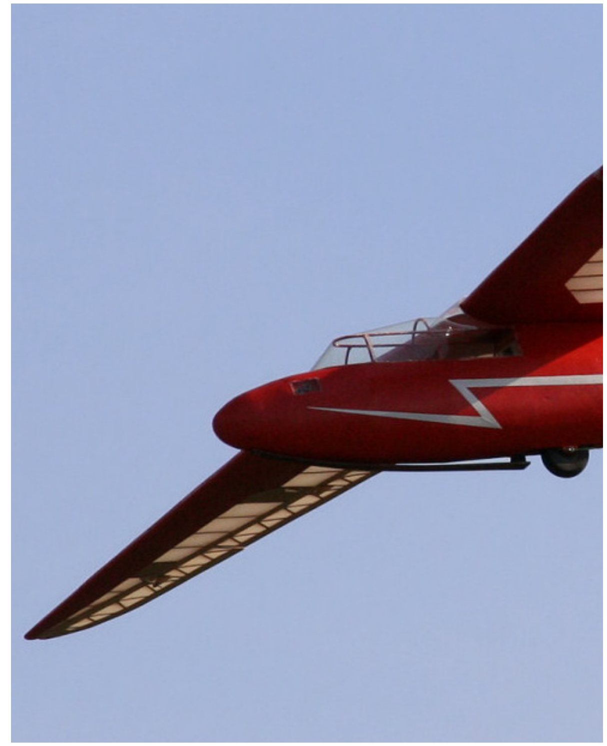
www.headsuprc.com; Source for very inexpensive servos with $2.00 shipping

www.dropbox.com; Free accessable storage for video and text files.

www.youtube.com; Web site for posted videos.

PNY Micro SD card, 4 GB; Purchased at WalMart.

In a future issue...



Yacine Vigourel's 1/5 scale *Dittmar Condor IV*. Design of the model began when Yacine was 15 years old, and it was under construction for two years.

Asiago GP2

Vincenzo Pedrielli, vincenzopedrielli@gmail.com

The Asiago GP2 was a sailplane for training purposes in soaring and acrobatics. It was designed in 1937, by Maurizio Garbel and Ermenegildo Preti of the Research Institute for Soaring flight (Centro Studi ed Esperienze per il Volo a Vela, CVV) of the Royal Polytechnic of Milano and it was built on commercial scale by Aeronautica Lombarda in Cantù.

General characteristic:

Wing Span	13,70m
Length	6,50m
Wing surface	12,70sqm
Aspect ratio	14,8
Empty weight	120kg
Useful load	90kg
Total weight	210kg
Wing load	16,5kg/sqm
Load factor	9
Min. sinking speed	0,80m/sec
Gliding ratio	1:20

DESCRIPTION

WING: The Asiago was a high winged plane with a monospar wing sustained by a single steel strut. The spar was formed by two strips of laminated spruce and covered laterally with plywood. The leading edge was also covered with plywood and thus resisted torsion stresses. In the central part of the wing the aerofoil GO 535 was maintained constant while in the trapezoidal portion was smoothly changed to the NACA M6. The ailerons were rather big and rotated on ball bearings.

The ratio of the differential command was 1:25 and together with the ball bearing suspensions of all hinges and pulleys gave the transversal command a soft touch usually unobtainable in those days. Almost all metal parts were of Dural.

FUSELAGE: The front part of the fuselage had a hexagonal section, rounded up in the front and becoming rhomboidal in the rear. The fuselage was completely covered with plywood. The pilot seat was very comfortable, being purposely designed to give the least fatigue in long flights. The barograph was placed behind the head of the pilot inside the fuselage. The landing could have been done by the utilization of a normal skid or by a central wheel. The tail skid was of spatula type with a tennis ball as shock absorber. The control lever was of Dural to avoid disturbing the compass and it was mounted in ball bearings.

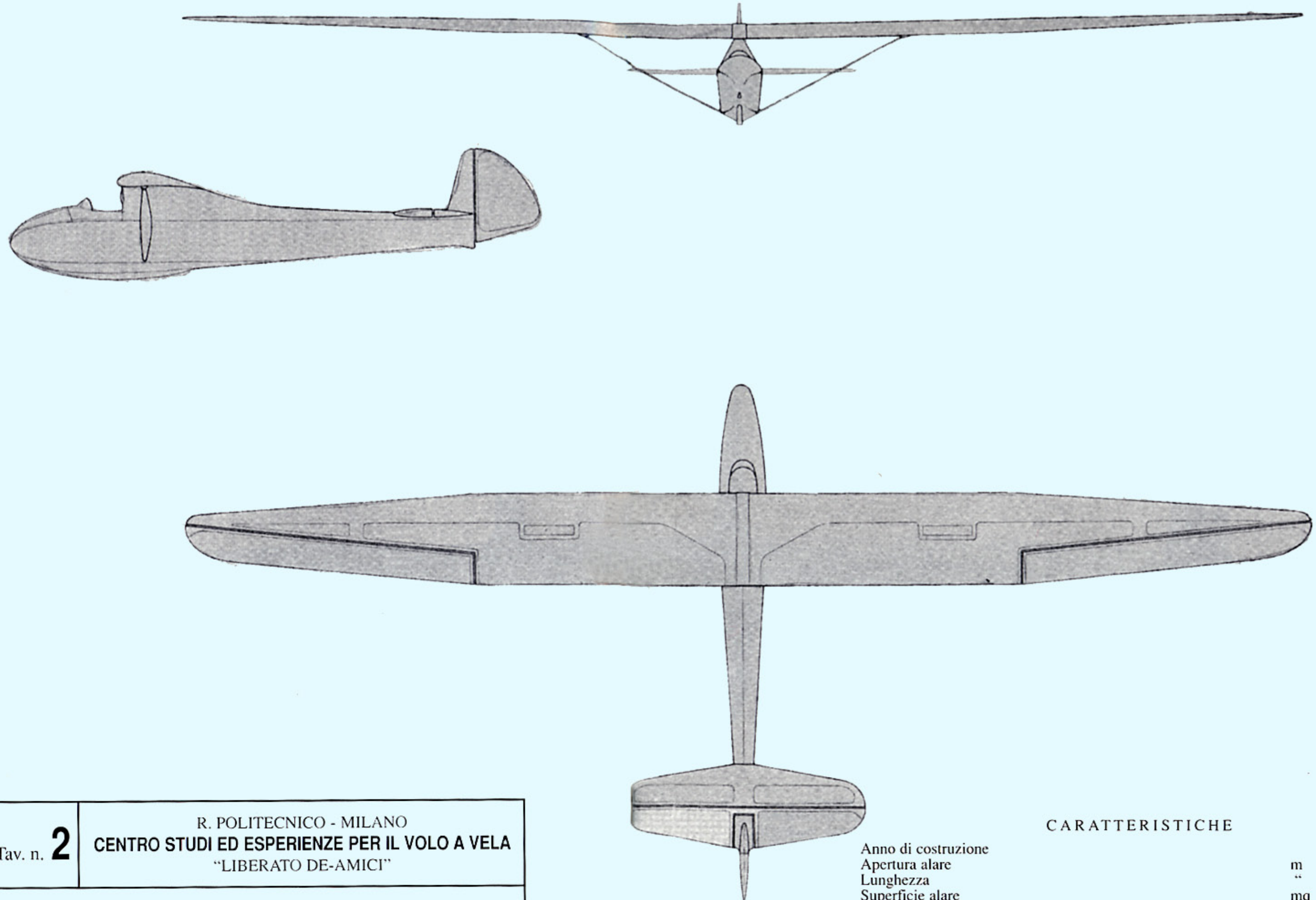
TAIL: The cantilever tail plane was designed to improve the aerodynamic performance of the sailplane. All cables were inside the fuselage.

To rig the Asiago took less than 8 minutes, just time to fix 15 bolts.

The Asiago was registered by the Registro Navale e Aeronautico in the category of "Aerobatic Sailplanes." Leut. Col. Umberto Nannini, Chief Inspector of Soaring Flight, flew the Asiago and tried it for aerobatics. His opinion was

"An ideal ship for our school of thermal soaring and aerobatic flights, that we should quickly introduce in all private soaring Clubs."

The great merit of this sailplane was its very low cost, due to the simplicity of its design, and it was produced on a commercial scale.



Tav. n. **2**

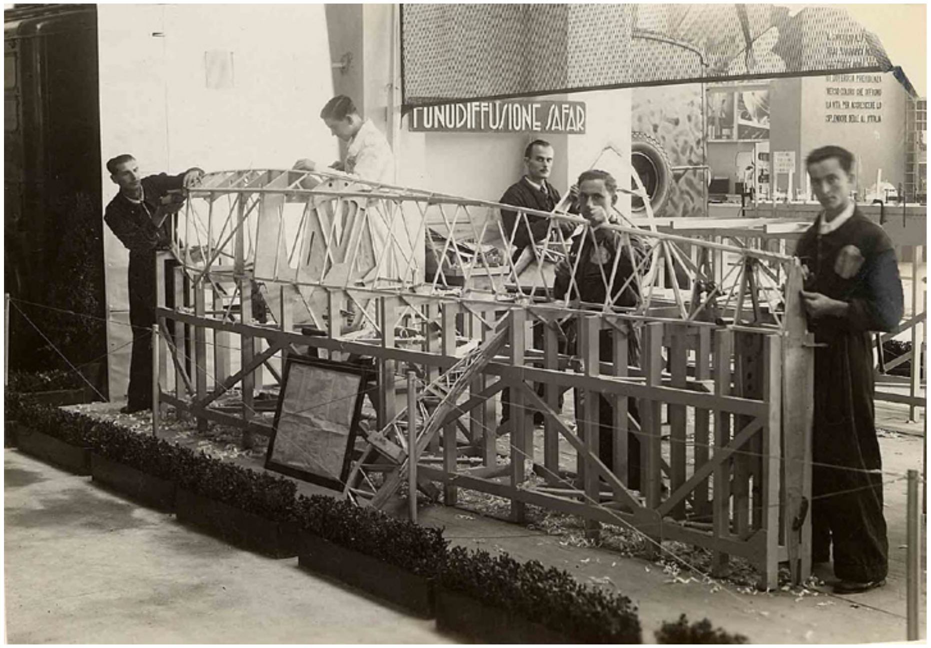
R. POLITECNICO - MILANO
CENTRO STUDI ED ESPERIENZE PER IL VOLO A VELA
"LIBERATO DE-AMICI"

APPARECCHIO C.V.V. 2 ASIAGO

Progetto di G. PRETI e M. GARBELL

CARATTERISTICHE

Anno di costruzione		1937
Apertura alare	m	13,70
Lunghezza	"	6,50
Superficie alare	mq	12,70
Allungamento		14,80
Peso a vuoto	kg	130,–
Carico utile	"	80,–
Peso totale	"	210,–
Carico alare	kg/mq	16,50
Velocità di discesa	m/sec	0,80
Rapporto di planata	Cp/Cr	20,–


UNUDIFFUSIONE SAFAR


I-CIAB


I-CIAB


I-CIAA

Adam Quennoz couldn't resist taking a photo of his 100 point landing at the March 6th Mississippi Valley Soaring Association thermal duration contest. Motorola Droid, ISO 56, 1/1779 sec., f2.8

PRACTICAL HORTEN

Dr. Ing. Ferdinando Galè, ferdigale@alice.it

In the recent decades the Horten theory on the design of tailless configurated aerodynes has been analysed in detail and described in the technical literature both in Europe and in the USA.

Therefore it is not repeated here, since these notes are addressed to model builders who are not necessarily aerodynamic researchers nor aeronautical engineers. The aim is to supply them with the necessary practical information, thus enabling them to design a genuine Horten type model. “High brow” mathematics and elaborate calculations are avoided.

It goes without saying that this paper cannot be considered a scientific treatise because of the many simplifications introduced. By doing so, the author hopes that the real gist of the whole matter is easily understood also by those readers who are not familiar with aerodynamic science.

As done with other publications of mine - some of them have been published in the USA by B2Streamlines - the explanation of the Horten design theory will be done step by step, along with some working examples whenever possible.

In the case of a straight wing (no sweep), the position of the geometric aerodynamic center, ACg, is immediately located at a quarter chord from the nose on the geometric mean chord, cg.

Usually the position of AC is assumed to be at 25% of the reference chord, but values ranging from 23% to 29% have been reported in textbooks.

By connecting all the points located at a quarter chord we determine the so called focal line. By projecting ACg on a side view, we determine a point which is of paramount importance for the static longitudinal stability (Figure 1).

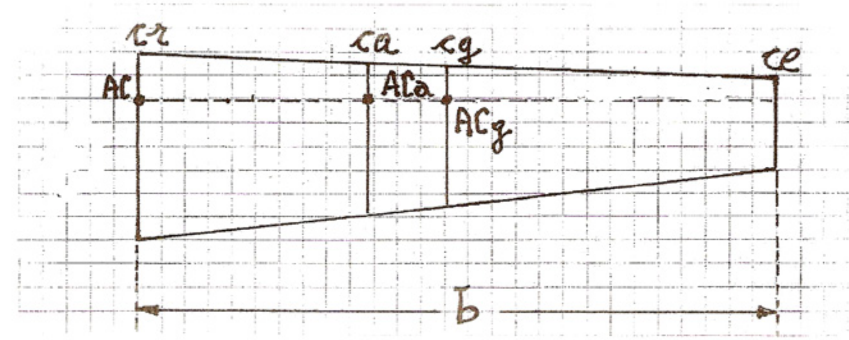


FIG.1

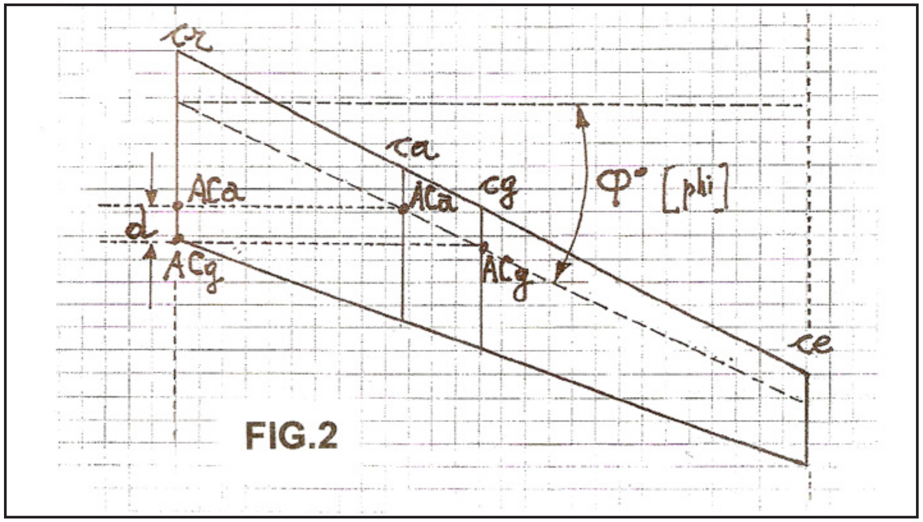


FIG.2

Every text book tells us that the aerodynamic center must be located behind the center of gravity CG in order to obtain adequate static stability.

The distance between these two points is called static margin, SM. It is usually considered a good stability index and is measured in percentages of cg.

However, its absolute value cannot be determined with adequate accuracy because the real position of AC cannot be assessed. This will be explained later. Values ranging from SM = 0,2cg to SM = 0.4cg are reported in the technical literature for various types of aerodynes.

Almost always the airfoil incidence diminishes from root to tip; that is, there is more lift towards the wing centerline. As a consequence of the twist thus introduced, also the aerodynamic center AC moves towards the centerline.

As far as a rectilinear wing is concerned, we could not care less, since we have considered thus far only its projection on the centerline. So far so good.

The whole picture changes if we bend backwards the focal line, thus creating a swept wing (Figure 2). The sweep angle of the focal line is indicated here with the Greek letter φ (phi).

The projection of the two aerodynamic centers ACg and ACa do not coincide any more. The distance between them, d, although very small in most cases, may become important when the longitudinal stability has to be assessed. Generally speaking, all swept back wings experience a reduced CG range.

Very often airfoil data are given by the aeronautical laboratories for infinite aspect ratio (AR = ∞). Imagine that we divide this infinite wing in stripes of equal width. Each one produces the same amount of lift. Each stripe produces also the same amount of drag. Therefore the lift line is a straight one, exactly as the drag line.

Now, since this situation is pretty hypothetical, let's imagine that we cut out a small portion of such an infinite AR wing, thus obtaining a rectangular wing. Then, by bending backwards and tapering the two semispans, we obtain the swept wing of Figure 2.

By doing so the whole picture is changed. If the wing incidence remains unchanged, the lift distribution along the wing semispan turns out to be elliptical. This has been determined theoretically on the basis of the Prandtl's lifting line concept and verified experimentally in several aeronautical laboratories around the world.

Some decades later the very same Ludwig Prandtl came to the conclusion that the wing with the lowest induced drag is NOT the elliptic one, but the one with a very high aspect ratio AR and most of the lift towards the wing centerline.

Here Reimar Horten comes into the picture. Starting in the mid-thirties of the last century, he grabbed the real importance of this concept by Prandtl and developed the bell shaped lift distribution theory.

This is the main feature of his thought on flying wings.

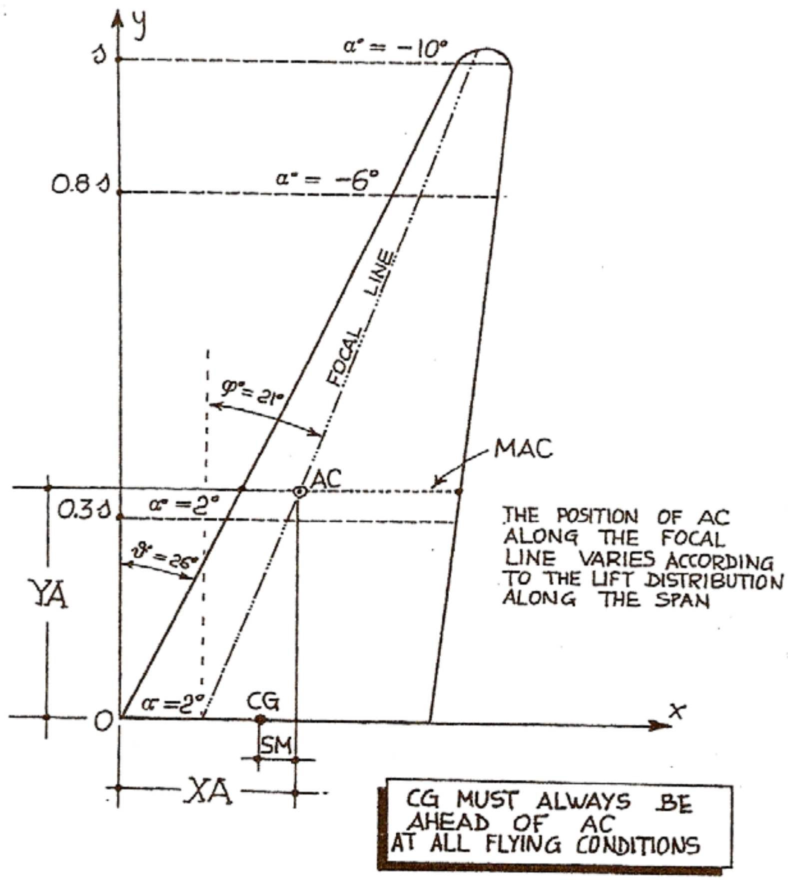


FIG.3

Now let's see how a true bell lift distribution can be calculated, using some first hand information extrapolated from the correspondence that the author has exchanged with Dr.Reimar Horten in Argentina after WW II.

Some letters are included in Reference 3, along with a translation in Italian.

A well designed bell lift distribution ensures adequate longitudinal and directional stability without any vertical surface, limited throw of the elevons, reduced drag upon deflection of the elevons, and minimum risk of flutter.

On the other hand, for a given wing area, the wing span should be slightly increased in respect with the elliptic lift distribution. Hence a larger aspect ratio AR, with reduction of the Reynolds Number, RN, towards the tips. This reduces somewhat the bell advantage of the lower induced drag. Interested readers can find additional details in References 2 and 3.

In order to have the largest quantity of lift concentrated towards the wing centerline, a robust geometric twist must be introduced - that is a variation of the wing incidence - along with an aerodynamic twist - that is a variation of the airfoil along with reduction of thickness and/or incidence.

What it boils down to is the position of the aerodynamic center ACa which is determined by the co-ordinates XA and YA. See Figure 3.

At this point a word of caution is in order.

Unlike the center of gravity, CG, which can be determined with precision, the aerodynamic center, AC, can only by found by means of empirical calculations, at least by the average modeler. Only adequate computer programs or wind tunnel tests can ensure an acceptable accuracy in determining the position of AC on the semi-wing.

Its two co-ordinates XA (abscissa, horizontal axis) and YA (ordinate, vertical axis) are of duplex validity.

The projection of AC onto the wing centerline, XA ensures adequate longitudinal stability, provided it is located behind the center of gravity, CG.

Even if the determination of XA is not accurate, there is no reason for concern. Quite differently from airplane builders, modelers can easily adjust the position of CG by increasing or reducing or moving some ballast, for instance batteries.

This is common practice with all types of flying models in order to achieve the correct static margin, SM, the distance between the CG and the AC.

The distance YA between AC and the wing centerline is by far more important as far as lateral and directional stability (and maneuverability) are concerned. In this respect we would like to have CG and AC as close to each other as possible, but not coincident. This ensures a quicker response of the wing tip action (stability) as well as a prompt response of the outer elevons (maneuverability).

As already said, the calculation of the coordinates XA and YA of the aerodynamic center AC is far from being an exact matter. In this respect Reference 6 is quite enlightening.

A swept back wing with elliptical lift distribution had been tested at the NACA (now NASA) Langley wind tunnel at Reynolds Number RN = 4 x 10^6. The NACA Report 1208 (W. Schneider, August 14, 1951) shows the results of calculations made with different procedures.

The test model was a swept back flying wing with the following specifications:

Wingspan	b = 3,3 m
Aspect Ratio	AR = 8,02
Taper Ratio	TR = 0,45
Sweep angle	φ = 45° (phi)
Airfoil	NACA 63_1A012

Although these conditions are quite different from those encountered in the modeling world, their findings cannot be disregarded.

Method	XA	YA
Experimental (α = 4,7°)	0,328	0,458
Multhopp 7 x 1	0,244	0,434
Multhopp 15 x 1	0,320	0,455
Multhopp 15 x 1 (modified)	0,339	0,459
Multhopp 25 x 1	0,331	0,457
Multhopp 15 x 2	0,311	0,458
Weissinger 7 x 1	0,363	0,466
Weissinger 15 x 1	0,316	0,454
Falkner 19 x 1 (modified)	0,313	0,453
Falkner 6 x 3	0,297	0,449
Falkner 5 x 3	0,390	0,473

Conclusion: there is no need to rack one's mind in order to find a "sure" result.

Typically with the elliptical lift distribution, the point XA is located at the centroid of the half-elliptical planform, that is at 0,42 s.

In the case of the bell lift distribution, YA is located at about 0,33 s, which position favours a better roll stability. These two values were used by Dr.Reimar Horten in his preliminary calculations.

This author does not see any reason why they should not be valid also for flying models, since – in most cases – our calculations are even less then preliminary.

As already said, the bell lift distribution is the main feature of the Horten concept on flying wings. Let's now see how the bell can be traced from a practical point of view (Figure 4):

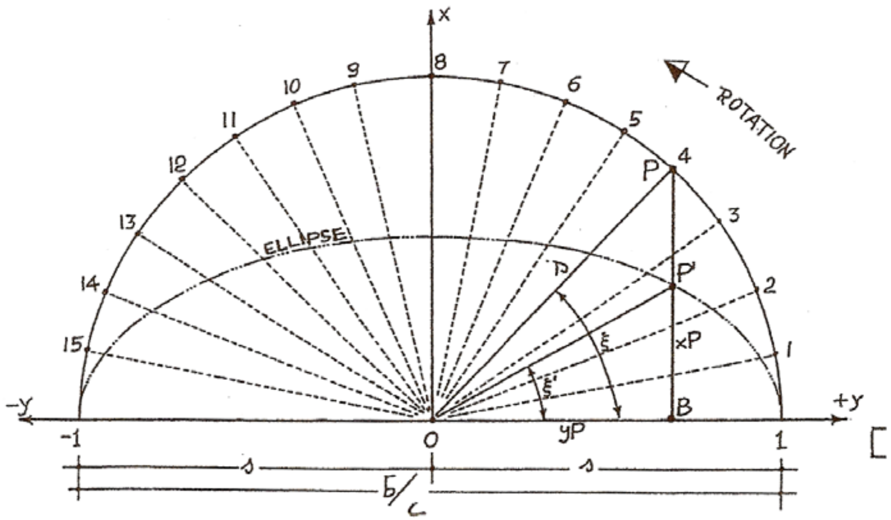


FIG.4

TABLE 1

HORTEN'S FACTORS

P=ξ	yP	cosξ	sinξ	$\sin^3\xi$	s $\text{in}^4\xi$	$\sin^3\xi*\sin^4\xi$	$\sin^2\xi$	$\sin^{2,5}\xi$
8=90°	0,9808	1	0	0	0	0	0	0
7=78,54°	0,1915	0,19509	0,98078	0,94344	0,92531	0,36104	0,38268	0,95264
6=67,32°	0,3827	0,38268	0,92388	0,78858	0,72885	0,55761	0,70711	0,82042
5=56,25°	0,5556	0,5557	0,83147	0,57483	0,47795	0,53107	0,92388	0,63040
4=45°	0,7071	0,70711	0,70711	0,35556	0,25000	0,35356	1	0,42045
3=33,75°	0,8315	0,83147	0,55557	0,17148	0,09527	0,15843	0,92388	0,23006
2=22.5°	0,9239	0,92388	0,38268	0,05604	0,02145	0,033963	0,70711	0,09059
1=11,25°	0,9808	0,98078	0,19509	0,00743	0,00145	0,00284	0,38268	0,01681

1) Draw a horizontal segment which represents the wing span b in a convenient scale. For instance, if b = 200 cm and the scale ratio selected is 1:5, our segment will be 40 centimeter long.

2) Let's rotate the segment 0-1 (which represent the wing semi-span s = b/2), so that it traces a semi-circumference, having rotated for 180 degrees.

3) Subdivide the entire semi-circumference into sixteen sectors, each one having an angular value ξ = 180:16 = 11,25°.

4) Let's number from 1 to 15 the numbers onto the circumference.

5) Now let's take into consideration a point onto the circumference, for instance the point 4 (fourth sector).

6) By tracing a vertical segment from this point, we hit the radius 0 –1 at the point P.

7) The co-ordinates of P are given by simple trigonometric relations

Yp = s*cos ξ
(read "s multiplied by cosine ξ csi")

Xp = s*sin ξ
(read "s multiplied by sine ξ csi")

8) Needless to say, the same applies to all the points on the semi-circumference

9) Now the gist of the whole matter. If the length of every segment P –B is multiplied by a factor lower than 1, the shorter segments P' – B determine a convex elliptic curve. For instance this can obtained by using the factor sin ξ.

By using factors different from sin ξ, as those outlined in the Table 1 (prepared by Dr. Reimar Horten), different types of bell shaped curves are obtained.

Most probably the value suitable for model flying wings ranges from $\sin^{2,5} \xi$ to $\sin^4 \xi$.

First of all, we must introduce the concept of circulation, which is little known among model builders. It is usually indicated with the Greek letter Γ (capital gamma). At any point of the wing span the circulation is defined as

$$\Gamma = Cn * CLn$$

where
Cn = local chord
CLn = local lift coefficient

Unfortunately, the local lift coefficients are unknown almost always and their determination is beyond the possibility of the average modeler.

Said determination can be made by means of elaborate computer programs, but as far as this author knows, they are in German only, a language which is not very popular among modelers of most countries.

In his preliminary calculation, Dr.Horten used the value CLn = 1 for the entire wing span. As a consequence, the bell curves that we have just learned to calculate are geometric, since they depend only on the length of the various chords.

However, a compromise solution has been found, as shown with a practical example presented later on. Although not rigorously exact, it produces an acceptable visualisation of the bell lift distribution.

Several procedures have been presented in the technical literature which can be used to determine the correct amount of twist. Some of them (Culver, Panknin, Schrenk and others) are reported in References 2 and 3.

TABLE 2

SAMPLE CALCULATIONS

$$\gamma_{1/3} = 2 * [\ 0,33 + 1,05 * (0,33)^2 + 1,10 * (0,33)^3] =$$
$$= 2 * [\ 0,33 + 0,1143 + 0,0394] = 0,9675°$$
$$\gamma_{2/3} = 2 * [\ 0,66 + 1,05 * (0,33)^2 + (1.10 * (0,33)^3] =$$
$$= 2 * [\ 0,66 + 0,1143 + 0,0394] = 1,62°$$
$$\gamma_{3/3} = 2 * [\ 1 + 1,05 + 1,10\ ] = 2 * 3,15 = 6,30°$$

As a confirmed rule of thumb, the absolute value of twist ranges from about 6° to about 9° in most cases, including also free flight swept back flying wings built before WW II.

At modeling level, the formula developed by Dr.Reimar Horten for duration sailplanes and motorgliders appears to be adequate. It ensures that the craft is in directional and lateral trim without elevon and/or rudder deflections.

It is reported in Reference 2 and 3:

$$\gamma° = \alpha°*[\ y/s + A\ (y/s)^2 + B\ (y/s)^3]$$

where

$\gamma°$ = total geometric twist (absolute value in degrees)
$\alpha°$ = incidence of the root chord cr
y = distance between cr and the local chord
s = semi-span b/2
A = numerical factor, slightly larger than 1
B = numerical factor, slightly larger than 1

Ideally, this procedure divides the wing into three equal parts: in the first one, close to the wing centerline, the twist is linear, then evolves to a parabolic one, which make for a better overall efficiency.

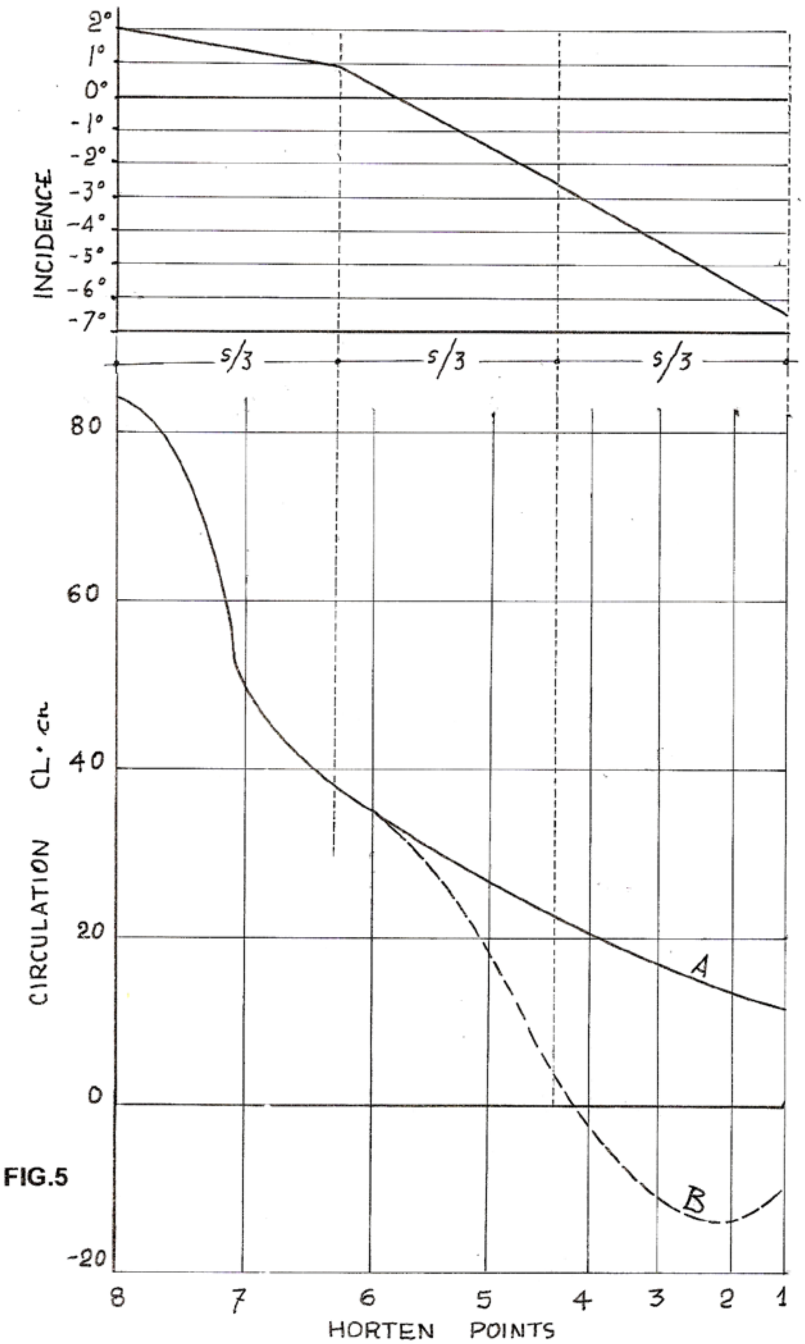


FIG.5

The numerical factors A and B were adjusted by the Horten brothers on a case to case basis.

The aim of the exercise was to ensure that the local stalling lift coefficient is reached first in the middle third of the semispan, provided an adequate taper ratio TR is chosen.

Let's make an example: s = 100 cm, α = 2°, A = 1,05, B = 1,10 s.

According to the above formula the twist values at three different points of the semispan, s, turn out to be

$\gamma_{1/3}$ = 0,9675° $\gamma_{2/3}$ = 2,87° $\gamma_{3/3}$ = 6,30°

The absolute value of the overall twist is thus γ = (+2°) + (-6,30°) = 8,30°. Please look at TABLE 2 for the detailed calculations, as well as the upper part of Figure 5.

How should these data be interpreted?

At the wing root the incidence is 2°, at the end of the first third it is +0,9675°, at the end of the second third is -2,87°, and at the wing tip is –6,30°.

Now let's make a practical example. A preliminary scale layout of a true Horten type flying wing model is sketched in Figure 6.

Its specifications are as follows:

Wing span	b = 200 cm
Aspect ratio, b^2/S	AR = 5,7
Wing area	S = 71 dm^2
Weight	W = 1800 g
Wing loading	W/S = 25,71 g/sm^2

TABLE 3

SUGGESTED CLn VALUES FOR PRELIMINARY BELL CALCULATION

HORTEN POINTS	BELL sin4ξ	BELLsin3ξ	BELLsin2,5ξ
(8)	1,06	0,95	0,9
(7)	1,17	1,07	1,03
(6)	1,14	1,12	1,1
(5)	0,99	1,075	1,1
(4)	0,70	0,9	1,0
(3)	0,39	0,68	0,84
(2)	0,012	0,30	0,42
(1)	0,00	0,02	0,11

At the various Horten points the lengths in cm of the local chords are as follows:

(8)	84,49
(7)	49,43
(6)	35,82
(5)	26,87
(4)	22,99
(3)	17,91
(2)	14,41
(1)	11,76

At this point we decide to adopt the trigonometric function “bell $\sin^3 \xi$,” which has a coordinate YA = 0,334.

Using the data presented in TABLE 1, we can draw the bell shape A. See the lower part of Figure 5. It is just an indication, because it is based on the chords only.

TABLE 3 shows values of CL for swept back wings and three sin ξ values.

Even if we multiply the values of line A (Figure 5) time these CLn values, the whole picture won’t change much.

As a matter of fact the real bell line is concave in the outer part of the semi span because of the robust twist introduced. Here the aerodynamic force (lift) is directed downwards (line B). The actual bell shape stands many chances of being similar to this one.

All this is nothing more than an academic exercise, inasmuch as we don’t know for sure how to relate the bell shape to the performances of our model.

As a rule of thumb one could say that a bell $\sin^3 \xi$ is suitable for an agile all-around glider (or motorglider) as the one of Figure 6, while bell $\sin^{2,5} \xi$ is adequate for a sailplane with a large aspect ratio, AR. It should be remarked, however, that there is not enough evidence in this respect.

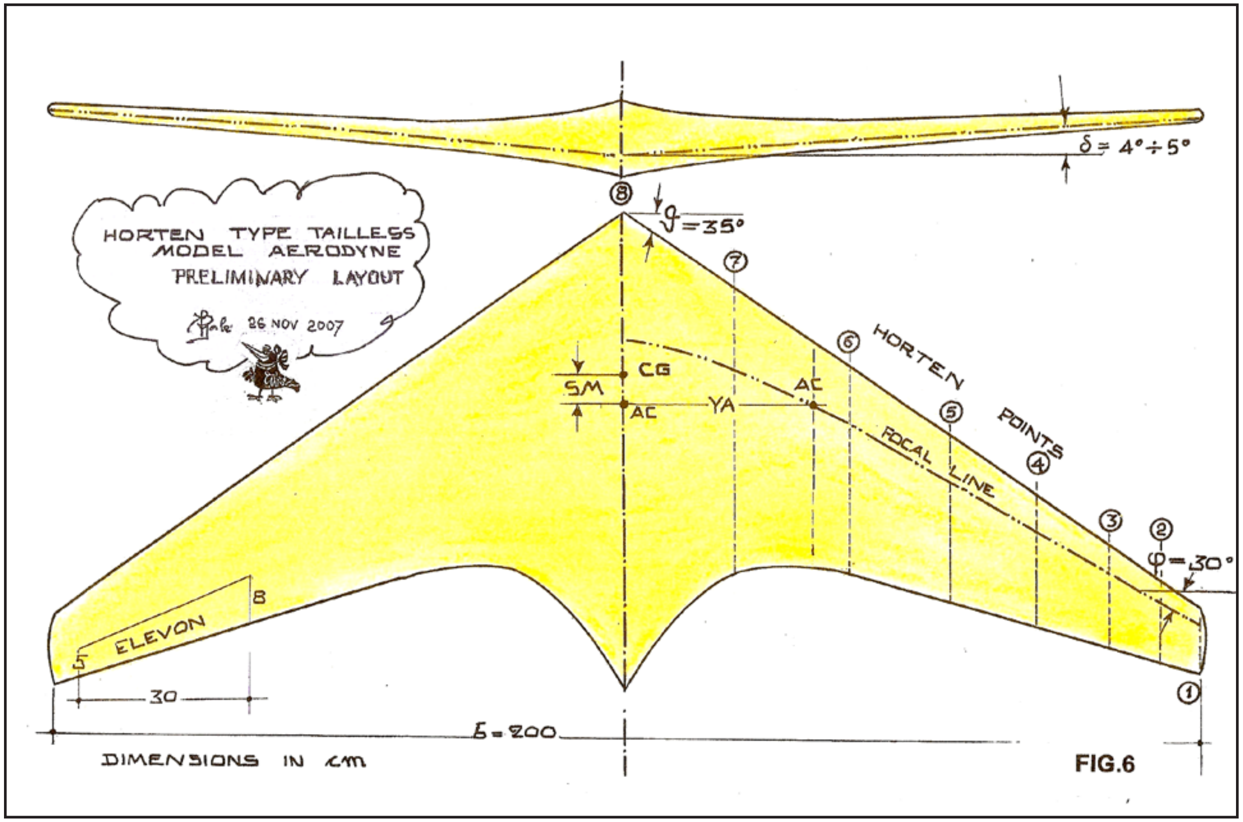


FIG.6

REFERENCES

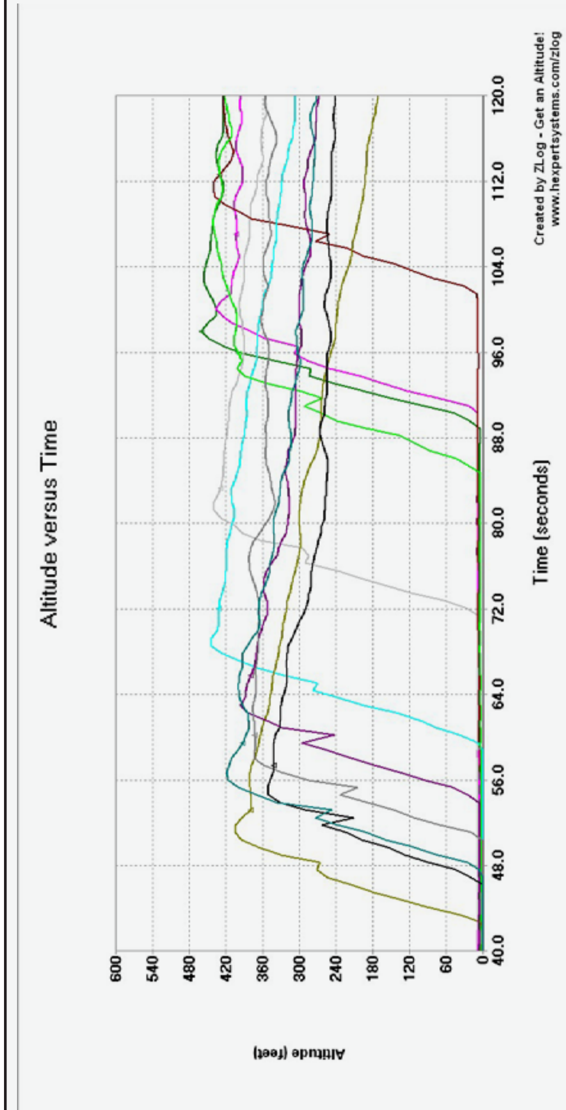
(1) Tailless Tale, Ferdinando Galè, B2Streamlines, Olalla, November 1991, USA

(2) Tuttala Horten (Horten Tailless), Ferdinando Galè, La Bancarella Aeronautica, September 2007, Turin, Italy

(3) T.W.I.T.T. (The Wing Is The Thing) Newsletter, El Cajon, California, USA, Several issues since 1986

(4) Stabilita' e Manovrabilita' Laterale Del Velivolo, A.Lausetti-P.Morelli, Turin, Italy, 1977

(5) NACA Report #1208, W. Schneider, 1951, USA



Mississippi Valley Soaring Association ZLog data plot of launches at Horseshoe Lake, 10 February 2010.

— Glauco Lago

<http://www.hexpertsystems.com/zlog>

11.7 Section 4C Volume F3 - RC Soaring

F3B Multi-Task Gliders

a) 5.3.1.3. Characteristics of Radio Controlled Gliders **Germany**

Amend paragraph d) as follows:

Any ~~device for the~~ transmission of information from the model aircraft to the competitor is prohibited, **with exception of signal strength and voltage of the receiver battery.**

Reason: **Urgent Clarification.** Almost every 2.4 GHz system transmits automatically status data back to the transmitter. These data are signal strength of the receiver, receiver battery voltage. The transmission of this status data can not be switched off on almost every 2.4 GHz system.

As the rule was written the intention was to forbid the transmission of for example the actual height (vario), speed of the plane, in general: flight data of all kind.

To have information about the signal strength of the received signal is a safety issue and should be allowed.

The rule at the moment forbids most of the new innovative 2.4 GHz systems.

b) 5.3.2.2. Launching **Germany**

Amend paragraph o) as follows:

o) There must be a quick release mechanism on the power lead to the battery in order to remove power from the motor in an emergency. (Connections to the battery must be removable without the need for tools). If slotted pole shoes are used both of them have to be slotted.

Reason: **Safety.** If only one slotted pole shoe is used nobody can see in the case of an emergency which one is slotted and which one is not slotted.

c) 5.3.2.4 d) Task B – Distance **Belgium**

Amend the paragraph as follows:

The model aircraft must be identified by the contest director or designated official to the judges at Bases A and B before or during the launch. **In no case shall this procedure interfere with the moment chosen by the competitor to launch or re-launch his model during the working time.** The competitor must stay within a distance of 10 m either side of Base A during the timed flight.

Reason: **Urgent Clarification**. A recent evolution in the identification procedure is generating problems. It imposes to wait for a return signal given by the contest management after a call of his identification mark by the pilot, in order to be allowed to launch the model during the working time. This implies that the pilot has no longer full control on the use of his allotted working time.

Confusion in this signalling procedure provoked a protest during the last World Championship in the Czech Republic. The consequences of this confusion were decisive on the first and second place in the overall ranking. As mentioned in the existing text, it is the responsibility of the contest management to identify the

model(s). If the local signalling apparatus does not allow identifying the models before the start of the working time, it is the organiser's responsibility to arrange identification in a different way. But in no case should the procedure interfere with the free use of the complete working time.

Identification of each model by the judges at bases A and B is simple to accomplish before the start of the working time. With the cooperation of all, the identification of 5 or 6 models takes less than 30 seconds. The impact on the duration of a round remains negligible.

d) 5.3.2.4. Task B – Distance **Germany**

Amend paragraph c) as follows:

c) ~~An audio~~ **A visual** system or a combined audiovisual system announces to the competitor when his model aircraft crosses the Base A or Base B (imaginary vertical planes). The absence of a signal will indicate that the model aircraft has failed to correctly cross the base. The instruments used to check the crossing of the vertical planes must assure the parallelism of such planes. Timing and signalling shall occur when any part of the model aircraft crosses the base. If an audiovisual system is used, signalling is also valid when the audio system fails ~~or vice versa~~.

Reason: **Urgent Clarification.** The experiences at some competitions have shown, that it is always possible to fly only with visual (optical) signals, but sometimes it is very difficult till impossible to fly only with audio (acoustical) signals. The reason is that mostly electronically produced audio signals are used; they have mostly an equal loudness and differ not very much, especially when some of these signals sound at the same time. If there is a combination of electronically produced signals and a buzzer, a horn or an electrical bell, then we have no equal treatment for all competitors because it is much easier to identify a buzzer, a horn or an electrical bell. Visual signals like headlamps in addition with different colours can be identified very clearly by everybody.

If an audiovisual system is used it is practice that every pilot has a helper who looks on the optical signal. In the future the primary system should be a visual system; this system can be combined with an acoustical system, but if the visual system fails the competitor can claim a reflight.

e) 5.3.2.5. Task C - Speed **Germany**

Amend paragraph f) as follows:

f) After having completed the task, the model aircraft ~~can~~ **must** land ~~anywhere~~ **in the area(s) determined by the contest director** outside the safety area(s).

Reason: **Urgent Clarification.** The wording "anywhere" is not precise enough.

cont/…

F3J Thermal Duration Gliders

f) **5.6.1.3. Characteristics of Radio Controlled Gliders** **Germany**

Amend paragraph c) as follows:

c) Any ~~device for the~~ transmission of information from the model aircraft to the competitor is prohibited, **with exception of signal strength and voltage of the receiver battery.**

Reason: This is exactly the same amendment as for proposal a) (F3B) in this section with the same reasons.

g) **5.6.11. Final Classification** **Germany**

Amend paragraph 5.6.11.1. a) as follows

If ~~five (5)~~ **seven (7)** or less qualifying rounds are flown, the aggregate score achieved by the competitor will be the sum of ~~his~~ **these** scores for ~~those five rounds~~ **all rounds flown**. If more than ~~five~~ **seven** rounds are flown, then ~~his~~ **the** lowest score will be discarded before determining ~~his~~ **the** aggregate score.

Reason: F3J competitions in recent years are run with way more accuracy and expertise than at the date this rule was invented. Pilots flying and tactical skills as well as their equipment reached better efficiency by far. In most of the 2 day events on international level 6 preliminary rounds are flown. Under normal or even "good" weather conditions this leads to very little differences in the scores as well as to more risky flying. Pilots knowing they will be able to discard a bad score in the end are taking much more risk. With the worst result being discarded the differences in scores are getting tighter. The only way to get a greater variation of scores in these conditions is to set the limit of rounds flown until the worst score will be discarded higher.

h) **5.6.2.4 Safety Rules** **Czech Republic**

Replace the paragraph 5.6.2.4

~~a) No part of the model aircraft must land or come to rest within the safety area.~~

~~b) The model aircraft must not be flown at low level (below 3 meters) over the safety area.~~

~~c) Every single action against the safety rules will be penalised by deduction of 100 points from the competitor's final score. Penalties shall be listed on the score sheet of the round in which the infringement(s) occurred.~~

a) No part of the model aircraft may touch any object or person in the defined safety area.

b) Contact with an object within the defined safety area (including the launch corridor) will be penalised by deduction of 200 points from the competitor's final score.

c) Contact with a person within the defined safety area (including the launch corridor) will be penalised by disqualification of the pilot from the competition.

d) For each attempt only one penalty can be given, If a person and at the same attempt an object is touched the disqualification is applied. *cont/…*

e) Penalties shall be listed on the score sheet of the round in which the infringement(s) occurred.

f) If necessary the organiser may define a part of the airspace as safety space. In such case he must appoint at least one judge who observes the border (vertical plane) by a sighting device. This judge must warn the pilot if his glider crosses the border. If the glider doesn't leave the safety space within 10 seconds a penalty of 200 points is given.

Reason: The present 3 meter level is very difficult to judge and causes often discussions and even protests. The safety space was already applied as local rule.

i) **5.6.3. Contest Flights** **Czech Republic**

Amend paragraph b) as follows:

b) The competitor will be allowed ~~two attempts at each official flight~~ **an unlimited number of attempts during the working time**.

Reason: There is no serious reason for limiting the number of attempts. Any new attempt means shorter time space for flying, therefore the competitor is automatically penalised by repeating any attempt. Beginners are often stressed by the present limit.

j) **5.6.5. Cancellation of a flight and/or disqualification** **Germany**

Add a second paragraph as follows:

5.6.5.2. Neutralization of a flight group (only for fly-off rounds)

During the fly-off rounds only within the first 30 seconds of the working time the Contest Director has the right to neutralise the ongoing flight group in events leading to a reflight according to 5.6.4 a) – e).

If an event according to 5.6.4.a) – e) occurs within the first 30 seconds of the working time, the Contest Director needs to:

state the immediate neutralization of the group clearly to all competitors;

stop the running working time;

call all competitors to land as soon as possible.

This round will be started again with the preparation time as soon as possible.

Reason: In fly-off rounds the only way of handling a reflight is to re-fly the whole group (and thereby round). This mostly leads to a disadvantage for competitors claiming a reflight for all others already might have a valid and good score so that they can do the reflight taking higher risk getting even a better score. Lots of reflights are given due to events happening in the phase of launching. By neutralizing the group within the first 30 seconds there will be no disadvantage by scores for competitors who would have needed to claim a reflight. Even by neutralizing the group and not waiting until the ongoing working time is finished the organizer can save time.

F3K Hand Launch Gliders

k) 5.7.3.2 Start and landing field **Germany**

Amend paragraph 3 as follows:

~~Competitors may leave the start and landing field while flying their model glider, but starting, landing, and catching the model glider must only occur within the start and landing field.~~

<u>Competitors may leave the start-and-landing field while flying their model glider. For starting their model glider and in order to achieve a valid landing (see 5.7.6.2) the competitor must be inside the start and landing field.</u>

<u>Reason</u>: For a better view of the model under difficult conditions, e.g. flying far away, the common practise of F3K pilots is to follow their model after launching it to better see the reactions of the model. The current rule is not precise where the pilot should be, outside or inside the start- and landing field. The additional explanation shall clarify where the pilot has to stand when landing the model in the start- and landing field.

Volume F3 Helicopter begins overleaf

Two Oceans Slope Soarers

AEROBATICS EVENT

30th and 31st of January 2010

Kevin Farr, kevin@fvdv.co.za

South Africa

The Two Oceans Slope Soarers Aerobatics Event was scheduled to run on the 30th and 31st of January 2010 for the second time in the annual event.

The weather was watched with anticipation the whole week prior to the event, and true to this skinny piece of ocean-surrounded land, called the Cape Peninsula, the weather forecasts changed on a daily basis and kept shifting in a somewhat maddening fashion — particularly if you are trying to organise slope soaring competition on that very skinny piece of land!

In the end, nature would devise the outcome and the committee organised all that could be organised, packed all that could be packed, generated a mountain of score sheets to be utilised by each of the four judges.

Based on last year's event, we hoped nature would lend us at least sufficient time to complete two rounds, but possibly three rounds, across the 16 competitors who had entered the competition.

On Friday the 29th a good few of the competitors escaped from their respective businesses, had a traditional gut filling breakfast at Dixies, and gathered at Red Hill for a practice session in what were pretty strong

Mandatory Manoeuvres:

a	Two Rolls	K=8	b	Two Inside Loops	K=8
c	Double Immelman	K=9	d	Cuban Eight	K=10

Optional Manoeuvres:

1	One Roll	K=5	2	One Inside Loop	K=5
3	Split S	K=5	4	Immelman	K=6
5	Stall Turn	K=6	6	Straight Inverted	K=7
7	Three Turn Spin	K=8	8	Three Inside Loops	K=10
9	Vertical Eight	K=10	10	Slow Roll	K=11
11	Reverse Cuban Eight	K=11	12	Three Outside Loops	K=12
13	Inverted Eight	K=12	14	Figure M	K=12
15	Square Loop	K=12	16	Horizontal Eight	K=12
17	Three Rolls	K=13	18	Four - point Roll	K=14
19	Rolling Eight	K=15	20	Four – point Rolling Circle	K=18

conditions for that slope.

Dave Greer flew in from Durban followed by Russell Conradt and Michel Leusch later in the day, and the stage was set for some fun in the sun. After about two hours at Red Hill and one fairly wrecked competition plane later, the victim of some insane rotor in the landing area, the Red Hill slope eventually blew out at about 50 odd kilometers an hour, and the crew moved off to Smitswinkel Bay for the rest of the day, and even more practice.

Smitswinkel Bay is unique in being positioned right at the end of the Peninsula, a stone's throw from Cape Point, and in the lee of the mountainous point itself. This allows for the prevailing South Easter to sheer by and allows for great slope soaring when all other spots are being reduced to a twig by the incessant howl of the South Easter.

At the end of the day the now legendary meet-and-greet took place at Dixies, and in a somewhat more restrained manner than last year due to lessons learnt on the nature of hangovers and competition.

ROUND 1: Saturday 30th January 2010

Saturday dawned windy as predicted and a quick flight at Red Hill confirmed that the ever strengthening South Easter was once again going to wreak havoc in the landing area, and thoughts of damaging or destroying half the fleet of gliders in the first round led to the decision to move the competition to Smitswinkel Bay.

On arrival all the necessary elements of the competition site were rolled out, the ADT caravan which served as the food stall for the weekend was powered up to serve awesome meals to starving competitors, under the guidance of Annelise van Niekerk, while her husband Tinus van Niekerk, TOSS Vice Chairman, flew his rounds through the day. Great teamwork that, and another pointer to the RC sport of slope soaring being a family affair.

The four judges for the competition, who had selflessly offered their time for the two days of the competition, Head Judge Andrew Anderson, Johnny Calefato, Kurt Mackrill and his father Claude Mackrill, gathered and issued a pilots briefing on what they wanted to see on the day. Which areas worked as the centre lines and outside lines of the flying box, how to present the manoeuvres and how to call your manoeuvres throughout your scheduled routine. With Jeff Steffen TOSS Chairman and contest director finalising the briefing, the competition kicked off in glassy smooth lift. With Damian Hinrichsen and Kevin Farr the first to step up to the line and take on the challenge.

The whole event has been refined to a selection of four mandatory manoeuvres and then the selection of six optional manoeuvres as chosen by each pilot based on his ability and willingness to risk the K-Factored manoeuvres in what could be changing conditions. This led to some interesting choices of manoeuvres based on trying to find a balance between risk and reward, while trying to ensure a high scoring routine and not being left in the dust of those who chose high K-Factors and completed those well.

The scheduled slots of pilots were flown in tandem to ensure speed and efficiency and the highlight of the day was undoubtedly the round flown by Steve Meusel, rated later in the day as one of the best rounds flown in any year of the competition so far.

Other highlights included a really good round flown by Michel Leusch and an equally impressive round from last years winner Marc Wolfe.

As the first rounds completed and a 15 minute break was taken for the awesome foods on offer, the wind began an unfortunate shift towards the south, the demon wind in our part of the world that renders virtually every slope unflyable, and the lift became unpredictable. After attempting to fly the first two scheduled slots of the second round, the lift went to the dogs and gliders fell out of the sky with indecent regularity.

This led to one of the longest fetches in history, as Marc Beckenstrater's glider lost all lift and disappeared down the slope. After about an hour of searching, Marc found his glider 50 meters from the water, a good 100 meters vertically down the cliff, and if you look in the photos you will see just how far away that is. The poor lad was about as wrecked as his glider by the time he made it back to the top.

Another notable casualty was Pieter Grove who in a brilliant attempt at keeping view of a sinking glider, rushed to jump onto one of the rocks on the side of the road, slipped and did a very neat head-over-heals tumble into the bush, emerging later with a smile on his dial, but after finally collecting his undamaged glider from the depths of the slope. To add insult to injury the judges were unwilling to add bonus points for the notable attempt, or even the form he managed to hold during the entire exercise.

With these two particular incidents showing the vagaries of the declining lift, the second round by agreement with the judges was cancelled and called off for the day. That night an awesome dinner was had by one and all at the Dixies watering hole and due diligence was taken to keep ones head clear for the Sunday rounds.

ROUND 2: Sunday 31st January 2010

Waking to a beautiful Cape morning the gleeful pilots took to the slope in a Le Mans style race and found a light but super clean South Wester blowing up the Kommetjie cliff face. With haste the pilots were gathered, the judges seated, and the round kicked off as soon as possible to attempt to ensure a speedy turnaround for the completion of at least two rounds during the day.

Pilots are permitted to change their sequence to suit the conditions between rounds to allow for adaptation of you flight schedule to match the conditions at the time.

With the light to medium conditions on hand the lighter, smaller gliders proved to be invaluable, and with a lot of sharing of specific planes such as the Aldij and the Mini Dragon, pilots were able to complete their schedules with a fair amount of speed and efficiency.

As the rounds rolled off, the heat in the bowl began to once more kill the lift, and the later participants had to really work to gain height for the chosen manoeuvres.

In the end Steve Meusel grabbed the moment and flew another great round, Dave Greer flew a beauty and Malcolm Riley flew his Aldij as if on rails, and produced possibly the best round of the day.

With the second round complete, lunch was ordered for the hard working judges, and the ever waning lift taken into account.

After waiting it out for an hour or so, taking in the awesome Cape scenery, and watching the wind switch to the West, the Contest Director finally called off the third round and called the competition complete.

AFTERMATH:

All the contestants, judges and supporters then headed for the Kommetjie watering hole called Fishermans.

The prize-giving took place and Steve Meusel duly took the honours with first position, keeping the floating trophy in the Cape against seriously tough competition. Michel Leusch flew his way into second, Marc Wolfe into third and Damian Hinrichsen into fourth spot.

The Floating trophy was handed to Steve, the 2nd, and 3rd place trophies to the respective winners, and each and every participant congratulated on a contest well flown.

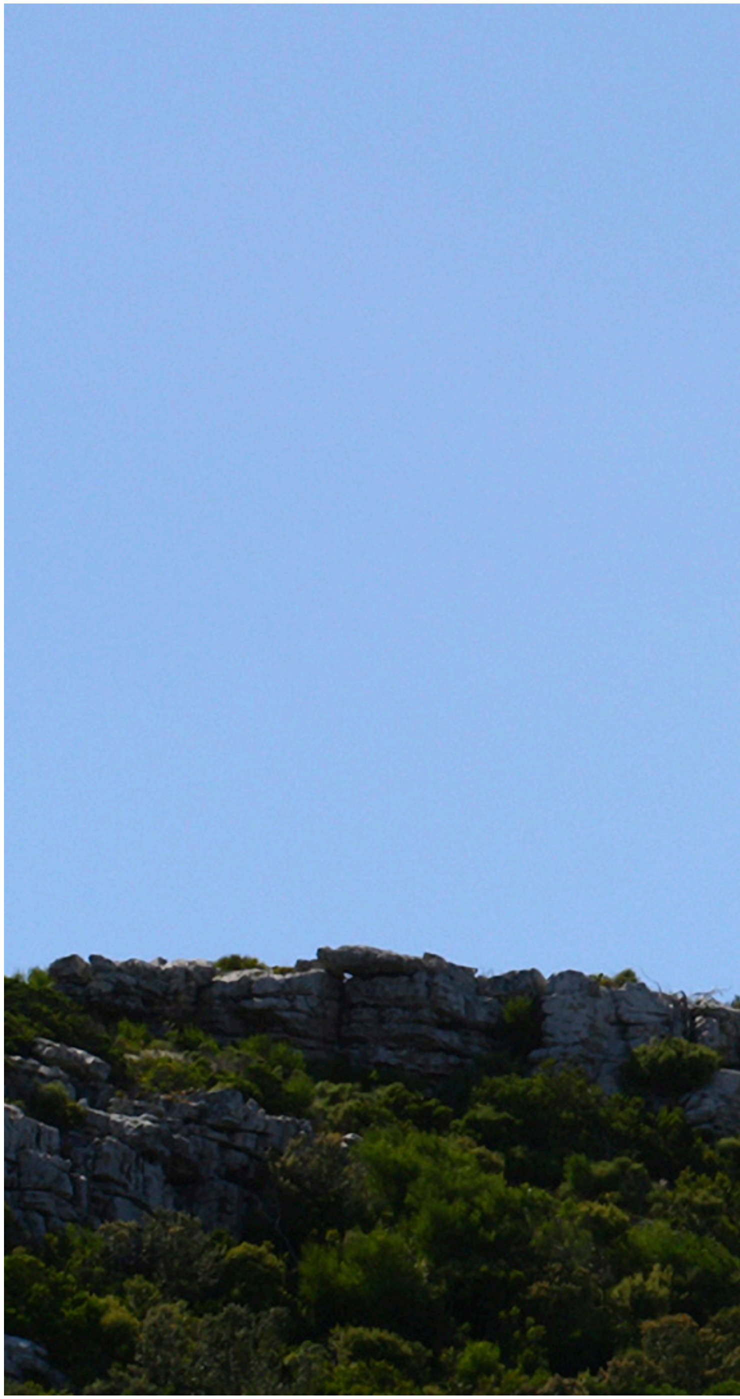
The list of sponsors and prizes were phenomenal, as long as your arm, with each participant taking away something of value right through to the last position. For this we can only say a huge thank you for all the generous support and look forward to seeing the same great crowd of delightful judges, participants and sponsors for next years event.

As much as you plan, scheme, and study the weather patterns, you can only so often expect an event to be a success two years in a row! Specifically when bound by nature, but that's what once more was handed to the grateful pilots and participants in the Two Oceans Slope Soarers Aerobatics Event 2010.

Roll on 2011!

Winners one and all:
1. Steve Meusel 100.000%
2. Michel Leusch 95.465%
3. Marc Wolfe 93.700%
4. Damian Hinrichsen 86.280%
5. Dave Greer 75.710%
6. Kevin Farr 72.875%
7. Malcolm Riley 72.195%
8. Russell Conradt 68.840%
9. Theunis van Niekerk 62.905%
10. Gus Thomas 60.725%
11. Pieter Grove 56.180%
12. Bobby Purnell 55.845%
13 Jeff Steffen 12.980%
14. Marc Beckenstrater 11.425%
15. Tim Watkins-Baker 4.725%

And will grateful thanks to all our sponsors
AMT Composites
ADT for the Caravan
Micton Hobbies
Clowns Hobbies
Hobby Warehouse
Fragram Tools
Russel Conradt
and all the Two Oceans Slope Soarers members who dipped into their own pockets to add more and more prizes, giveaways and welcoming gifts for the event. We cherish you one and all.



Steves Aldij gets launched.

Take to the skies!

Above: The judging line on Sunday.

Below: The Durban crew.

Above: The panel of judges.

Below: Tim Watkins Baker and Bobby Purnell - always cheerful lads.

The light weight Mini Dragon

Left, top to bottom:

Post-competition chatter.

Trophy time for TOSS Aerobatics 2010.

Steve Meusel and Michel Leusch.

Right top to bottom:

The banners of the sponsors —

AMT

Clowns Hobbies

Hobby Warehouse

MIRAMAR 2010

Buenos Aires State, Argentina

Author: Alejandro "@le" Arroyo, sdemdq@gmail.com
Translated to English by: Carlos Cordero
Photos courtesy of the author

Start of work time Minitermicos:
(L) Luis Petrone (Club Planeadores del Atlantico),
(M) Carlos Cordero (CA La Plata) and
(R) Walter Ezcurra (CA Ciudadela)

This year the elected scenario to carry out the Tournament in February 12th to 14th was the Agricultural School N°1 Bernardo Yraizos, where its director the Agr. Carlos Barquin and the Professor Engineer Eduardo Ruete, together with the authorities of the School Cooperative, didn't doubt to offer the facilities and the necessary help (preparation of the field, infrastructure, etc.) to receive all the participants.

One of the advantages of the place was that it offered lodging without charge for the participants

This clearly shows that EABY N°1 is a state school with the doors open to the community.

The whole organization of this event started on June 2009. We've built an Internet site (www.gliders-MIRAMAR .com.ar) where you could appreciate all the information about the Tournament (lodging, flight field, schedule, previous editions, inscription, etc.).

Another task carried out for this event was delegate to one of the members of the organization, Gustavo Cravacuore, who developed the Computer Program for all the categories.

MIRAX of Argentina gave us the front shirts with numbers and signaling elements for the field.

The participant's number was, like in previous editions, important. Although at the beginning we had a bigger number of pilots that had confirmed their participation in advance, unfortunately some of them could not make it. However, this didn't make the historical number of participants decrease; on the contrary, new names have been added to the event.

We developed a new category and to prove their development and to simplify the organization, to speed it up, we call it "Minitérmicos Extreme." For the same one we used the same models as those for Minitermicosicos. The regulation forces the participants to fly all in the same air with a single flight, without speculations, since the participants are forced to leave in the first 20 seconds of the work time. Another characteristic is that the models have to land before the 6 minutes of the task. The computed maximum flight time is 5 minutes.

The agility of the regulation allowed us have two groups that carried out 10 flights each in four hours and a half. If we had wanted to carry out this category with the same quantity of flights and participants following the traditional Minitérmicos regulation, the time wouldn't have been enough to carry out two categories in so few hours, like we had to carry out on Sunday forced by climatic reasons.

This category presents a Challenger Trophy denominated "Minitérmicos del Atlántico" that will battle it out for every year.

You can see more details of the regulation and the conclusions in our <http://www.gliders-MIRAMAR .com.ar> web site.

Observations made by the participants:

- "The organization of this competition was the better level that we have carried out."
- "The flight field was very good, very wide and comfortable, even with shade for the cars; we could prepare the tows in all directions, free of obstacles in the approach areas."
- "The field equipment of the Organization: work tables, PCs and

prints, audio system, electric power, signaling systems of landing areas were all impeccable to keep control of the minimum details."

- "All this very laudable if we keep in mind that those who worked in the organization were only six people, two of them competed at the same time, what demonstrates a great previous work which made a faultless competition."
- "The Computations Team was perfect, with a very developed program that allowed having all the information in real time, and operation folks with great capacity for its handling."
- "The lodging facilities at 200 meters of the flight field were a very good place to stay, to share, and with facilities to repair the models."
- "Two operators (Gustavo Cravacuore and Walter Miranda) have the responsibility for the computations and the handling of the digitized locution that indicated the work time with intervals of 30 seconds of time; the same one was given by Felipe Vadillo."
- "The work carried out by the organization didn't leave place to any doubt."

COMPETITIONS:

1) On Friday morning was carried out the First competition in the country of gliders DLG, FAI F3K. Although only four competitors participated, it was an excellent beginning for a new category with a big future.

2) On Friday afternoon was carried out Minitérmicos del Atlántico or Minis Extreme, 10 rounds were flown in only half-day.

3) On Saturday a very strong wind of around 25 to 40 Km/hr blew. A task of Gliders Std.(RES) was carried out and it had to be suspended due to the wind force and breaking of tows and models.

4) On Sunday Minitérmicos was carried out in its version Extreme, and then Std. (RES), both under perfect conditions.

DLG (F3K - FAI) (Friday 12th - 10:00 hs)
1-Felipe Vadillo
2-Alfredo Lattes
3-Alejandro Arroyo

Minitérmicos Extreme (Friday 12th - 15:00 hs)
1-Ernesto Dondero
2-Adrián Bardet
3-Felipe Vadillo

Minitérmicos Metropolitano (Sunday 14th – 10:00 hs)
1-Felipe Vadillo
2-Alfredo Lattes
3- Daniel Scardamaglia

STD, RES 2.6 m (Sunday 14 th– 12:30 hs)
1-Daniel Scardamglia
2-Mariano Bardet
3-Adrian Bardet

This was the third edition of this event. I consider that this year the group that organized the Tournament (Alvaro Arroyo, Cesar Busato, Gustavo Cravacuore, Walter Miranda, Alberto Passi and Alejandro Arroyo) has achieved an important grade of maturity and establishment in the sport field as well as in the organizational field.

Those who made MIRAMAR 2010 want to thank the members of the Agricultural School Nº1 Bernardo Yraizos, to MIRAX Argentina, to all those who participated and mainly to our families for their patience.

Personally, and to end the story, I think that many times "wind mills" interfere in the achievement of our goals. This competition taught me that no matter the big or the powerful they may be, they should not be faced, but avoided. Somewhere we will always find good will and positive people to carry out the projects that others try to truncate. We found this in MIRAMAR 2010.

I can already confirm that Agrarian School B. Yaraizos Nº1 has granted us again all the facilities so that we can carry out the 4º Edition.

We are looking forward to see you all next year in MIRAMAR 2011!!

Pilots: Emilio Gianello, Felipe Vadillo, Alejandro Arroyo and Alfredo Lattes

Judges: “Papi” Denegri, Fabian Fernandez, Cesar Busato, Alberto Passi

Left: Alfredo Lattes with his Blaster DLG.

Right: Just before the start of the first round in the DLG contest.

Above: Alejandro Arroyo preparing his DLG model, molded from composite materials. “Papi” Denegri and Alberto Passi judges of the event. **Above right**: Alejandro ready to launch his DLG. **Right**: Alejandro in the foreground, further back Emilio Gianello, both in full search of thermals. **Below**: Model “TOP SKY 1,” of Chinese origin, belonging to Felipe Vadillo, winner of the DLG event.

Left: Emilio Gianello concentrates on flying his DLG

Above: Exact moment that Emilio Gianello "traps" his DLG for another flight

MIRAMAR 2010 participants pose with their models for the Minitermicos event.

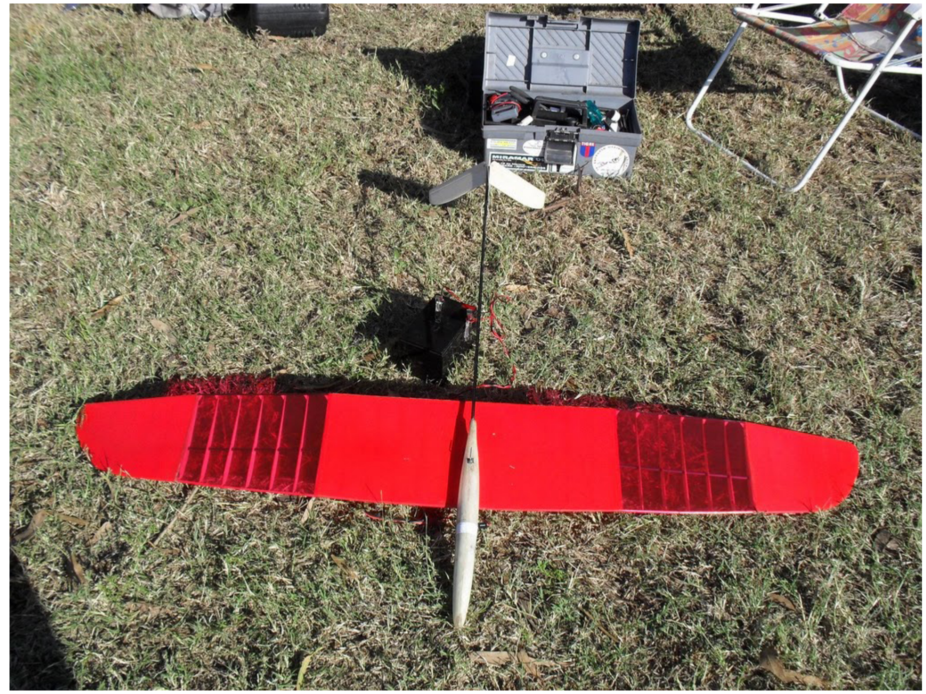
Left: Daniel Scardamaglia and his Minitermicos model.

Right: Just prior to the start of the Minitermicos event working time.

Model category Minitermicos, Carlos Seijo (C.A. Ciudadela)

Roberto Morriones, after having completed the precision duration task.

<u>Minitermicos entries</u> — Above left: Models belonging to the category Minitermicos David Friedman and Franco Capuani, both representatives of C.A. Ciudadela**. Above right**: A better shot of Franco Capuani's model**. Below right**: Model entered by Walter Ezcurra (C.A. Ciudadela)**. Below left**: Carlos Seijo's model (C.A. Ciudadela)

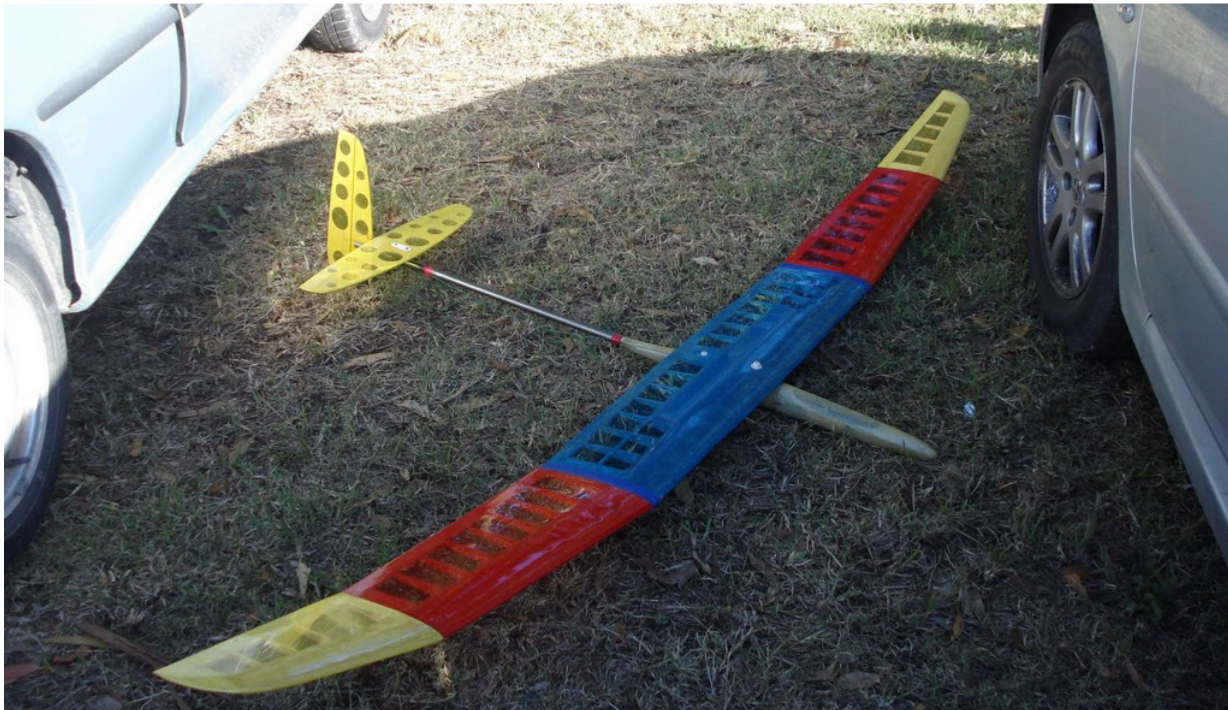


More Minitermicosmodels — Upper left: Roberto Morriones, Club Alas del Norte. **Upper right**: Minitermicos belonging to Daniel Scardamaglia (C.A. Delta) **Near left**: Fabian Fernandez (C.A. Newbery) and "Chango" Armesto (C.A. Rio de la Plata) **Far left**: Carlos Cordero of the C.A. La Plata just before the start of the Minitermicos event.

Left: Felipe Vadillo and Daniel Scardamaglia

Below: Franco Capuani checks the operation of his model before launching.

Below left: Fabian Fernandez with his Minitermicos model.



Left: STD model entered by “Pancho” Marañon, C.A. La Plata

Right: “Mini-Supra” STD model belonging to Alejandro Arroyo.

Detail of the tail group of Alfredo Lattes' STD model, developed from the Topaz.

Above: Officers and sound control; working time was announced by a digital voice. Cesar Busato and Gustavo Cravacuore at the notebook computer used to score all of the events.

Above right: Banner of MIRAX Argentina, major sponsor of MIRAMAR 2010.

Right: A sampling of the beautiful trophies awarded.

FVA 10B Rhineland

Siegfried Kaltenbrunner, kabrusi500@aon.at

The photo on the back cover is of my FVA 10B Rhineland soaring in late evening thermals.

The original glider was built from wood by a study group at the University Aachen in 1937. This was the first glider which was able to cross the Alps. It also won the second place prize for flight performance and the first place price for technical construction at the Rhön Championships.

Model specifications:

Wing span	2800 mm/110.23"
Length	1230 mm/48.42"
Weight	1550 g/54.67 oz
Wing area	35.5 dm^2/3.767 ft^2
Wing loading	44 g/dm^2/14.51 oz/ft^2
Airfoil	Goe 532 modified
Radio	5 channels, 7 servos

Wings and stabilizer are made from styrofoam sheeted with balsa. The fuselage is fiberglass with white gelcoat. The kit itself is an ARF produced in the far east, I think China or Vietnam, and imported by our local hobby shop. The model performs very well and does look bigger than it really is.

My flying site is in lower Austria, about 50 km west of Vienna. I have included a little map so you can get an idea as to where the airfield is located in Europe. Usually we are towing our gliders with a tug. It's a semiscale model of a Pilatus Porter PC6 equipped with a 35ccm gasoline engine. I have a couple of photos where you can see a double towing of two FVA's at once. The one named "Hans" (have a look at the rudder) no longer exists. At the next start after the double towing, my friend could not release the tow line and the tug pilot did not recognize this until too late. After a few seconds the wing was broken and "Hans" was history.

Usually we are towing our gliders with a tug. It's a semiscale model of a Pilatus Porter PC6 equipped with a 35ccm gasoline engine.

My flying site is about 50 km west from Vienna. I have included a little map so you can get an idea as to where the airfield is located in Europe.

Below is a photo of our airfield taken from a motorized sailplane. The folding propeller can be seen at the far left.

Two FVAs, “Hans” (upper right) and “Sigi” (lower left), being towed simultaneously by the same tug.

Two FAVs, Sigi in the foreground, Hans behind, after the double towing. At the next start my friend could not release the tow line and the tug pilot did not recognize this until too late. After a few seconds the wing was broken and “Hans” was history.

“Hans,” before its demise, coming in for a landing.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RCSD