Radio Controlled
Soaring Digest
May 2009 Vol. 26, No. 5

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May 2009
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Front cover: Alan Mayhew's Xplorer at the Open F3J International competition held in Adelaide, South Australia in early March. Coverage of that event by Greg Potter appeared in the April issue of RCSD. Photo by Greg Potter

R/C Soaring Digest

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R/C Soaring Digest (*RCSD*) is a reader-written monthly publication for the R/C sailplane enthusiast and has been published since January 1984. It is dedicated to sharing technical and educational information. All material contributed must be exclusive and original and not infringe upon the copyrights of others. It is the policy of *RCSD* to provide accurate information. Please let us know of any error that significantly affects the meaning of a story. Because we encourage new ideas, the content of each article is the opinion of the author and may not necessarily reflect those of *RCSD*. We encourage anyone who wishes to obtain additional information to contact the author.

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In the Air

We're right on the cusp of what we hope will be great flying weather here in the Pacific Northwest. We had a bit of snow and hail during the morning hours just last week, yet it's 70 degrees outside as we write this, and the weather forecast for tonight is predicting a possibility of snow in some areas. Changeable just doesn't seem to adequately define this meteorological situation.

An exciting project just came off our building board and is ready to fly, but between our co-builder still being in school and the changeable weather, test flying has yet to take place. Everything should be lined up for publication in the June issue, however.

We do have another project on the building board and we're hoping to get it finished before the weather undergoes a more permanent change. Yes, it's tailless, and yes, there will be a construction series published in *RCSD*. Stay tuned!

The photo background on the Contents page shows an Electro Corobat (see page 65 of this issue) going up in a strong thermal. Larry Weller's Corobat series look like great alternatives to EPP "foamies" for both slope and electric flight.

Time to build another sailplane!

———————

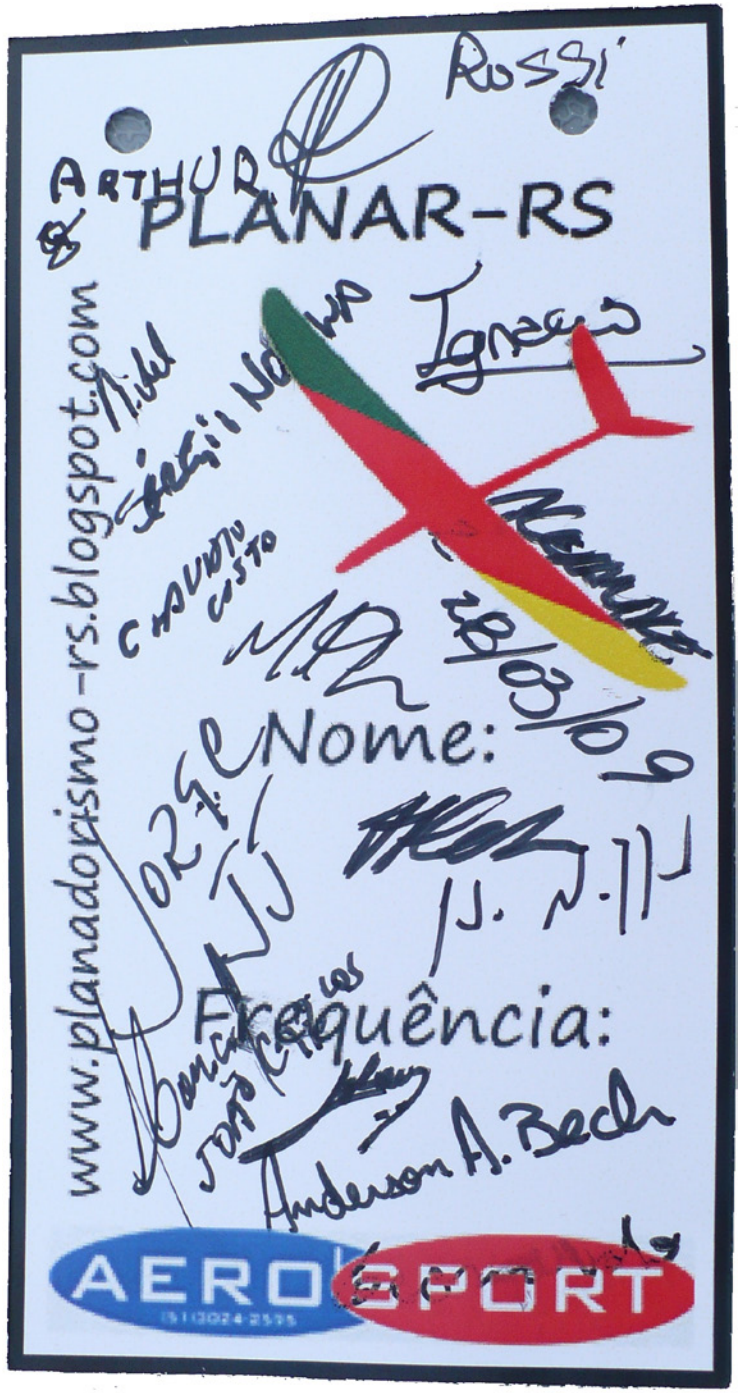
Correction to *Kinetic 100 does 392 mph on second day of flight*: The photo caption on page 19 should read "The revised wing and stab section came from Dirk Pflug." Our apologies to everyone concerned for the misinformation.


NIKE
SPIRIT ELITE
ASCENT

FIRST GLIDER PILOTS' REUNION

Torres, Brazil

José Ignacio Blanco, blanco.jig@gmail.com

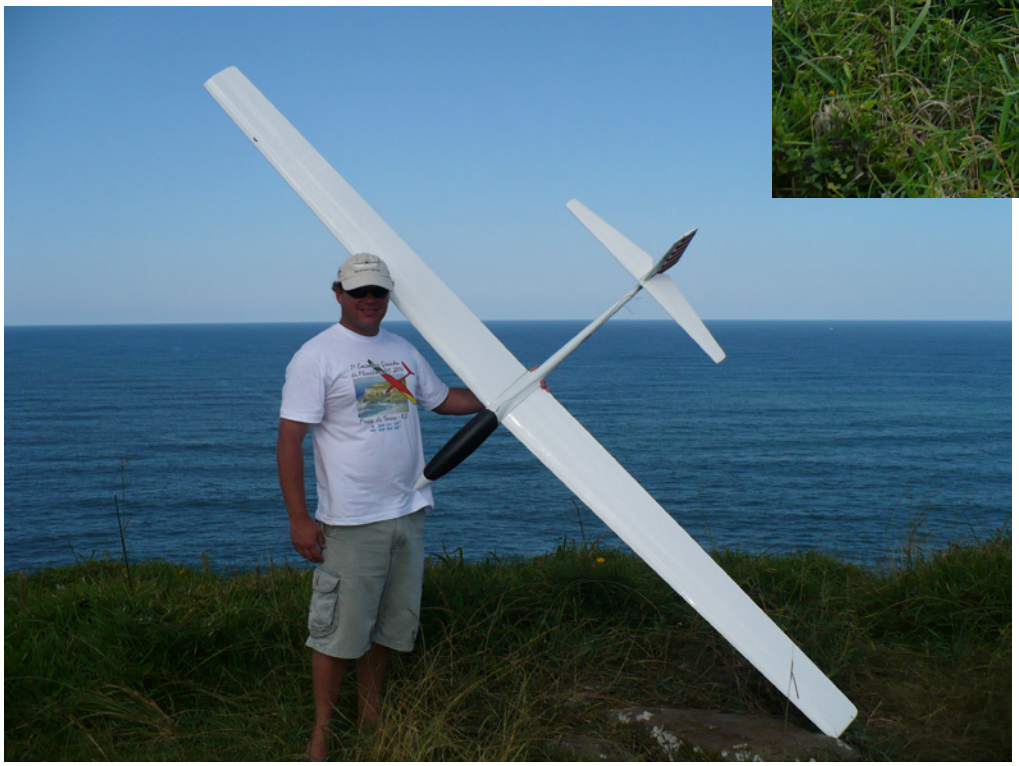


The silent flight, yet not so popular in the Gauchos land, was celebrated in a reunion in the last days of March (27th and 28th) where about 20 pilots from the state of Rio Grande do Sul got together to fly and exchange experiences.

The event was done with a beautiful landscape, the beach of Torres, where the slopes and wind normally supply the pilots with pleasant flights and time-to-time with frustration. The frustration comes from the rocks where some planes crash with no chance for recovery.

The weather was great for the first day, sunny and warm, but with almost no wind. These photos show Lucky Marcelo with his Terminator II. The light plane was able to make plenty of flights and allowed Marcelo to do a lot of slope soaring.


www.planadorismo-rs.blogspot.com



During the second day, the wind was stronger and allowed heavier planes to fly with more confidence, so the scale models and full house gliders were able to take their places in the skies.

In all, the flights were very pleasant for the pilots, and the opportunity for making new friends and making the glider pilots a more solid team was great. For sure this was the first event of this kind in our state, but it won´t be the last.

We are already planning a road trip (we liked the Volksrust idea from the issue February 2009) to visit six different flying sites where all the pilots will have the opportunity to get together once more.

An eight minute video of the reunion is available at <http://www.youtube.com/watch?v=k2GXHeZONCk>.

What makes a receiver FULL RANGE?

By Pete Carr WW3O, wb3bqo@yahoo.com

I received a Shadow 3 receiver that is made by Sombra Labs in Canada. It is advertised as a “full-range, fully synthesized” receiver. It comes with a separate programming module used to set the receiver operating frequency. The size and weight of the unit make it very suitable for use with very small Park Flyers, electric indoor models and any model needing a very small and lightweight radio.

The instructions that came with the receiver only illustrated the frequencies for operation in the 72/75 MHz bands. I wanted to use the receiver in a model controlled by a 6-meter band radio, so I e-mailed the company. My Aroosh Elahi (aroosh@sombralabs.com) replied with very detailed instructions for setting up the receiver on 6-meters. I followed the directions and the receiver locked in on 50.960 MHz, channel 08.

This is the first agile frequency RC receiver I’ve had, so I decided to do some testing.

The Sombra Shadow is shown with it’s companion programmer. Under test I connected several servos to observe at what point they jitter as the pulse amplitude decreased.

There are a decreasing number of RC radio manufacturers making equipment for 6-meters. Guys like me are always looking for new and better gear that will work in this Amateur Radio band. However, we are a sceptical bunch and tend to question the brash statements of manufacturers. In this case the statement about the receiver being “full range” interested me.

The receivers for RC use lead a miserable life. In addition to the physical abuse of being bashed into the ground on landings, the high stress of launches and such, receivers have a tough time electronically. Unlike most receivers that operate near the ground, RC receivers are expected to pick up the desired transmitter signal and process it to drive the servos while ignoring unwanted signals.

In addition, while the desired signal from the transmitter gets weaker with range, the undesired ones tend to increase as the model increases its slant range. The receiver Automatic Gain Control (AGC) circuit adjusts the gain according to the strength of the incoming signal so the receiver doesn’t jitter or quit while right next to the transmitter at launch. As range from the transmitter increases the AGC decreases which raises the gain so that signals from the ground maintain a usable level at the decoder output.

Receivers that are used quite close to the transmitter - Park Flyers and indoor models - fly in a condition where the AGC severely reduces gain all the time. In addition, most receivers are single frequency devices that are front-end tuned to accept the desired signal and reject all others.

A synthesized, frequency-agile receiver must have a front-end input circuit that is broad enough to accept signals from any band where it can be programmed to operate. There will be very little rejection of unwanted signals by the receiver front end. The receiver is looking for desired signals and will hear undesired signals to some degree.

The third element in this equation is noise. Noise is defined as random energy of a certain frequency or band of frequencies. There is noise from the Earth, noise from the sky and noise generated inside the receiver itself. Noise can be added to unwanted signals to form new signals and noise can also cover wanted signals so the receiver can’t “hear” them.

As the RC receiver flies away from the transmitter the desired signal gets weaker while all the bad stuff tends to get stronger. As you know, no RC equipment gets a tougher range test than the gear in sailplanes. We fly further away from the transmitter than anyone else in RC. If we fly so far away that we have trouble seeing the ship, we go and build a bigger one! All the while the RC equipment is the same but the range gets longer.

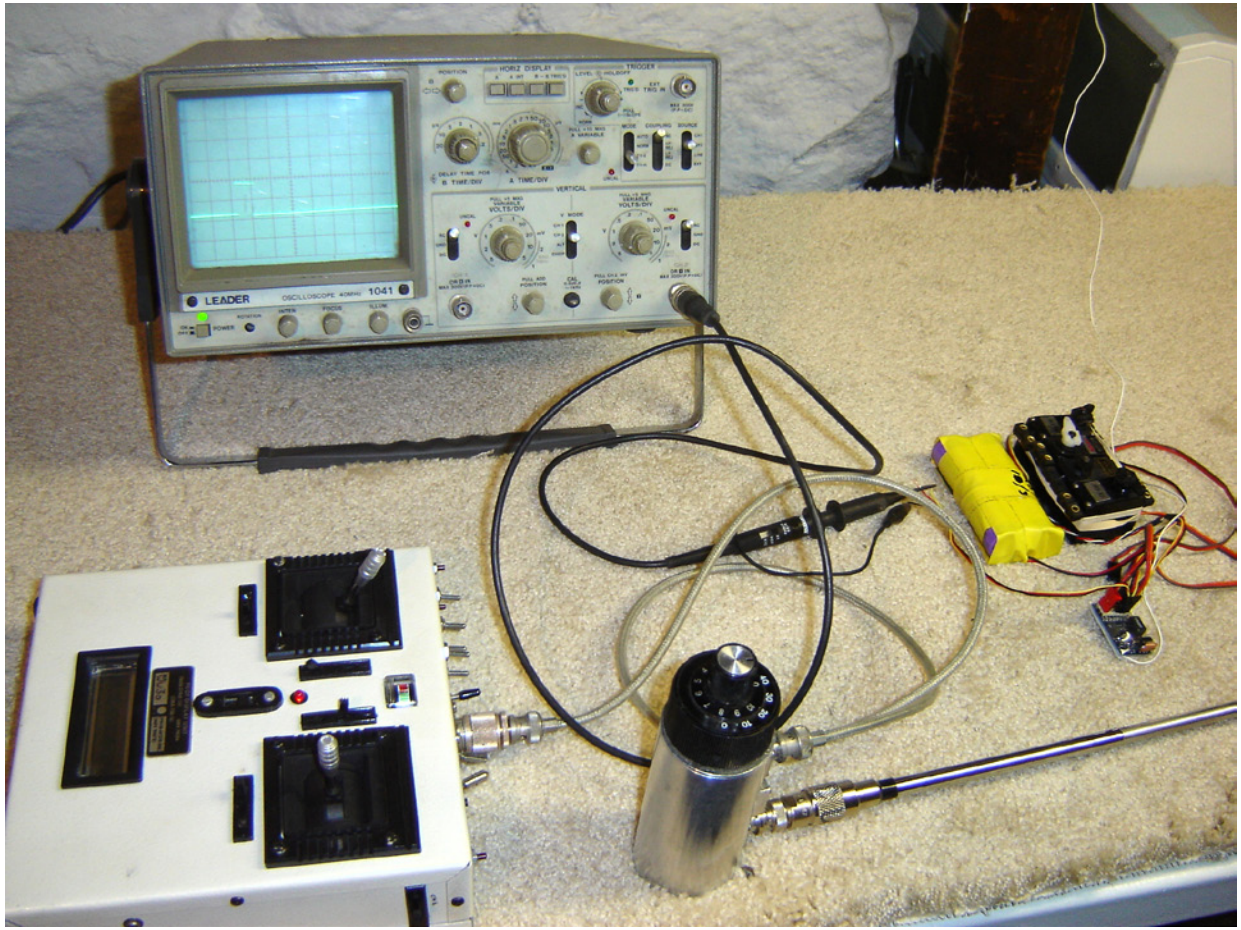
Since the data pulse that runs the servo is the end result of all the circuitry in the receiver, I wanted to look at that pulse and vary the conditions.

Since this receiving environment is constantly changing it's very difficult to put metrics to the situation. After thinking about the question for a while I decided to compare the Shadow receiver to a receiver that I knew worked flawlessly at what I considered maximum range. I normally use a Futaba R168DF on Channel 08 and it has never glitched.

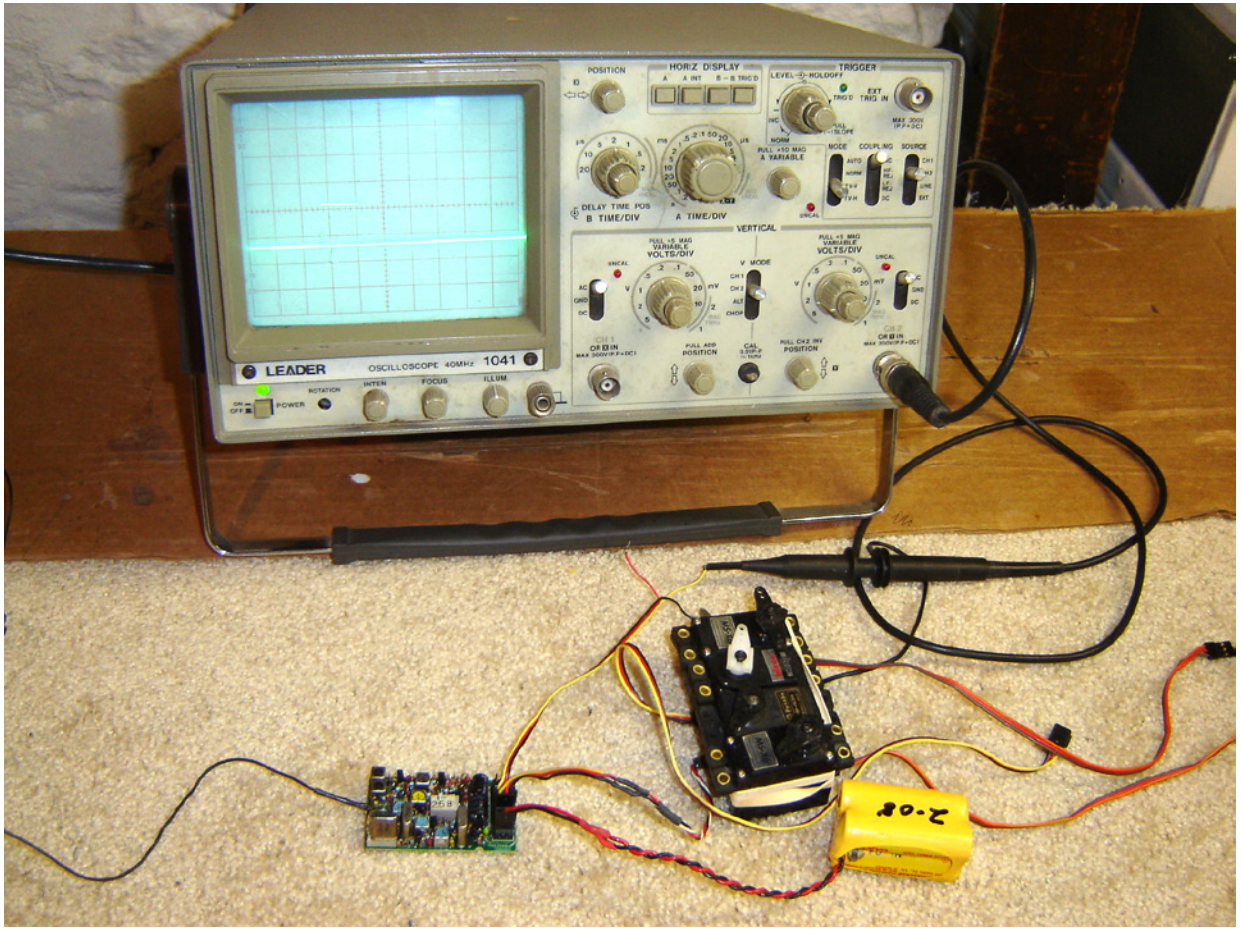
I decided to test for two factors. One was Minimum Discernable Signal (MDS) and the other was adjacent channel rejection.

To be fair, I didn't expect the Shadow to do as well as the Futaba at adjacent signal rejection because of its wide-band front end. I did compare the antenna length of the Shadow with the Futaba and found that they were very similar. The antenna of a receiver is made up of the wire extending from the circuit board and the antenna coil (inductor) that makes up part of the electrical full length of the antenna to make it resonant. You can have a bigger coil and less wire or reverse the numbers and still get resonance. The best balance of coil verses wire is where the receiver gets enough RF to make it work while there is an acceptable length of wire trailing out behind the aircraft. This resonant antenna combination also helps reject out-of-band signals. The Futaba is single-frequency so this rejection is higher than with the Shadow.

Minimum Discernible Signal (MDS) level of a receiver is normally labeled in dBm



A MicroPro 2000 encoder with FMA RF deck in a ACE case comprises the transmitter at left. The SO-239 and PL-259 adaptor connectors are at the transmitter top. The Step attenuator and telescoping antenna are at right. The Leader oscilloscope displays the single channel pulse at the rear.



The Futaba receiver is connected to the scope using the same equipment as with the Sombra Shadow.

or decibel milliwatts (with respect to 1 milliwatt). Watts, or milliwatts are units of power where voltage and current are combined. If, for example, the receiver has a noise floor of -133 dBm, then any signal stronger than -133 dBm should be capable of being received. As I mentioned before, noise from outside sources adds to the noise floor of the circuit so MDS is an ever changing number.

The Local Oscillator and Mixer are next in line after the antenna. All the signals picked up by the antenna arrive at the mixer. The local oscillator produces a signal on a frequency that is added to the mixer. The only output from the mixer is the single frequency that is desired. Up to this point there isn't much amplification added to the signals. The reason is that any undesired signals or noise would also be amplified. Once the desired signal is produced from the mixer it can be further filtered and amplified. This part of the receiver is called the Intermediate Frequency (I.F.) strip.

There may be two I.F. strips where the signal is converted to a lower frequency and then converted again in the second I.F. strip. These double conversion receivers are pretty much standard design in high performance receivers. The I.F. strips amplify the signal and that gain is adjusted by the AGC. Gain also produces noise within the circuit so the

amount of gain and the components that make it are very carefully chosen.

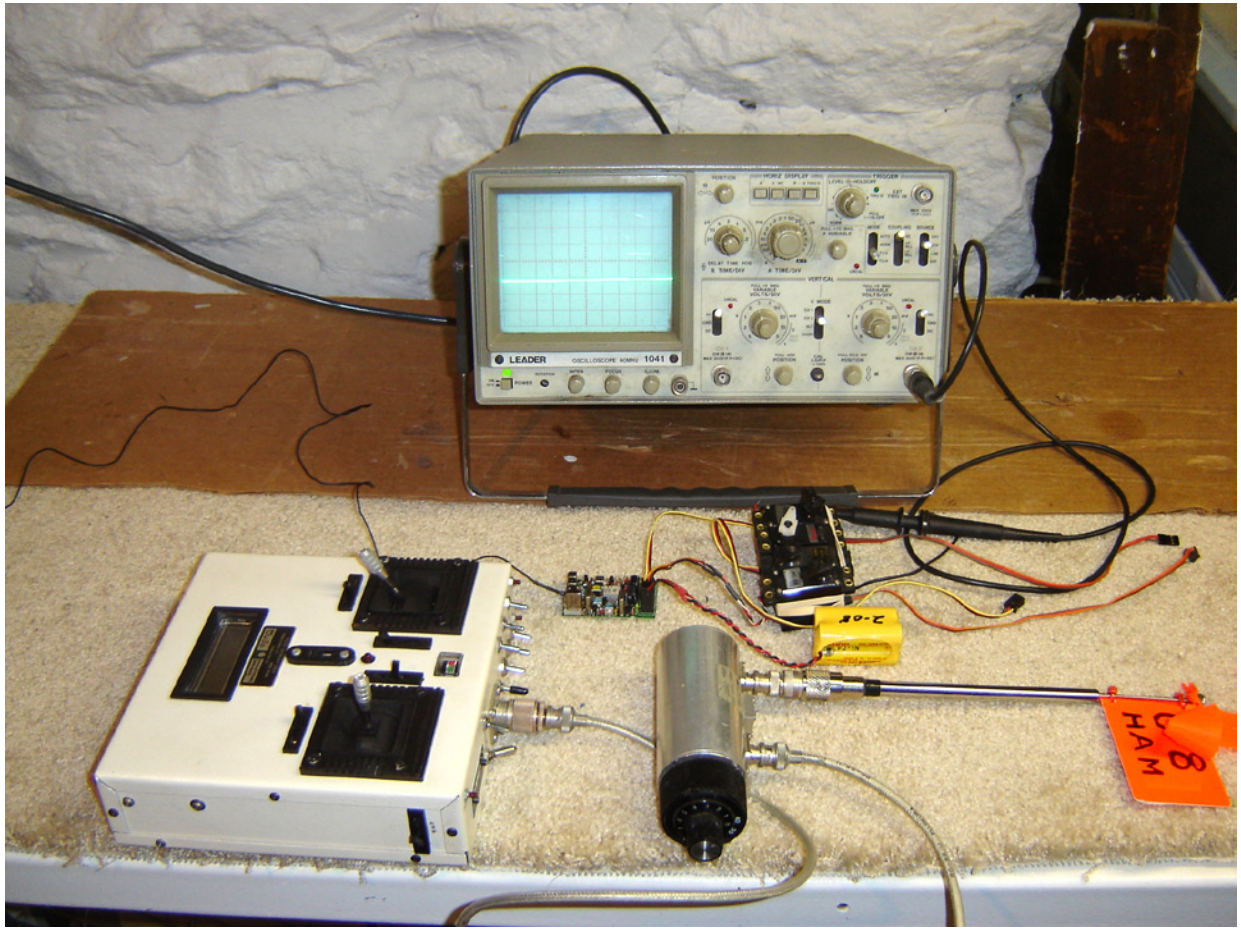
The output of the I.F. strips is fed to a discriminator. This circuit removes the data pulses from the I.F. carrier and sends them to the decoder. The decoder divides the data up and sends it to the various servos. The clock pulse is retained in the decoder and tells the circuit where the pulse train of data begins.

The servos each see a single pulse that varies from about 1 millisecond to about 2 milliseconds. The pulse length sets the physical position of the servo arm.

Since the data pulse that runs the servo is the end result of all the circuitry in the receiver, I wanted to look at that pulse and vary the conditions. If the pulse was altered very little then the receiver could compensate for changes in signal input. If the pulse developed problems then I wanted to know the conditions where that happened.

I connected an oscilloscope to the servo connector of the receiver and turned on both the receiver and transmitter. After adjusting the presentation to lock in the display I was able to see a single data pulse as it would be applied to the servo.

Then I connected a JFW Industries Model 75DR-003 step attenuator to the antenna of the transmitter. There is an SO-239 connector on the transmitter that normally accepts a PL-259 connector



The entire test setup is operating with a pulse displayed on the scope screen. Recovered pulse amplitude is about 4.3 volts. Servo jitters begin at about 0.6 volts of pulse amplitude.

The Leader 1044 40 MHz scope displays a single decoder output pulse at 2 volts per division vertical scale. Both receivers had a about the same pulse amplitude. Noise was barely visible in this scope trace.

with the telescoping antenna hooked to it. I then connected the antenna to the output of the step attenuator using a UHF to BNC adaptor.

The goal was to add attenuation and reduce the RF output of the transmitter at controlled steps and observe the results on the scope. At the same time the impedance match at the transmitter output was preserved at 50 ohms by the attenuator so the transmitter would not overheat.

Now, this is only a poor representation of the actual conditions found at long range by the receiver. However, it would be a good indicator of how the Shadow would perform compared to the Futaba.

As transmitter signal decreased, the AGC increased the Shadow I.F. strip gain and there was some increase in noise. However, the signal to noise (S/N) ratio was excellent. I noted the amount of attenuation on the step attenuator.

I then installed the Futaba and looked at the scope traces with the same amount of attenuation. The results were very similar. On both tests the single pulse to the servo remained at about the same amplitude.

Next I turned on a transmitter at full power on channel 04 and repeated the two tests. As expected, the level of noise was higher on both receivers but the Futaba was better than the Shadow. This would be like the aircraft flying away from

the desired transmitter and right over another transmitter on channel 04. The scope showed some increase in noise level. Some of this may be because there was a lot of RF in a small space in the shop and the wiring might be picking up signals.

The net results were that the Shadow performed nearly as well as the Futaba. Having looked at the pulse output of both receivers I would say that the Shadow might "jitter" the servos a bit shorter in range than the Futaba. Does this make the Shadow not quite "full-range"? It's hard to say.

There is one other ingredient in this stew of information. The Shadow has Digital Signal Processing (DSP). This is a computer algorithm that filters receiver information according to certain parameters. It helps the wide open front end of the receiver cope with the signals it receives.

There is a wide variety of DSP technology available to solve specific problems and Sombra Labs doesn't say what it uses. The Berg receivers had DSP in them that was very effective. Bergs were also single frequency devices so the result was a super performance unit. I believe that Sombra Labs uses DSP in similar fashion to improve the overall performance of their receiver. The Futaba does it the old fashioned way without benefit of DSP. I do know that the Futaba is as "full range" a receiver as I need and the Shadow tests a very close second.

The Hams that operate 6-meter RC have very little need to switch frequencies. For that reason I was more interested in the Shadow for its' performance. While it fits very well into the smallest of HLG fuselages, it also works surprisingly well in electrically noisy Park Flyers and indoor models.

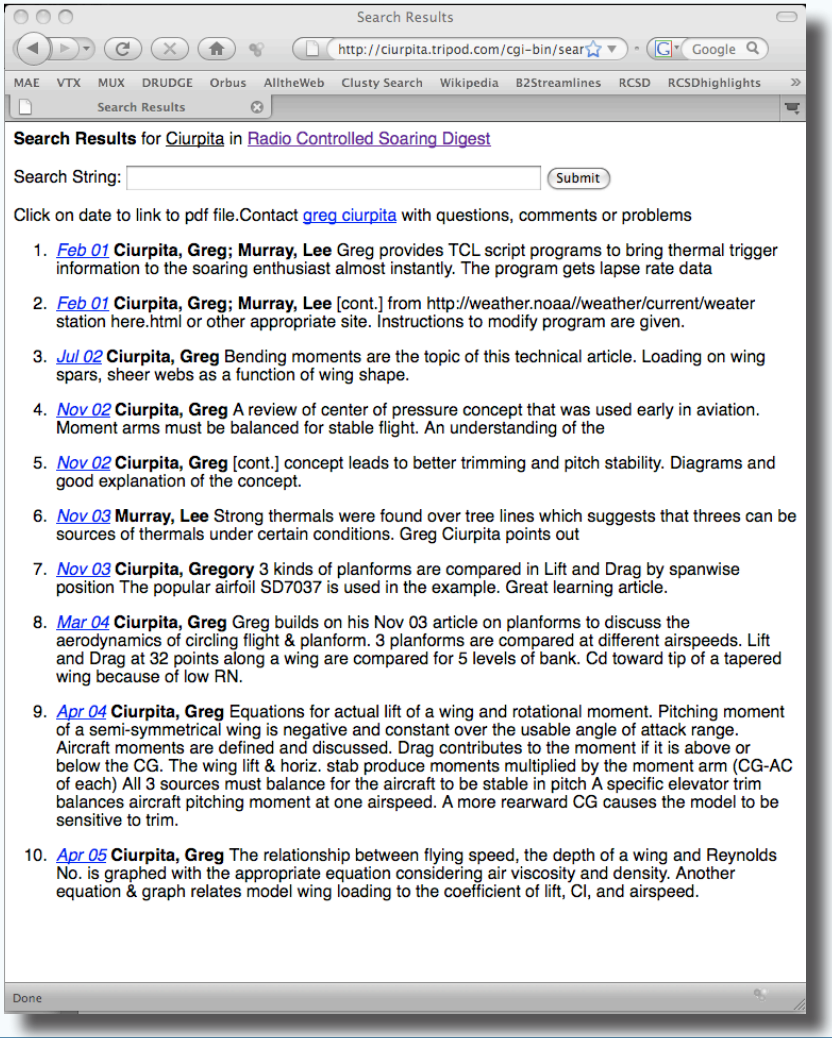
The amazing part (at least to me) is that the circuitry of the agile Local Oscillator is smaller than a crystal it replaces.

Of course, it's performance, not size that matters. Isn't that right, guys?

From: Greg Ciurpita <gregory.ciurpita.1983@njitalumni.org>
Subject: RCSD Index

Thought I'd let you know that I had some free time and finally modified my *RCSD* search engine so that the results have links to the pdf files you've been archiving, thanks to your methodical naming convention.

<http://ciurpita.tripod.com/rcsd/rcsd.html>



Museum of Flight

In an annual rite of spring, the member clubs of the Seattle Glider Council again presented a glimpse into the fascinating world of silent flight at Soaring Expo 2009, held March 21-22 at The Museum of Flight.

Full-size sailp[laness, paragliders, and radio controlled gliders were on display. Lectures, movies and presentations were offered all weekend, and representatives of local soaring and RC glider clubs were on-hand to answer questions.

On Saturday, glider designer Danny Howell gave a presentation on the status and performance of the “microlift” glider, LightHawk. Danny discussed the design challenges and the manufacturing advances that were required to produce a glider capable of exploiting microlift, a very weak atmospheric lift condition that is hardly usable for conventional sailplanes. The film documentary “Silent Wings — The American Glider Pilots of WWII” was shown on Sunday in the museum theatre. Through rare archival footage and photographs, the narrated film reveals the critical role gliders played in World War II offensives.

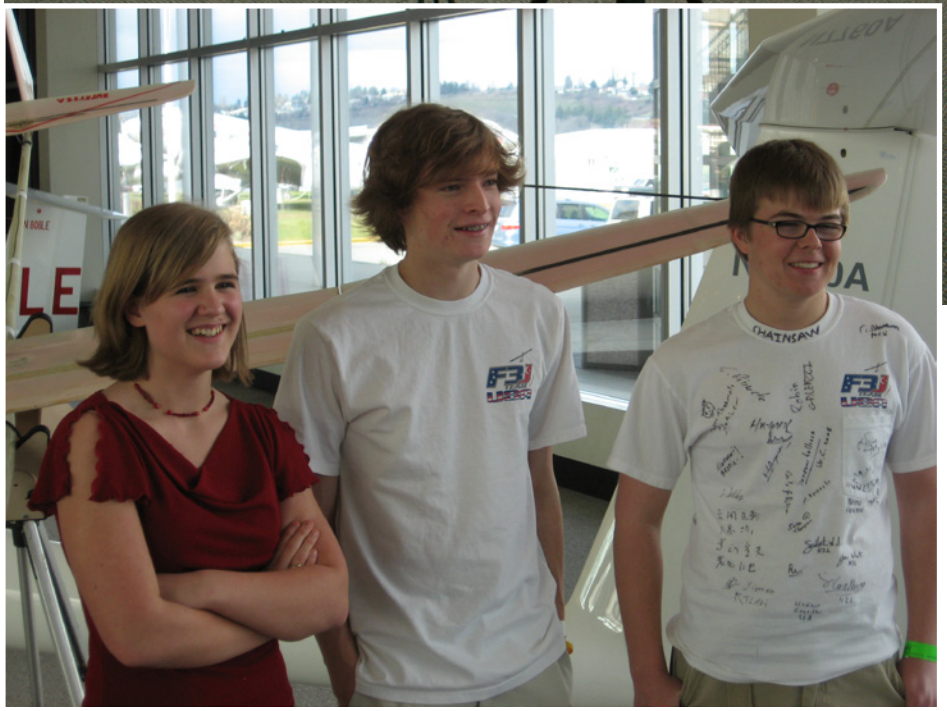
Sunday afternoon, Dave Beardsley provided a look at RC soaring, including what it takes to get started in the activity, the F3J contest format, and what kind of gliders are flown in competition. Brendon Beardsley then, through slide presentation commentary, shared his experiences representing the United States at the 2008 F3J World Championships in Turkey.

SOARING EXPO 2009

The Seattle Area Soaring Society provided a number of RC sailplanes for static display in the museum during the Expo. On the main floor, under the M-21 engine inlet, a table held several Olympic IIs and Dave Jensen's sloper. In front of the display was Sanders Chai's DG 1000 with electric easy-up system. SASS had two staffed booths where club information was made available. Photos by Seth Arlow, MD.

Left: Dave Jensen's Erwin all carbon sloper resides on its Plane Perch (formerly Super Stand, tburkhard@comcast.net). Photo by Alyssa Wulick

Below left: Three of SASS's several Juniors. Alyssa Wulick (see Supryssa, January 2009 RCSD), Brendon Beardsley (2nd Junior F3J WCs), and Michael Knight (U.S. F3J Junior Team alternate). Photo by Patricia Holmes



Below: Dave Beardsley's 1/3 scale Wilga. This 'ship is perfectly capable of pulling up large scale gliders, and does so on a regular basis.

Above: Three Olympic IIs, one in skeleton form, on the display table under the M-21 engine inlet on the museum main floor.

Below: Adam Weston's Encore RC-HLG.

Below: Brian Keeffe's Shadow, photographed from the walkway. Photos by Alyssa Wulick

A review

by Seth Arlow MD, arlow2@msn.com

"High Performance Thermal Soaring"
Radio/CarbonArt Productions
©2008 by Paul Naton
with flight demonstrations
by David Hobby
1 hr, 37 min, 45 secs.
Plus about 15 minutes of added features and DVD previews
Rated G

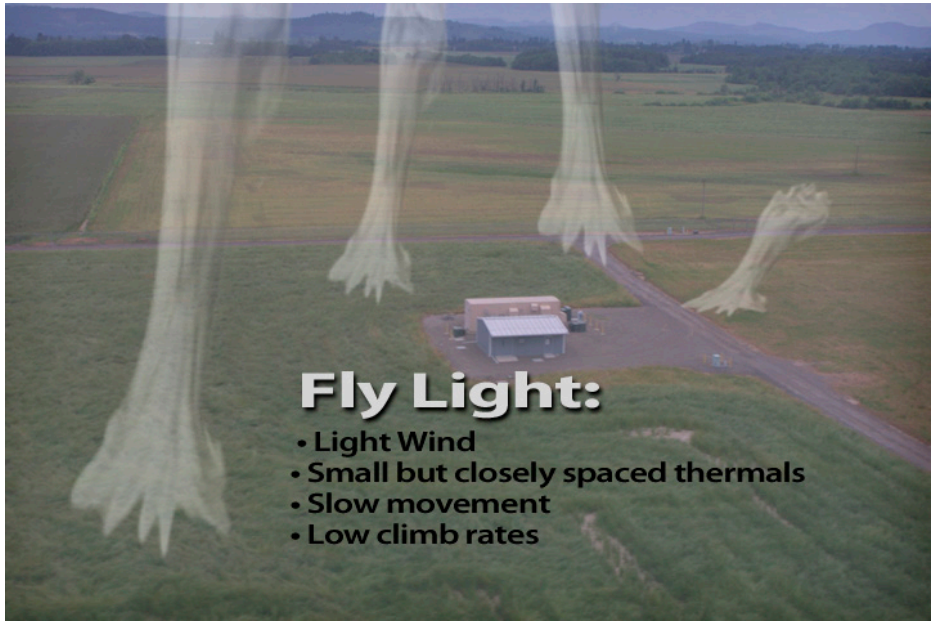
Can watching a DVD make you a better glider pilot?

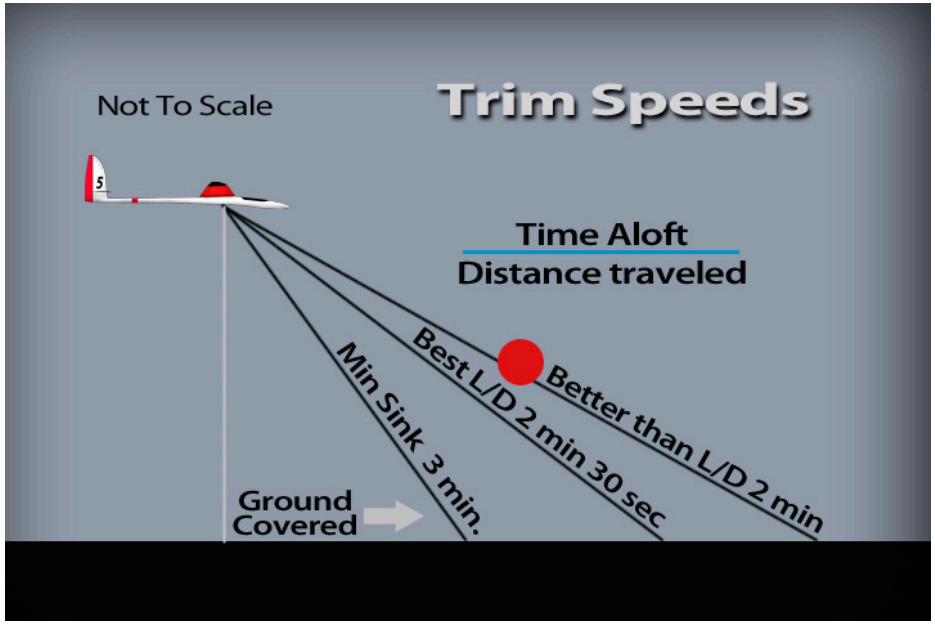
This is the question inherent in viewing Paul Naton's latest addition to his collection of home study DVDs for RC soaring enthusiasts.

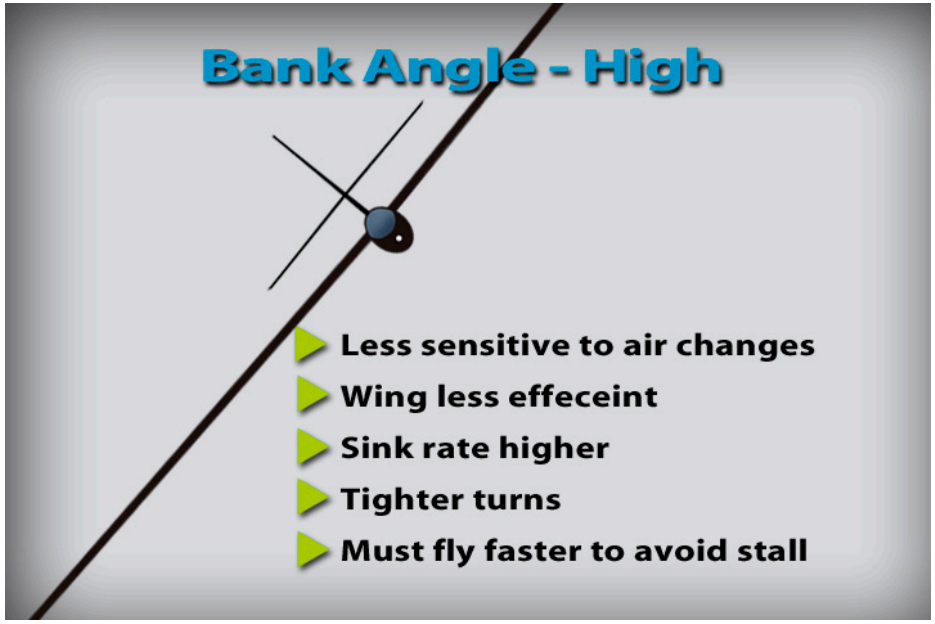
This newest entry, like his previous ones, is well organized and beautifully photographed, and benefits from, indeed requires, multiple viewings and perhaps note taking as well.

The first half of the program is divided into seven topics, with narration and illustrations by Paul Naton.

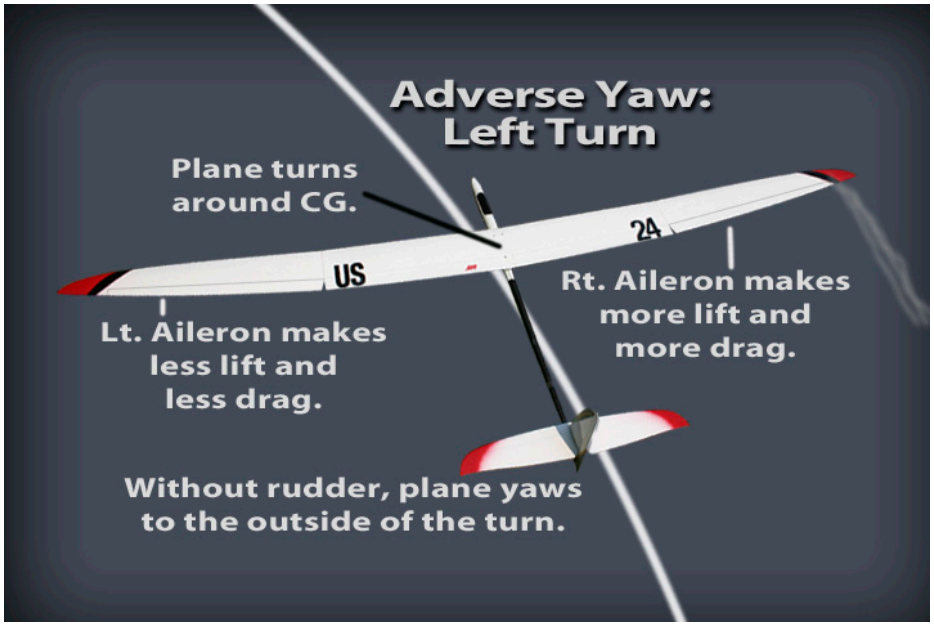
Each of these sections starts with an overview, and ends with a field assignment, things for the serious viewer to work on, away from class.

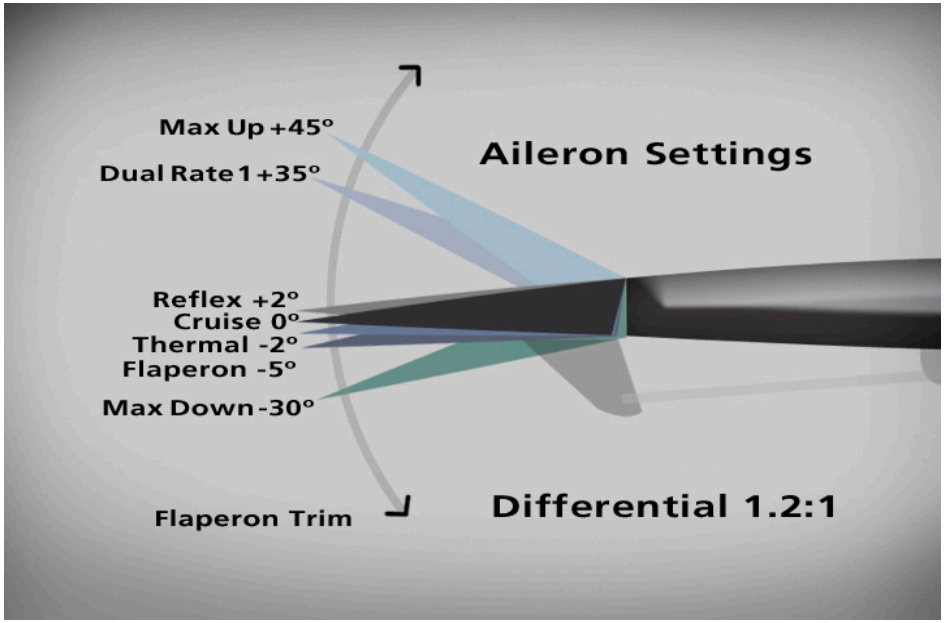






These begin with a very quick review of basics (“Weather Geek” and “The Cube of Air”) and quickly advance to fairly technical advice on setting trim speeds and center of gravity (“Three Speeds” and “CG for Dummies”) and then on to selecting bank angle (“In the Bank”), “Stick ‘N Rudder” and ballast. Advice to pilots includes hints on watching ground signs of thermals, using transmitter aerial streamers, and some guidance for the use of ballast on older and newer generation thermal gliders.





The second half of the DVD features a long interview and flying demonstration with David Hobby, who has twice been F3J World Champion. These "Pro Sessions" were recorded over two days in Australia.

Hobby is easy to understand, and is at his best when demonstrating the finer points of his technique with a small paper model of an F3J ship held in his hand.

He talks at length about finding lift, and most importantly, staying in lift. As Hobby says repeatedly, "being able to stay in lift is more important than how you fly in lift."

Hobby talks, and demonstrates in detail with his miniature model, how he selects bank angle and search patterns.

He also discusses specifics of his own plane setup, which includes rudder mix in all modes, and comparatively (for an expert competitor) forward CG, for smoother flying in weak lift conditions.

The weakest part of the DVD is David Hobby's flying demonstrations with his Onyx JW.

While he is no doubt the definition of an expert pro flier, the video really does not come across. This is partly the problem inherent in viewing video of glider flight. If the view is expansive enough to show what the plane is doing relative to the

ground, the craft is so small that it is difficult to appreciate what the pilot or the aircraft is doing. If the zoom is sufficient to show the plane clearly, the viewer can't tell if it is gaining or losing altitude. I also got the impression that this part of the DVD was hampered by a tight filming schedule.

The final part of the DVD is "Extras," which includes a pro session with Paul Naton on plane setup. This is done quickly, and covers a number of fairly complex and detailed subjects, such as camber and flight modes. One wishes the video of the plane (on a stand, demonstrating settings with a quick flick of switch or stick) was done in a better environment and more slowly, so the many fine points could be better appreciated.

As to the question of will viewing "High Performance Thermal Soaring" make you a better pilot, the answer is "Yes," if you approach the DVD as a class for advanced pilots, taught by experts, who expect you to pay attention, take notes, heed their advice, and do your homework.

Olympia II

Elliotts of Newbury, Ltd.

Newbury Berks, England

The EoN Olympia history began with a contest for a single design for the 1940 Olympic Games to be held in Helsinki, Finland. The entrants included the Meise (Titmouse), designed by the DFS (Deutsche Forschungsanstalt für Segelflug) team led by Hans Jacobs, Akaflieg Munich's contribution (designed by Ludwig Karch) the Mu 17, the Orlik from Poland, and two Italian designs.

The selection committee chose the Meise after trials held in 1939, and the name became Olympia Meise. DFS sent out plans to a number of nations so building could start in anticipation of the Games, but the Games were cancelled following the outbreak of war.

One of the structural features of the Olympia Meise was the incorporation of a secondary spar in addition to the main spar. This made the wing torsionally stiff and inhibited wing twist due to aileron deflection.

The Meise had a semi-monocoque ply-covered fuselage, a classic torsion box leading edged wing and a tailplane with a minimum area stressed torsion box leading edge. The tailplane is the weakest part of the aircraft and is prone to fail during inverted flight, rolls, and high velocities.

The Olympia Meise was built in several European countries during the war. In England, following the war, the DFS plans were altered for mass production by Chilton. One example was built there, and then all rights went to Elliotts. A furniture-making firm before the war, Elliotts was involved in making aircraft parts during the war (Tiger Moth and Mosquito, and Horsa and Hamilcar gliders) and a return to building furniture was disallowed by the Board of Trade. With the rights to the Olympia Meise in hand, Elliotts began sailplane production. First flight of the EoN Olympia was in early 1947, and an initial production run of 100 units was started.

The Olympia quickly became popular with private owners and clubs and was exported to a number of countries.

The Olympia was produced in three versions: the Mk I had a steel-sheathed wooden skid under the front of the fuselage, similar to the Meise; the Mk II had single fixed wheel; the Mk III had a jettisonable dolly landing gear. The framed canopy of the Meise was replaced by a single piece bubble canopy with a sliding ventilation panel on the port side.

The two examples which Mark Nankivil photographed for these walk-arounds are EoN Olympia II models.

References:

Vince Cockett's web site <http://www.scalesoaring.co.uk/VINTAGE/Documentation/Olympia/Olympia.html> is an excellent source of detailed information on the Olympia series.

Coates, Andrew. Jane's World Sailplanes and Motor Gliders. Flying Books, Ziff Davis Publishing Company, Great Britain, 1978.

The World's Sailplanes. OSTIV. Büchler & Co., Berne Switzerland, 1958.

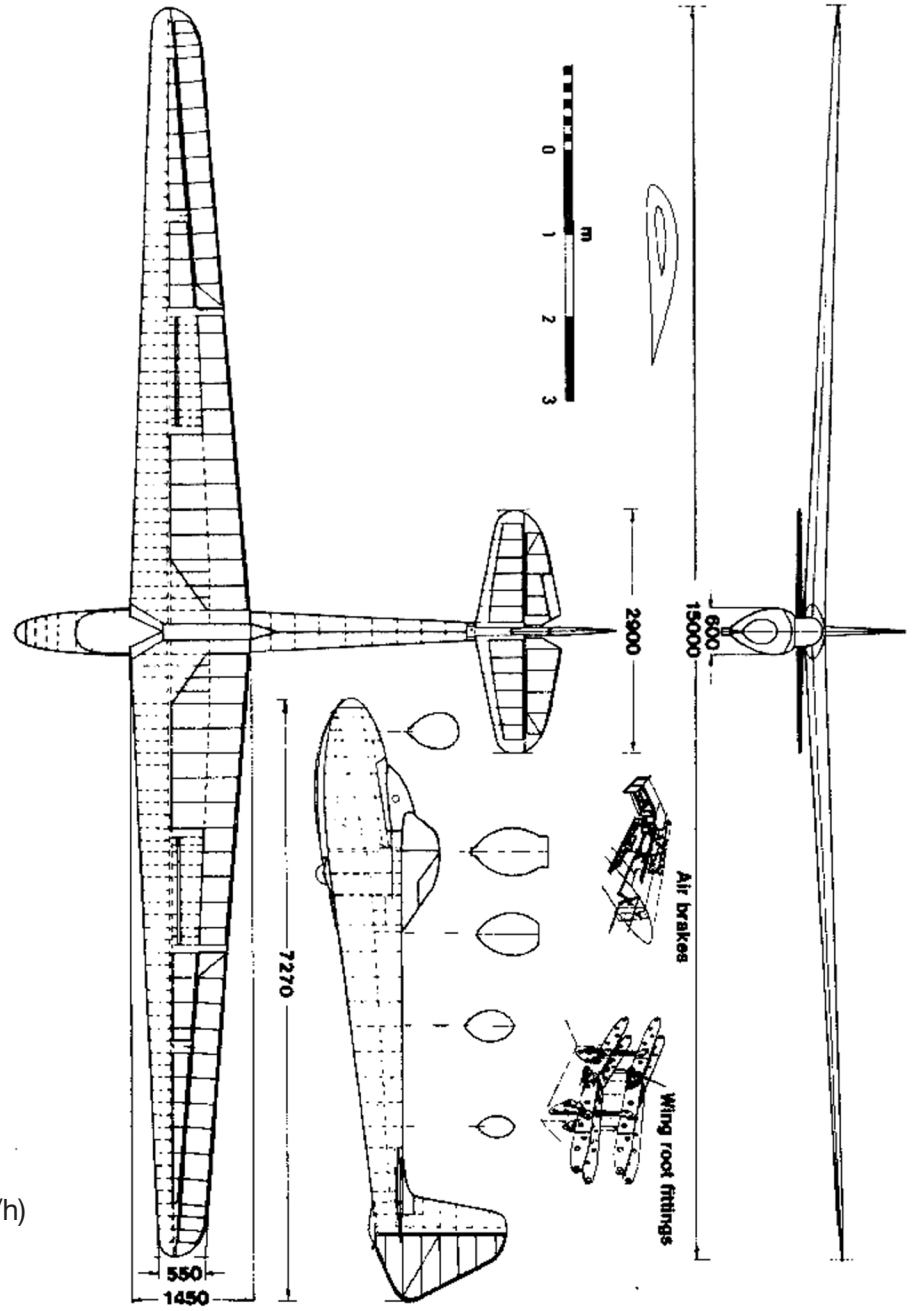
Hardy, Michael. Gliders and Sailplanes of the World. Ian Allan Ltd., London, 1982.

Full size plans for a 1/4 scale model of the Olympic II are available from Cliff Charlesworth at 41 Spring Road, Frome, Somerset, BA11 2JN, United Kingdom

A canopy for models built from these plans is available from <http://www.sarik-vacform.com>

Olympia EoN Mk 2

Span	15 m (49' 2.5")
Length	6.61 m (21' 8")
Wing area	15.0 m^2 (161.5 ft^2)
Aspect ratio	15.0
Wing section, root	Gö 549 mod.
Wing section, tip	Gö 676
Wing twist, aerodynamic	5.0 degrees
Empty weight	195 kg (430 lb)
Max weight	304 kg (670 lb)
Max speed	112 kt (208 km/h, 129 m/h)
Min sinking speed	0.67 m (2.2 ft)/sec @ 34 kt (63 km/h, 39 m/h)
Max rough air speed	69 kt (128 km/h)
Best glide ratio	~25 @ 39 kt (72.5 km/h, 45 m/h)



EON Olympia II N606BG

Owner: International Olympia Club
Flat Rock, Illinois

N606BG (formerly BGA 606) was first built by EON in 1948 (S/N 078). It was restored in England and flown at Southdown. Restoration started in August 1993 and was completed in June of '94. It was sold to a gentleman in Louisville, KY in Dec '96, and shipped to the US on 5 APR '97. It was licensed as experimental in the US 7-2-97. It was flown several times in 1997, and then stored until purchased by the IOC (International Olympia Club) on 8 Nov 2003. It has had over 150 launches and been flown over 100 hours since then. It is based at Lawrenceville, IL but is taken to Vintage Sailplane Regattas on a regular basis.

The Olympia flies well, albeit slowly. She is honest in handling and has no bad habits. She stalls in a straight forward manner, and recovers with minimal altitude loss by simply relieving back pressure on the stick. Large dive brakes are very effective allowing for steep approaches and easy landings. The large cockpit can handle tall pilots and, with padding, short ones. She is simply a joy to fly.

— David Schuur

The Olympia is in many respects a 15 meter version of the 18 meter Weihe. The Olympia was designed to take larger sized pilots including people over 6 ft tall (many prewar glider designs were for under nourished 14 year olds) so I find it very comfortable. The original DSF design had only a skid to take off and land on. Our ship is a post war model built in England by Elliotts of Newbury. I enjoy flying the Olympia and find it straight forward and easy to fly. I find it very comfortable with even a little wiggle room.

When I went to the first WVSA vintage regatta at Lawrenceville a fellow from Kentucky was at the event with pictures of an Olympia he had just bought in England which he hoped to have in time for the event. He never came back, but years later we heard the ship was for sale. For some unknown reason he had only flown it a few times and then it just sat. We ended up buying it as a syndicate called the IOC (International Olympia Club). When we got it we only needed to look it over and annual it. It is serial number 78, was BGA 606 and is now registered in the USA as N606BG. One of the IOC ideas is to take it to VSA events across the country and it has been to the east coast and as far west as Wichita.

— Lee Cowie


BGA 606
N606BG


21
ART


606


N606BG
BGA 606


ART

EoN Olympia IIb N480LY

Owner: Mike Cilurso
Schnecksville, Pennsylvania

My recollections of flying the Olympia were all very favorable. It was a very easy glider to fly. I do not remember any bad tendencies.

It is hard to believe it was designed in the 30's. I have flown many newer ones that took much more concentration and skill.

The Olympia would thermal well because of her light weight, slow speed, and ease with which one could hold a 45 degree bank.

The glider was a floater and not very good on penetrating. I remember many flights in windy weather when I would get to the top of a thermal and head upwind only to find myself in need of another thermal at the same place I started the last thermal. Then we would ride up the thermal again, being blown downwind and then heading upwind to do the whole thing over again. It got lots of air time but very little ground distance.

Her spoilers were powerful and made spot landings easy.

Her ability to float in ground effect saved me from an embarrassing short landing.

On hot Tennessee days with no wind and good thermals, she was delightful.

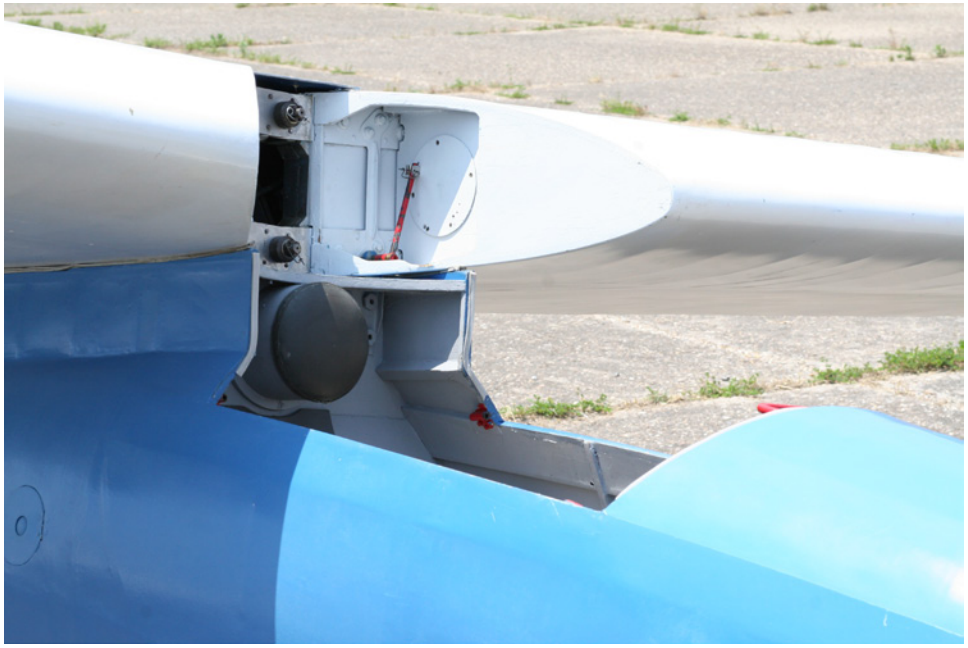
Assembly and disassembly was easy for an old glider. It usually took about 50 minutes with two people.

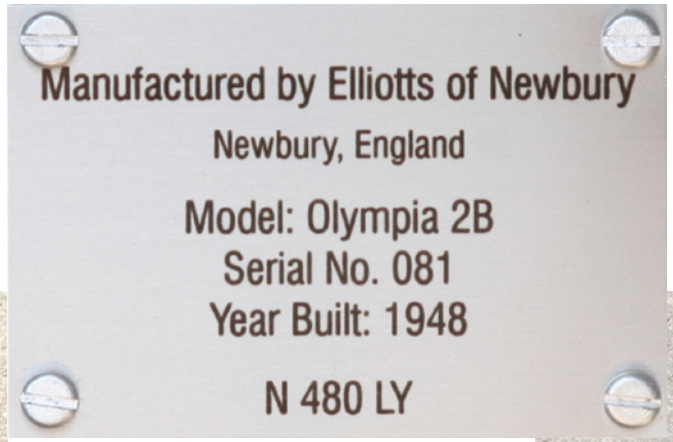
I gave the file on N49OLY to her new owner, Mike Cilurso of Schnecksville, PA. I remember she was built by Elliots of Newbury in the UK in 1948. Her serial number is 081. I purchased it in 1999 from two gentlemen in the UK, Colin Street and Peter Wells, and had it shipped to Charleston, SC.

I hated to part with her.

— Dennis Barton


TART
N480LY




Manufactured by Elliotts of Newbury
Newbury, England
Model: Olympia 2B
Serial No. 081
Year Built: 1948
N 480 LY


TART
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WABASH VALLEY SOARING
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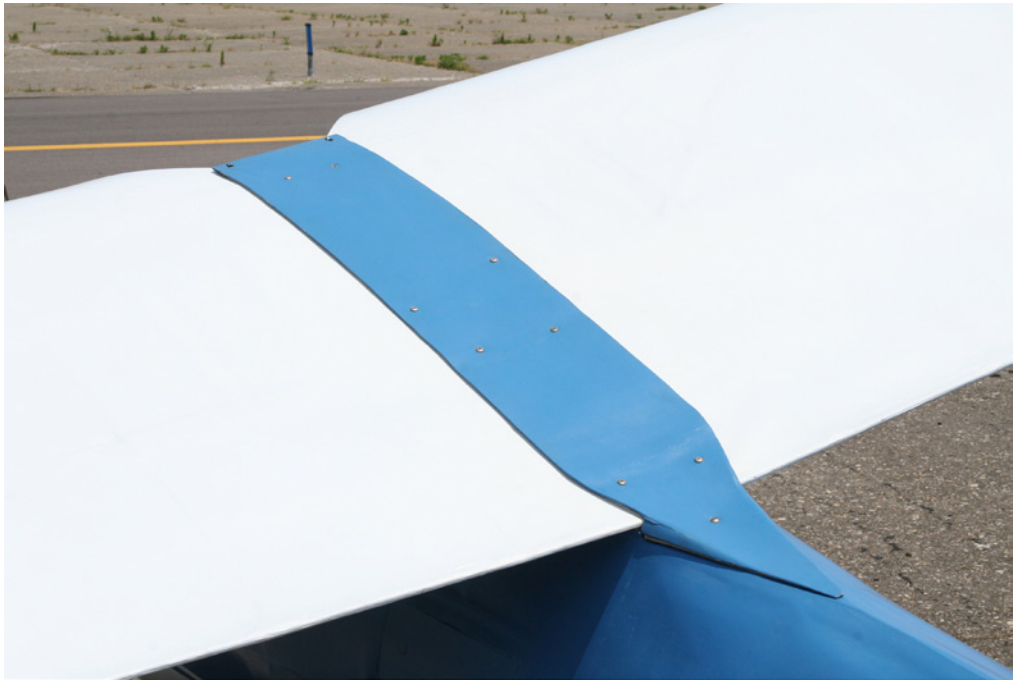



TART
N480LY


TART
N480LY

The Tool Room

by Lothar Thole, lothar.thole@gmail.com

Oscillating Tools — Part 3, The Fein MultiMaster

This is the third in a four part series reviewing three multi-purpose oscillating tools.

Part 1 brought you an introduction to oscillating tools and a review of the Bosch PMF-180 E, available in Europe and Australia.

Part 2 covered a review of the Dremel 6300 Multi-Max, available in the USA only.

This month we will review the Fein MultiMaster, which is available internationally.

Finally, part 4 will be a comparison of the three tools.

As a quick summary, oscillating tools are primarily designed for sawing soft metals, wood and plastics, for dry sanding of surfaces, corners and edges, for scraping, and for grout removal using the applicable accessories. The tools do their work by imparting a high-speed rotary oscillation through a small arc of around three degrees to the cutting blade or sanding disc. This makes it much safer to use than circular or reciprocating saws, whilst also allowing more accurate control of the cut.

Photo 1. The Fein MultiMaster

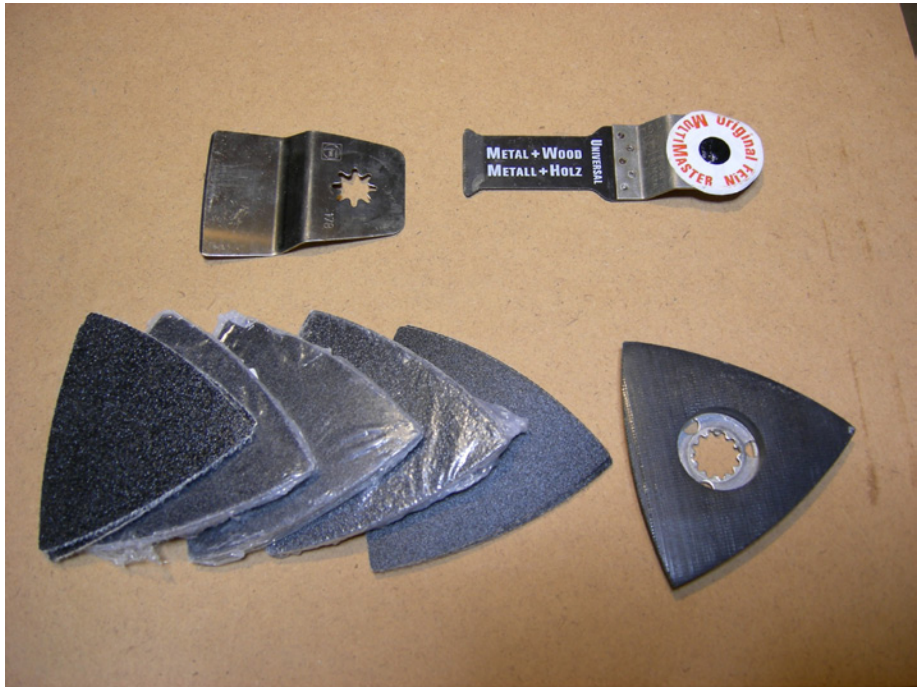


Photo 2. Supplied basic Start set accessories

Photo 3. Supplied Top set accessories

Fein pioneered the oscillation technology, and has been refining it over that past 40 years. As a result, the Fein range of accessories is vast.

For example, it includes a table and drill stand support which allows you to clamp the tool to a table or workbench, or alternatively allows attaching the tool to drill stands with a standard 43mm collar diameter.

Another useful accessory is the depth stop, which allows the depth of the cut to be more easily controlled.

There are five standard sets to choose from: Start, Select, Top, Top Extra and Accu. The Accu is a cordless variant.

Like the Bosch and the Dremel, the Fein MultiMaster also comes in a practical plastic tool case (refer to Photo 1). The basic Start set includes:

a) 1 Fein MultiMaster FMM 250
b) 1 sanding pad
c) 5 of each type of sanding sheet, grain 60, 80, 120 and 180, un-perforated
d) 1 universal E-cut saw blade
e) 1 rigid stopping knife
f) 1 key and mounting bolts

The above accessories can be seen in Photo 2.

The Fein MultiMaster Top set is supplied with the complete range of accessories of the Start version above, plus:

a) 1 Fein MultiMaster FMM 250 Q with quick action release
b) 1 sanding pad, perforated
c) 5 of each type of sanding sheet, grain 60, 80, 120 and 180, perforated
d) 1 dust extraction device
e) 1 carbide rasp, perforated
f) 1 Profile sanding set

The above accessories (and others) can be seen in Photos 3.

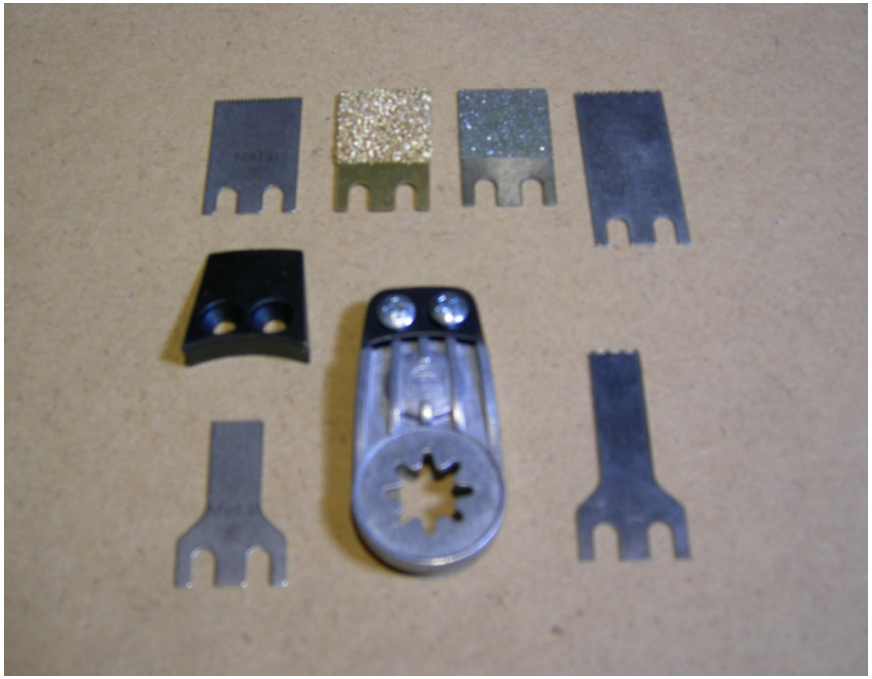


Photo 7. The fine cutting set.

Fein MultiMaster Technical Data

Rated power input	250W
Output power	130W
No load speed	11,000 - 20,000 rpm
Oscillation angle, left/right	+/- 1.6 degrees
Weight	1.2kg (~2.6 lbs.)

Of special interest to modelers is the fine cutting set (refer to Photo 7).

In addition there is a vast range of other accessories, which can be seen at <http://www.fein.com>

Setting up the Q tool for use.

1) The Q version has a quick release action making it very quick and easy to exchange accessories (refer to Photo 2). Flipping the quick clamping lever forward over the tool releases the fastening pin/element, which then just slides out.

3) Align the accessory, eg. blade or sanding plate, with the star-shaped tool holder in such as way that the openings in the accessory engage into the cams of the tool holder.

4) Insert the fastening pin/element, and flip the quick clamping lever back over the tool. This action clamps the accessory securely.

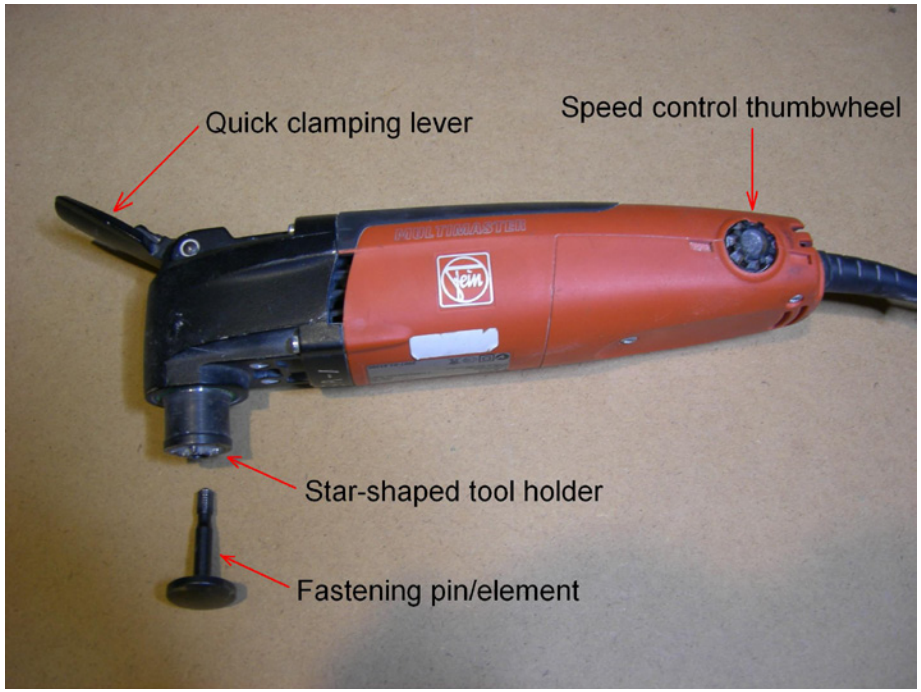


Photo 2. Overview od Fein MultiMaster showing major parts.

Photo 3. Fein MultiMaster with air extraction attachment.

5) If the sanding plate was attached, ensure that the Velcro backing is free from debris, and apply the appropriate sanding sheet to the plate. Press it against the backing plate with a light turning motion in a clockwise direction.

6) For a safe and fatigue-free working position it is possible to position the accessories in any snap-in positions in the tool holder.

7) The speed control wheel is located at the back of the tool (see Photo 2).

Dust Extraction

Warning! The dust from many materials may contain toxic chemicals. When sanding such materials, work in well-ventilated areas and wear appropriate protective equipment.

a) A dust extraction attachment can be fitted to the tool (refer to Photo 3), allowing attachment of a shop-vac.

b) This attachment should be used whenever possible to minimise exposure to dust.

c) Also vacuum the general work area frequently to minimize the dust.

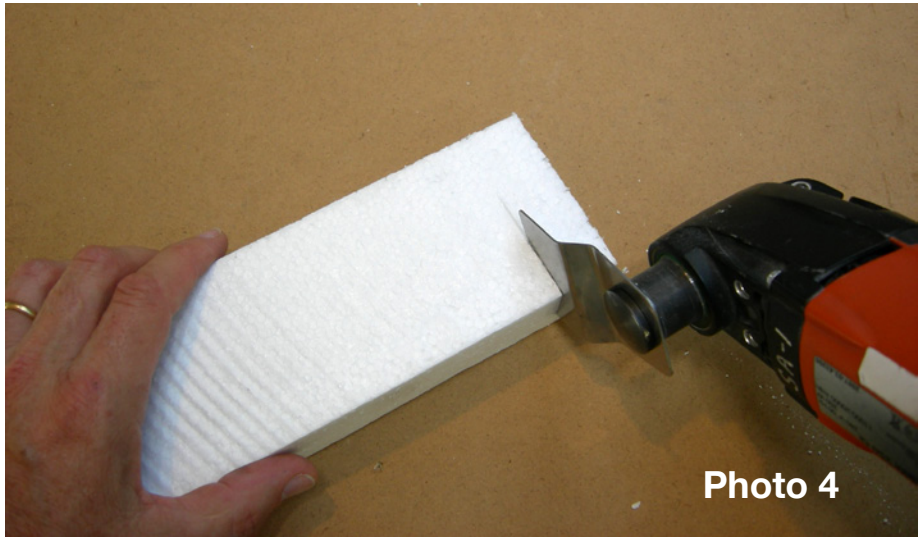


Photo 4

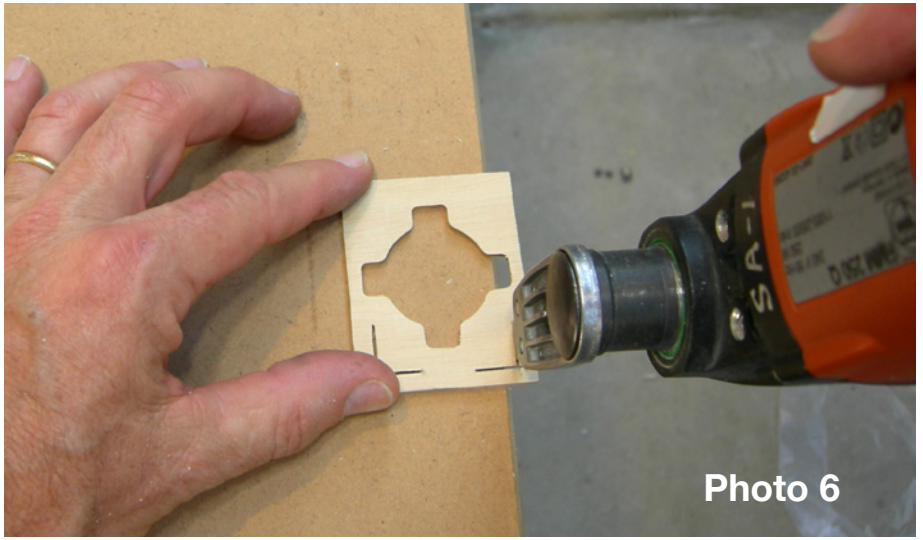


Photo 6


Photo 5


Photo 7

Examples of Use:

a) The rigid stopping knife is useful for cutting foam (refer to Photo 4).

b) The carbide rasp is excellent for fast shaping of Styro-foam, for example when making floats (refer to Photo 5).

c) The fine cutting set is great for plunge cutting cut-outs in plywood items such motor as mounting plates (refer to Photo 6).

d) The fine cutting set also includes a fine rasp very useful for smoothing sharp edges on metal parts such as aluminium rib templates (refer to Photo 7).

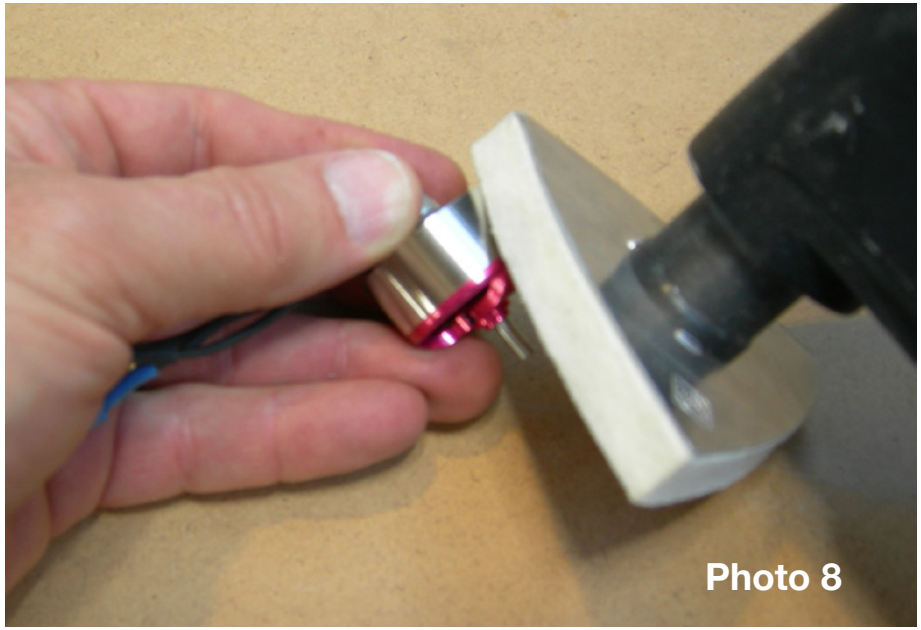


Photo 8

e) Finally, polishing attachments make light work of removing tarnish or light rust from metal parts such as motor housings etc (refer to Photo 8).

General Observations

The Fein Multimaster tool is heavier than both the Dremel and the Bosch. It is aimed at the tradesman and more heavy duty use.

The vast range of accessories available also ensure that the tool can do a multitude of tasks. For example, the fine cutting set is great for hobby projects requiring smaller plunge cuts and finer filing than is possible with the Dremel and Bosch attachments reviewed. (Both of these were introduced fairly recently, so more attachments can be expected in the fiuture.)

That's it for this month. Part 4 will cover a comparison of all three tools.

E-Tsotsi does it again!

by Piet Rheeders

On the Easter weekend and only six weeks after the first record attempt (see *RCSD* April 2009), my electric Tsotsi has done it again. This time round it flew for just about double the distance set before (72 km by road and 63 km in a straight line). Like last time, all information will be forwarded to the MGA for recognition of the new distance record.

I would like to thank Evan, Edmund, Sam and Kayleigh for giving up some of their time to assist me and also to AMT who kindly loaned us their Bakkie for the weekend.

Date of Attempt: 11/4/2009
Distance by road : 72 km
Distance in a straight line: 63Km.
Start point: S 27° 17.117', E 29° 53.786'
End Point: S 26° 46.273', E 29° 37.547'
Duration: 1 hour 34 min 59 sec.
Average moving speed: 45.6 km/hour.
Motor run time: 17min 40sec.

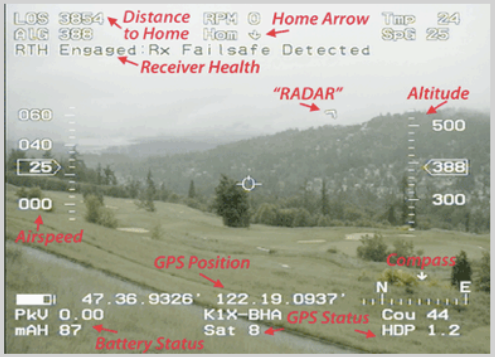
Eagle Tree Systems On-Screen Display Pro

EAGLE TREE SYSTEMS

New Pro On-Screen Display (OSD Pro) from Eagle Tree!

Got video?

Do you fly, drive or boat with FPV, or do aerial photography? We're pleased to introduce the Eagle Tree OSD Pro.



The OSD Pro displays all the key information about your model's status, and has many advanced features such as voice alerts, high resolution raster graphics, a new "RADAR" synthetic map, "Return to Home," and manual waypoints.

The OSD Pro is scheduled for shipment on or before May 15, 2009. See your dealer, email us, or visit our website at http://www.eagletreesystems.com/osd/osd-pro.htm for more information.

Coming in a future issue...

David Schuur has let us know that following two years of work on the wings, the restoration of the Kirby Gull, N41829, is now complete and she will be flying at upcoming vintage rallies this summer.

Mark Nankivil has promised a complete walk-around for *RC Soaring Digest*.

TOLEDO 2009

The 55th Annual Weak Signals RC Show, Family Reunion, and Techno-Orgy

Tom Nagel, tomnagel@iwaynet.net

Okay, let's face it. We RC people are all hopeless techno-geeks.

Those of us headed for Toledo each spring lie awake in our beds at 3 a.m. counting the minutes until the alarm goes off, like an eight year old on the night before Christmas.

We get up at the crack of dawn, gather our shopping lists and fill our travel mugs with coffee, and then set off through the wet and drizzley April weather as we head to northern Ohio and the Seagate Convention Center.

And so it was for a dozen dazed but intrepid members of the Mid Ohio Soaring Society as three carloads of us headed off to the Weak Signals show.

Because I was more dazed than intrepid, what follows is a sketchy report serving mostly to caption the photos I took, a quick look at a small corner of an enormous event.

We arrived before the 9 a.m. opening bell, bought our $8 tickets and broke up into small teams. mMy scouting partner for the day was Skye Malcolm.

We headed into the swap shop and did not actually use our tickets until a couple of hours later. As per usual, the swap show was extensive and packed with middle-aged male techno-geeks like ourselves. (The Toledo Show is one of the few places in the universe that I don't have to be self conscious when I wear the WWII Aircraft tie that my wife bought for me.)

The first picture is Skye holding a Ken Bates scale model flying wing that was for sale in the swap shop. The plane is a BKB1, built up from spruce and balsa, spanning eight feet. The BKB1 was designed as a home-built flying wing glider by a Canadian fellow named Stefan Brochoki. Controls were elevons and wing-tip rudders. The asking price was very reasonable.

Skye Malcolm holding Ken Bates' scale model BKB1 flying wing, for sale in the swap shop.

Skye and I tried to talk each other into buying it. We both ultimately walked away for similar reasons:

1. If we brought home another big sailplane our wives would kill us.

2. If we flew and crashed one of Ken Bates' scale models, we would kill ourselves.

3. We had come up in Skye's Honda Fit, and the eight foot scale flying wing literally would not fit in the Fit, unless I rode home on the roof.

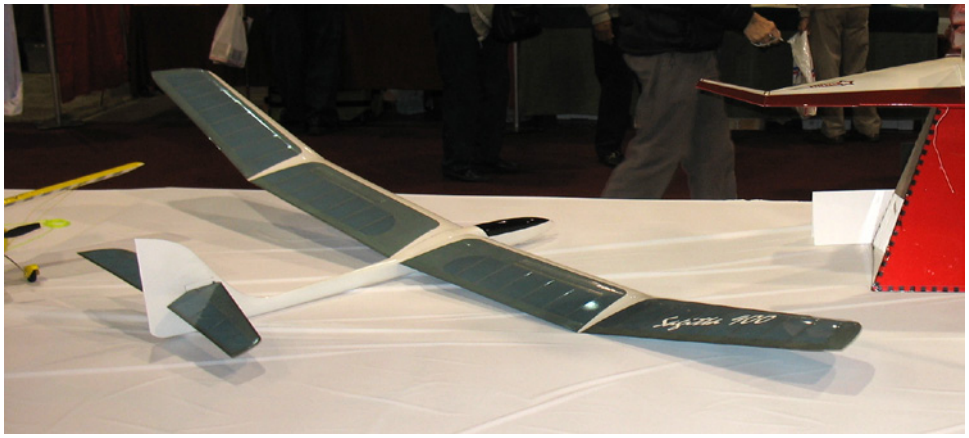
It was a close call.

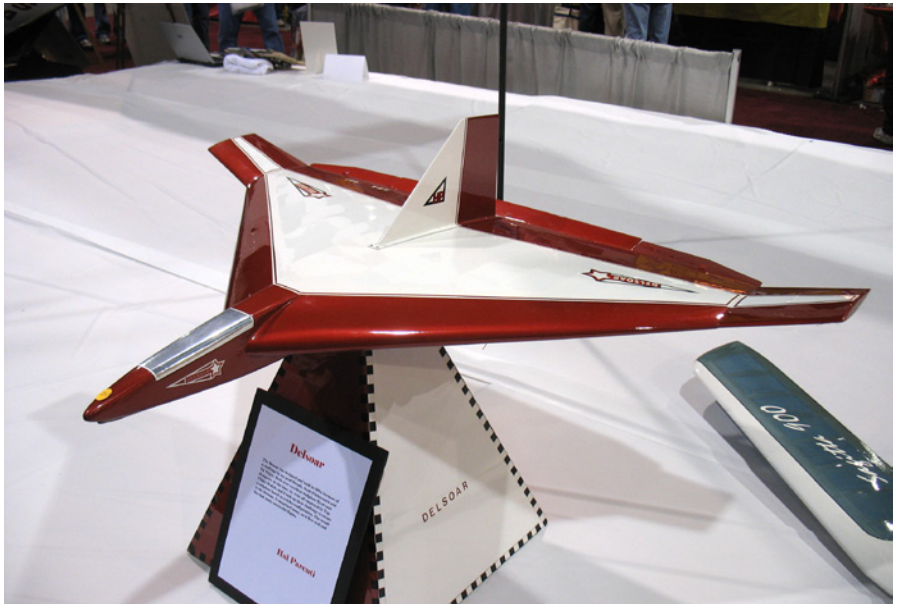
The next few pictures are included for their weirdness value and because I know the Editors of this magazine have a thing for flying wings.

First (upper left), a shot of a scale model jet powered RC skydiver. Talk about a niche market.

Next (upper right), a shot of a free-flight rubber powered flying wing called the Katana, available through Retro RC LLC, at <http://www.retrorc.us.com>.

Moving right along, I thought I would include a shot of the Sport Sailplane portion of the static display exhibit in the main hall (left). Someone was unclear on the concept, it seems. (Actually, this scale model of the Saturn V moon rocket merely loomed over the Sport Sailplane exhibit, and was not part of it. The builder claimed his scale Saturn V would reach an altitude of 4100 feet, almost the altitude where Skip Miller routinely cruises his cross-country ships at the NATS.)





Above: One of the two gliders in the static competition, a Sagitta 900,
Right: Hal Parenti's circa 1984 Delsoar

Above: The Wizard Compact DSX, world's fastest production sailplane at 342 mph.

Left: The Skip Miller Models booth

The new Sprite two meter.

This brings us to a couple of major changes in this year's Weak Signals show.

First, there was an absolute dearth of RC sailplanes in the static competition. I have included shots of Hal Parenti's 1984 Delsoar delta winged sailplane, and a Sagitta 100, and that was about it.

The second major change was that there were no less than FOUR actual sailplane vendors showing this year! I stopped and spoke with Barry Kennedy of Kennedy Composites, who was showing a new two meter ship called the Snipe, which is advertised as a scaled-down Supra; and an all-wood two meter RES kit called the Miles. The Miles was designed by Phillip Kolb and is imported from Turkey. One of our club members, an intrepid builder, plunked down his credit card and brought home a Miles kit. Film at 11.

Skye and I also stopped at Skip Miller Models to inspect his large array of models, including the Wizard Compact DSX, claimed to be the world's fastest production sailplane at 342 mph.

My favorite at Skip Miller's booth was the sign that read: "Friends don't let friends fly 2 meter—unless it is an Espadita." The Espadita is a scaled down Espada. Hmmmm—I can just see the 2 meter competition at Muncie this summer: scaled down Supra vs scaled down Espada. Probably some guy with a Sagitta 600 will win.

Icare Sailplanes and Electrics also had a large booth with many beautiful aircraft on display. Crowded conditions there kept me from taking pictures. ICARE was touting special GPS and scoring software for a European sailplane racing event flown for speed and distance over a triangular course. Each plane has a pilot on the sticks and a co-pilot on the real-time GPS calling the turns. And the two swap jobs on each round.

Top: The Cardboard Condor.

Above: The electric B-36 that garnered Tom's "Best of Show" vote.

Late in the afternoon we visited a booth by FlyFly Hobby Mfg. out of Dong Guan City in Guang Dong Province, China. They showing imported Chinese made scale sailplanes at very reasonable prices. Unfortunately, all they had on had for sale were the display models; orders for anything beyond that had to be imported at significant cost and delay. It seems to me there is an opportunity here for some entrepreneur to do a joint venture with these Chinese folks and put together a fully stocked booth next year. Check out <http://www.flyflyhobby.com>.

And finally, here are a couple of pictures of planes by guys with WAY too much time on their hands. First, the Cardboard Condor, a 150+ inch 50+ pound four engine monster made entirely out of cardboard by Ryan Livingston out of Marshal, Michigan. You can see this creation do a loop on YouTube.

And secondly, here is a beautiful scale model electric powered six engine B-36 built by a Canadian gentleman whose name I sadly neglected to write down. He had my vote for Best in Show. Check the Weak Signals show website for the actual results.

We had lunch at Tony Paco's in honor of Jamie Farr and Corporal Klinger, and then returned to the show to finish up a long day of bargaining, buying, oogling, kibitzing and salivating over all things aeronautic. We were all ready to head home by about 4:30 in the afternoon. All of us, that is, except our Kibitzer in Chief Don Harris who has known everyone in the hobby since the 1960's or earlier and was checking in with all of those folks in person while at the show. We had to corral Don and herd him out to the parking garage in order to depart or we would still be there, and I would have once again missed the deadline for publication. Corralling Don is an annual event, just like the Weak Signals Show itself, and it wouldn't be the same without it.

Those of us in MOSS feel privileged to live close enough to Toledo to drive up there for the day and privileged to have Kibitzer in Chief Don Harris on hand to introduce us to all of the RC luminaries who show up there year after year in support of our glorious sport or hobby or addiction, whatever it may truly be.

We had a great trip again this year.

ELECTRIC Corobat

The original Corobat is easily converted to an electric powered version that can be flown from the slope or as an aerobatic sailplane trainer.

Larry Weller, larry@moynihangallery.com

The Electro CoroBat is a cousin to the Corobat slope glider featured in a *RCSD* article I wrote about in March of 2008.

To review the Corobat for a moment, it was designed and developed by a flying friend of mine, Rolly Kardian. He first designed a gas-powered version of this plane specifically for combat because it was cheap, easy to build and expendable.

The initial version of his combat design had a shorter wing made of 2 mil Coroplast, a plastic product with the characteristics of corrugated cardboard, used as an inexpensive substrate in the sign business. The tail was made of 4 mil Coroplast attached with screws to a Whiffle type bat made of a material I would guess to be ABS.

Rolly improved his wing design by running the flutes of the Coroplast fore and aft rather than lengthwise like others were building at the time. Using a plywood tapered spar and running the flutes the short direction created a wing with a decent airfoil and much sturdier than the combat planes built at the time with the similar materials.

The Whiffle bat used as the fuselage is flat on part of one side and squared off at the top. It is made to give the user more surface area to hit the ball. This flat surface makes an ideal wing saddle and

offers an area that can be cut away to install the electronic gear.

On this combat model, Rolly inserted a piece of plywood inside the top of the bat as a reinforced motor mount. The engine was bolted to the top of the bat, which now became the front of the bat/fuselage. With the wing rubber banded in place and the tail screwed on, this became a formable combat competitor. It used a conventional tail providing control even if fouled with the enemy's ribbon.

Rolly learned to fly under the direction of his dad, Rich Kardian, off the slopes of West Michigan as a kid. He and his dad are very accomplished RC sailplane pilots. While a young pilot, Rolly occasionally received tutoring from the legendary Dr. Walt Good who would frequently come to the Saugatuck/

Douglas, Michigan area (where I now live) to visit family. Rolly credits Dr. Good along with his dad's guidance to help him achieve the piloting skills to become a serious sailplane contest winner at an early age. His dad Rich says Rolly would be out behind the house nightly hand tossing gliders.

Rolly found that by extending the wing length of his combat wing design to five feet he had more ribbon-cutting surface than his earlier design.

After a couple of seasons of intensive combat flying this group of modelers moved on to other areas of interest in the hobby. Then about two years ago a few of us got the sloping bug. Rolly realized his combat design might make a decent slope glider with a bit of design modification. The longer wing developed for combat also made for a smooth glide when the power was relaxed.

A group of us witnessed his initial Coroplast slope glider fly sporting a five-foot wing with a slimmed down airfoil held to a Whiffle bat with rubber bands. The blunt nose of the bat was loaded with radio equipment and lots of lead.

Rolly cruised the slope glider smoothly over the sandy beach of Lake Michigan frequently looping, rolling and flying inverted. Despite flying better than I expected, it was a ridiculous looking thing with that blunt nose. Still, I was getting excited about the potential of this design.

A week later, Rolly was back at the slope with the end of the bat cut off and fitted with a heat-shrunk water bottle formed canopy. Now it had the stealthy look of a modern slope glider and it flew even better then before, as you might imagine.

I had to have one of these.

Cheap, easy to build and nearly indestructible... How could a neophyte sloper resist?

It is important to tell you that I love to build as much as I do to fly. In fact this article would have been written last fall if I wasn't modifying four Dynaflite Bird of Times to electric power assist along with split wing flaps. The flaps go a long way in helping to land in the very narrow

confines of our field with a plane that doesn't want to quit gliding. Three of these are for friends and one is a back up for me. I have now converted seven or eight of these and perhaps will write about that conversion another time. Done properly, they almost appear designed for electric. Somewhere along the way I fit in my third Blaster build for another friend and performed a few of the typical repairs and improvements many of us make in the winter months.

Rolly told me the basics of how to build the Corobat wing and the rest I could easily figure out by looking at his airplane.

I built a couple Corobats, as we began to call them, one for a friend and one for myself. These are pictured along with Rolly's sloper in the previously mentioned article.

Very happy with the design, I made a few small changes in construction techniques and went on to build or have a hand in building five or six more of these, one of which is the Electric version that is the subject of this story.

It soon became obvious to me that this glider could rather easily be converted to an electric powered version that could still be flown from the slope (although I have yet to do this) or flown as an aerobatic sailplane trainer. This is my primary interest.

We soon discovered after a few photo shoot accidents that, like a Timex, "It can take a licking and still keep ticking." My thinking at the time of conception was this could be a boomerang that would indeed come back to me if I suddenly lost wind speed at the slope or the wind changed direction. So far I have had no inclination to take it to the slope over my new and improved lighter yellow wing Corobat.

Rolly flew the Electro Corobat for these pictures. I took the pictures with a borrowed camera and a lens that couldn't keep focus on a moving target, I'm sorry to say. Like a fisherman I tell you, you should have seen the shots that got away, i.e. mostly out of focus. During the course of taking pictures I kept telling Rolly to bring the Electric CoroBat low and inverted over the field. He would fly it across the field about 6- 12" off the ground while I took many out of focus

pictures. A couple of times he struck the ground in the inverted maneuver trying to comply with my instructions. Rolly would pull the grass off the spinner, wipe any dirt off the v-tail tips and launch it right back up in the air. This plane would fly off without so much as a scratch.

The Electric Corobat glides decently, although I wouldn't recommend it for the thermal advocate. It will go up in lift, but truthfully it is more of a soft liner. It rolls and loops well and obviously flies well inverted. It is a tough bird!

On one of the photo shoots it lost power, which we assumed at the time was a result of too long of a flight on the 2200 lipo used for both motor and servos. Rolly didn't attempt to bring it back to the field under the low battery condition. It came down rather hard in the adjacent crops with no more than a skin of mud on the nose and wing tips.

Later, on another photo mission, the motor and servos quit at an altitude of about 150'. Rolly now had absolutely no control over the nearly vertical dive into soybeans. This was a hit that one would expect to find a bag of balsa if made with that type of material. In this case the only damage was more mud and on closer inspection a broken motor mount at a glue joint. There were no other visible markings.

In the course of repair I discovered the Rim Fire 35-30 1250 KV motor seriously burned up. Cooked, in fact! I think overheating lead to the earlier incident that caused the BEC to shut things down.

Foolishly, I thought with the large airspace inside the canopy and the fact there is a large airspace between the spinner and the canopy that cooling would not be an issue. Well, my spinner fits so tightly to the canopy, a cosmetic feature I like, so not much air can get in that hole where the motor shaft extends out to the folding prop.

The motor mount was an easy fix. The motor replaced, I carefully drilled six or seven equally spaced 5/16" holes in the canopy right next to where it meets the spinner. I did this by gradually drilling with progressively larger bits with my fingers. The neatly drilled holes should allow ample air circulation now.

The one flight following repair late in the fall was uneventful as far as the motor was concerned. I think it will be fine although I will be sensitive using full throttle for extended periods until I am confident of the heat exchange off the motor.

This project appeals to me on several different levels. The build is quick and cheap without sacrificing decent appearance and performance. The cost of materials, discounting electronics, is probably $25-$30 dollars. This is assuming you have some plywood and control hardware on hand. If you had to buy the Coroplast and bats on-line it would be more sensible to buy enough to make shipping a reasonable percentage of cost. So that would be $50-$60 in materials, which is enough to make two or three Corobats, powered or not.

There is a need to build a simple plywood jig to properly build the wing, and carve a balsa or pine wood form to shrink the canopy over.

Because there is a little extra effort and cost making these, this airplane can make a good club endeavor or be a practical project for two or three modelers to share the work and cost and make several planes at the same time.

Having some experience with these Corobat designs now, I could build one

from scratch in a weekend; OK, probably three days if it were my goal. It is a very quick assembly for a scratch built model!

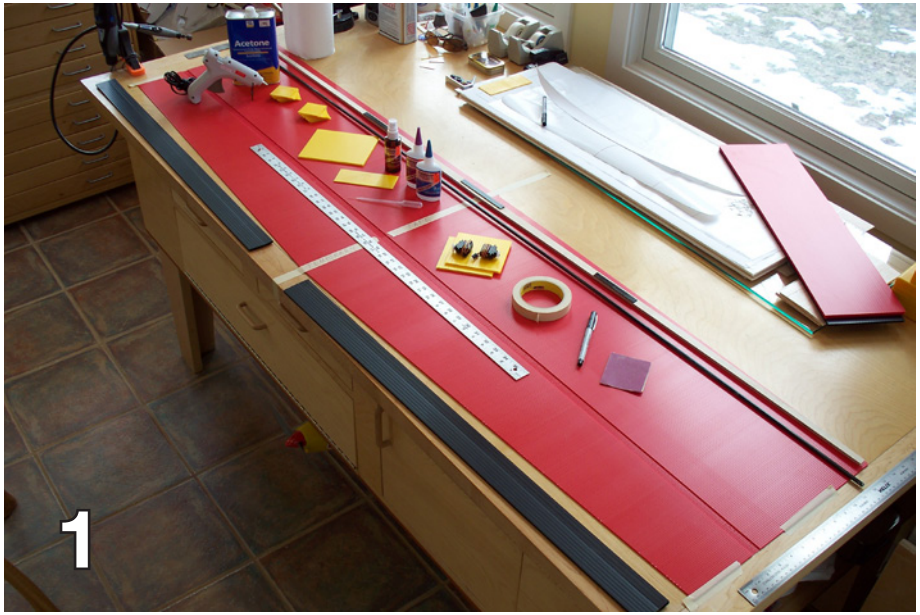
For myself, another benefit is working with materials that are somewhat unconventional for the purpose they are originally intended. I now find all kinds of use for Coroplast in fiberglass or balsa sailplanes. It is very strong for its weight and I find it useful for supporting pushrod sleeves, servo trays, wire harnesses, or building lightweight ballast boxes. Ultimately, the fun in this hobby is learning new skills, techniques and challenging ideas.

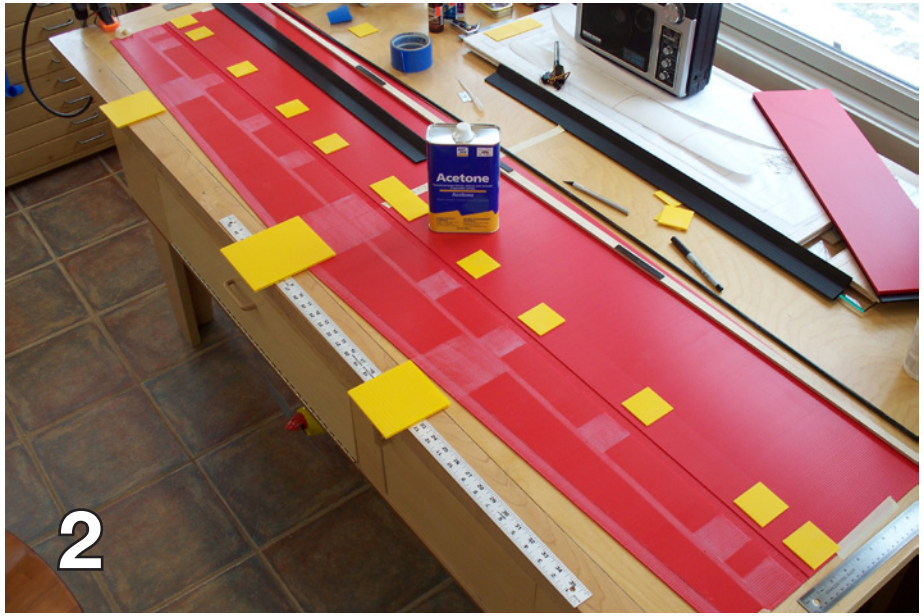
Now, are there better flying gliders? Yes, yes, yes…But I don't know any that satisfy all the criteria of fast to build, very little cost, tough as nails and to my taste pleasing in looks. There are EPP gliders that come close (I have those, too.) howeve, to get a decent finish can

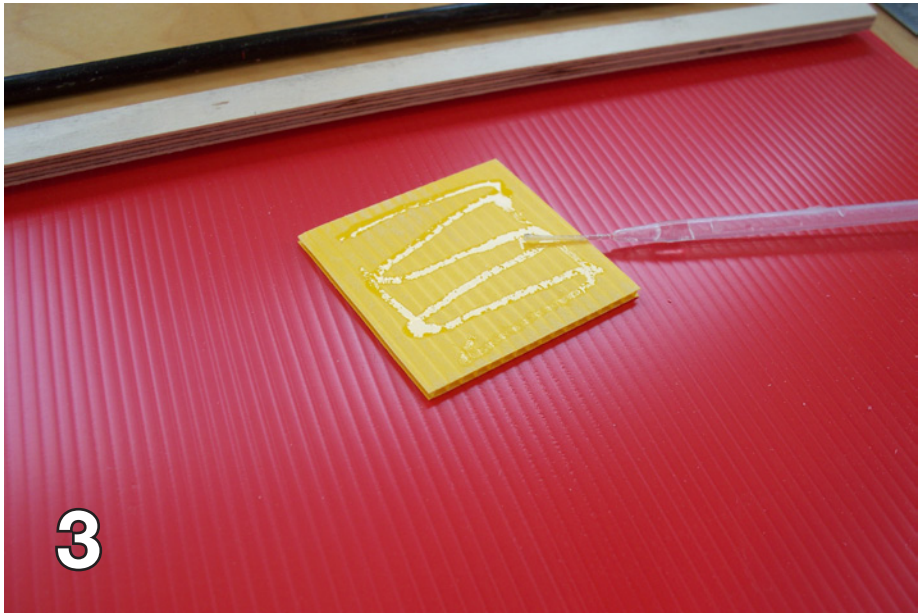
take some extra experience and time. With Coroplast the color is manufactured into the product. With the exception of spray painting the canopy, the finish work is done when the construction is complete. If electronic repairs become necessary on many EPP type gliders, some surgery is often required to get to the parts. With the Corobat, the electronics can be exposed for service with the removal of a few screws in five minutes; the entire plane dismantled completely in a quarter hour.

I keep parts for several more Corobats in my flat files just in case I somehow find myself short of something to fly.

There is one serious caveat with the Coroplast material and I must caution anyone who might build one of these gliders. Kept in a closed up hatchback, the wing will become cosmetically disfigured in a very short time. This won't affect flight so much as your ability to look fondly at it again. Protective wing sleeves will prevent this. Moreover, so will keeping it out of a hot car. You wouldn't do this to your child or your dog, so don't do it to your Corobat!







A brief overview of wing construction

(1) The wing is ready to be built with all its parts and adhesives pictured... not much there is there?

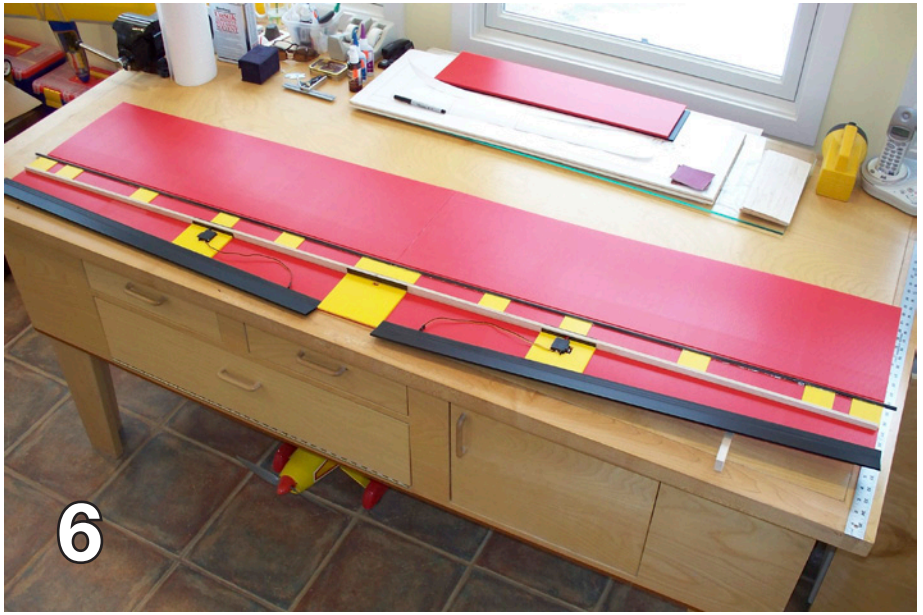
(2) The yellow wing parts are about to be glued where you see the sanded areas on the red Coroplast. I chose the yellow for parts simply to make it easier to see them against the red wing panel. When the wing is complete they are hidden inside the wing.

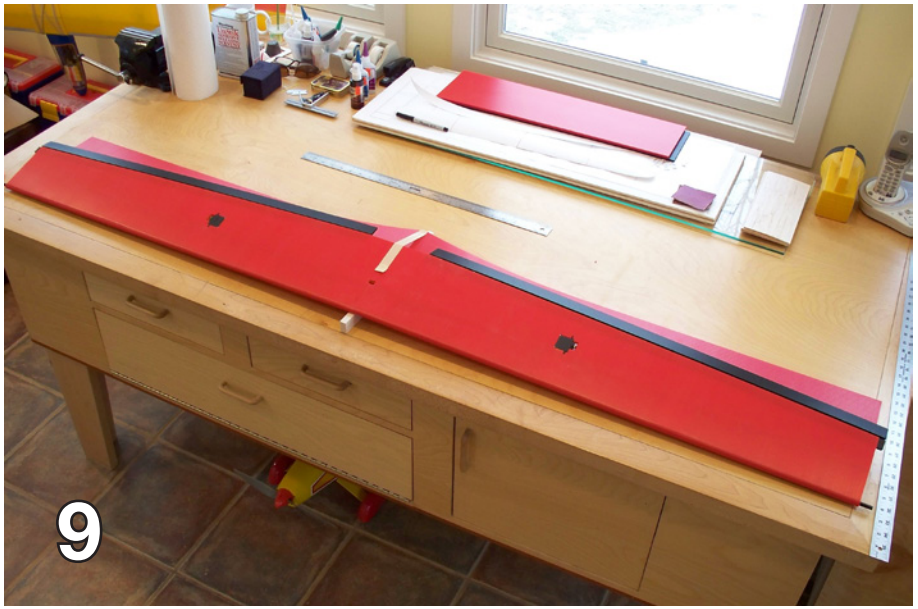
(3) This is the proper way to apply thin CA to the Coroplast... too much CA weakens the joint. Prior to gluing, I wipe down both the part and where it is about to be glued with acetone.

(4) I temporarily spot hot glue the fiberglass (juvenile arrow shaft) leading edge in place. Just before I put the wing in the jig to glue the top skin down I run a thin coat of Silicone along the joint. I spread it smoothly with my finger to wipe off the excess.

(5) The fiberglass leading edge, plywood spar, Coroplast ailerons and Coroplast spacers are all glued in place. The spar is glued with 15 minute epoxy. The yellow Coroplast servo doubler is trimmed for a force fit of the servo. This makes installing the servo easy.

(6) All the wing parts are glued together. You can see there just isn't much work to this. Now the wing skin in front of the fiberglass arrow shaft leading edge will get folded over the top, marked and trimmed. Then it goes into the jig for gluing together.

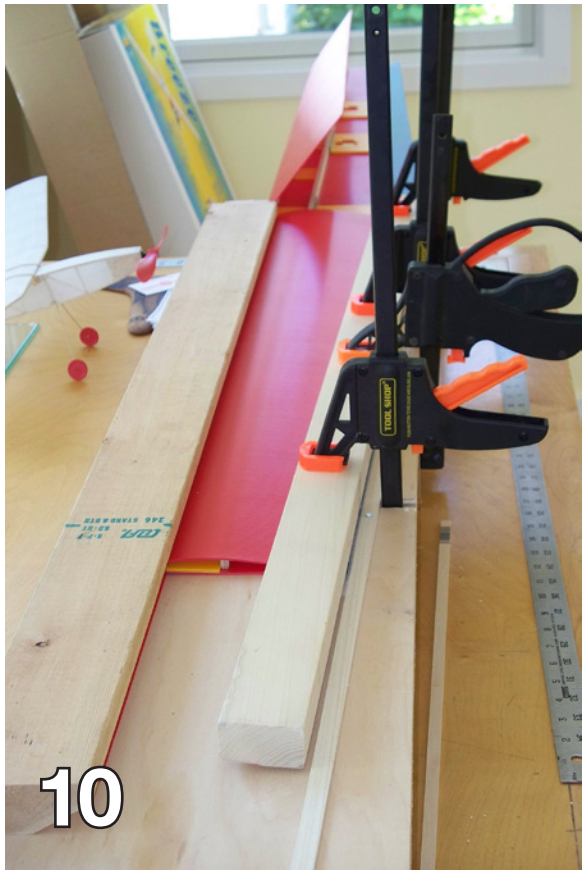


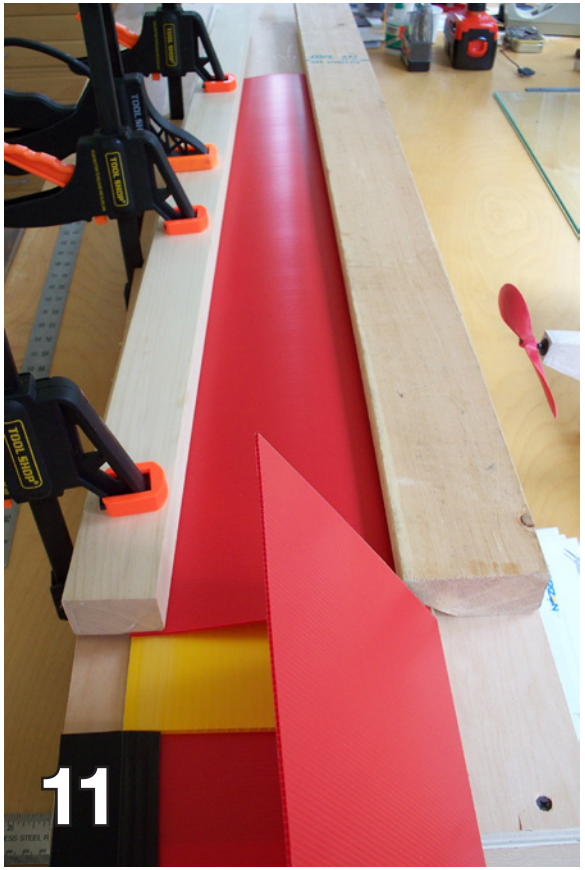


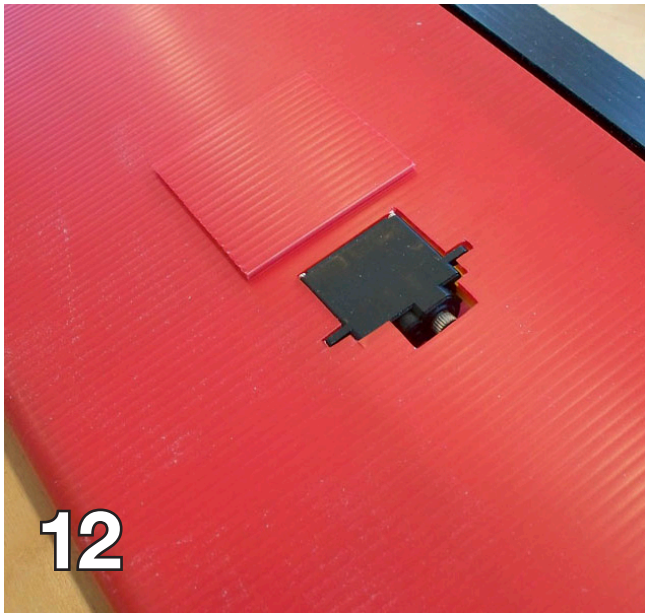
(7) The top skin is folded over the bottom skin as shown here. I mark with a Sharpie at the root and at the tip where the skin needs to be trimmed before it is glued down. Once marked on both skins I lay the skin back flat on the table and use a straight edge to trim off the excess material. The wing is then ready to glue and clamp down in the wing jig.

(8) This shows the airfoil at the tip. I am preparing to mark the top skin for trimming.

(9) All the wing parts are glued together You can see there just isn't much work to this. Now the wing skin in front of the fiberglass arrow shaft leading edge will get folded over the top, marked and trimmed. Then it goes into the jig for gluing together.



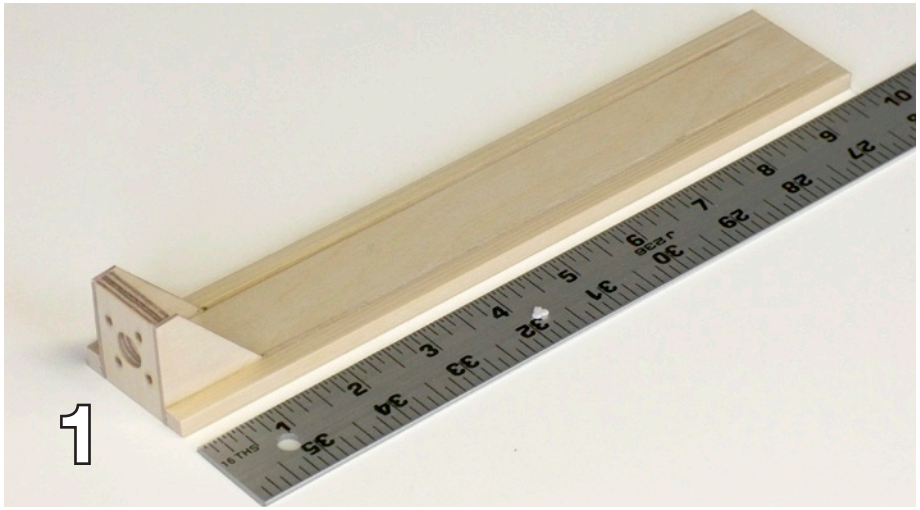


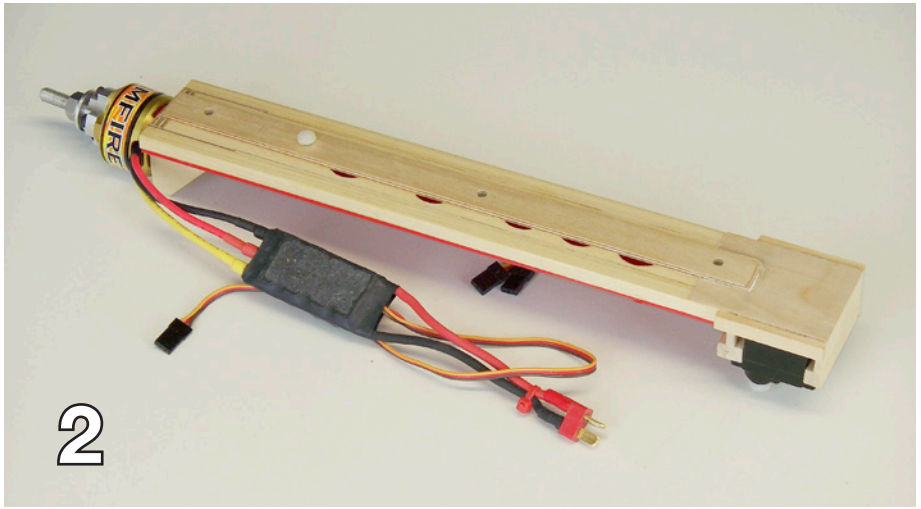


(10) The left half of the wing is clamped down tight to the wing jig. After a couple of dry fits to make sure everything lined up properly I brushed a thin coat of 30 minute epoxy on all the areas where the top wing skin makes contact. This type of epoxy provides enough working time to insure everything is lined up and clamped down.

(11) I let the wing set up in the jig for about six hours and then repeat the procedure on the other side of the wing. When the wing is removed I use a sliding chop saw to cut the tips at an angle and bevel. A piece of 2 mil Coroplast is glued down over the center section of the wing and thin styrene plastic is cut and glued to the wing tips.

(12) This close up shows the HS-82 metal gear servos in the bottom of the wing. The little square 2 mil Coroplast next to it is taped to the servo and then screwed to the wing with tiny screws. A slot for the servo control arm will be cut into the square servo cover first.

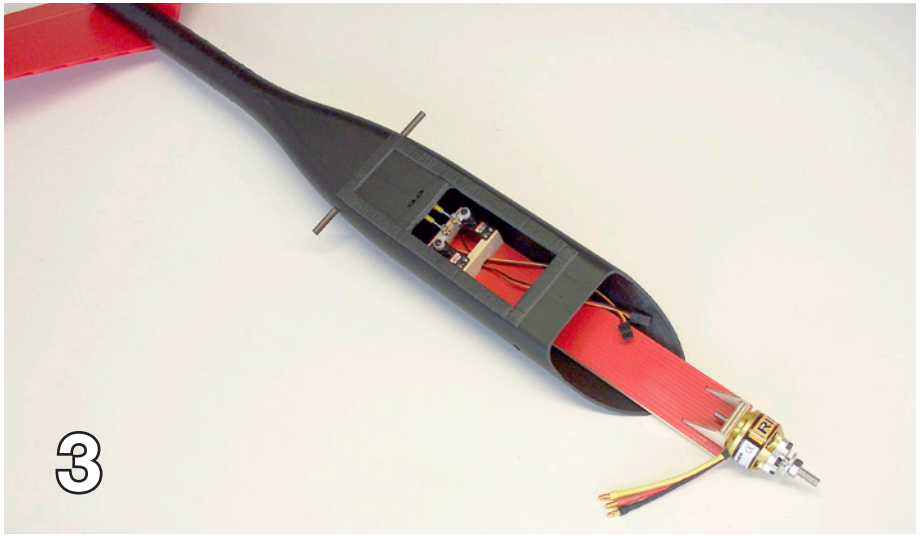


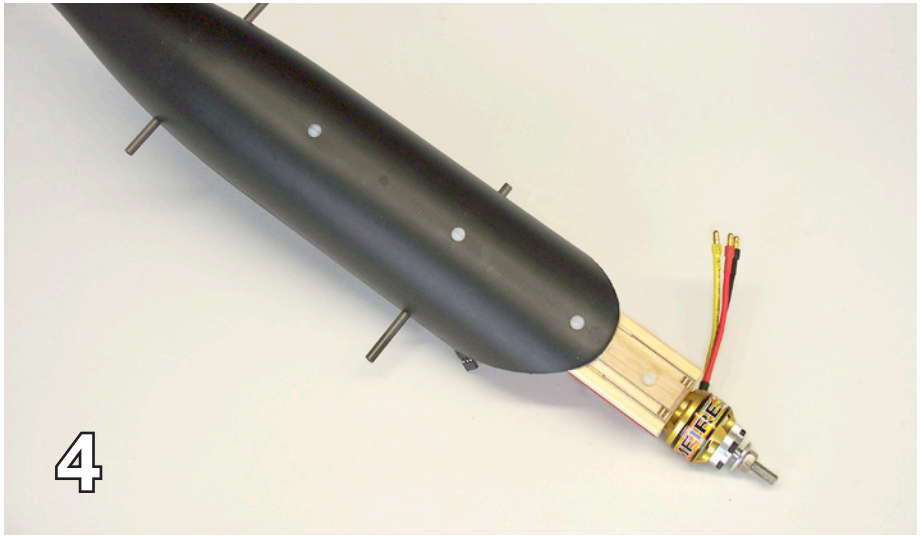


(1) This is the plywood and bass motor mount/servo tray in the early stage. I next drilled 5/8" holes along the tray to lighten it.

(2) There is a 1/16" x ½" plywood piece glued across the holes from front to back. This is filler piece because the bottom of the bat has a shallow curve. Without it the tray would not sit flat in the bottom of the fuselage.

(3/4) The motor mount/servo tray slides into the bat and is then held in place with nylon screws. Field access is a matter of removing the wing and unplugging the aileron servo connections, disconnecting the two V-tail pushrod clevices, and removing the three nylon screws holding the tray. The tray, with all electronics, then slides out easily.





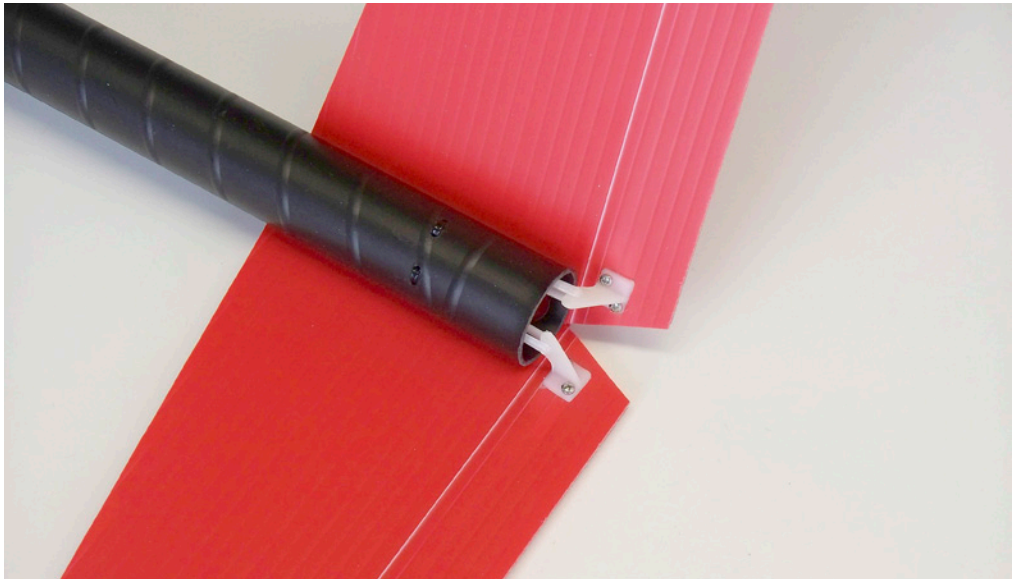
Adding the powerplant

(5) After Joe rough cut the form, I shaped and sanded it in less then three hours. I had never done this before until my first slope Corobat. It is really easy and fun but for the newbie the thought can be daunting. I cut the hole out of cardboard to the tracing of the spinner plate in order to make sure the spinner would line up on the canopy. In other words I slipped this over the plug and shaped the wood to fit it perfectly at this one spot. Later I would cut the plastic end off the formed water bottle at that point.

(6) Amazing what can be done with a plastic water bottle. The completed molded front end.

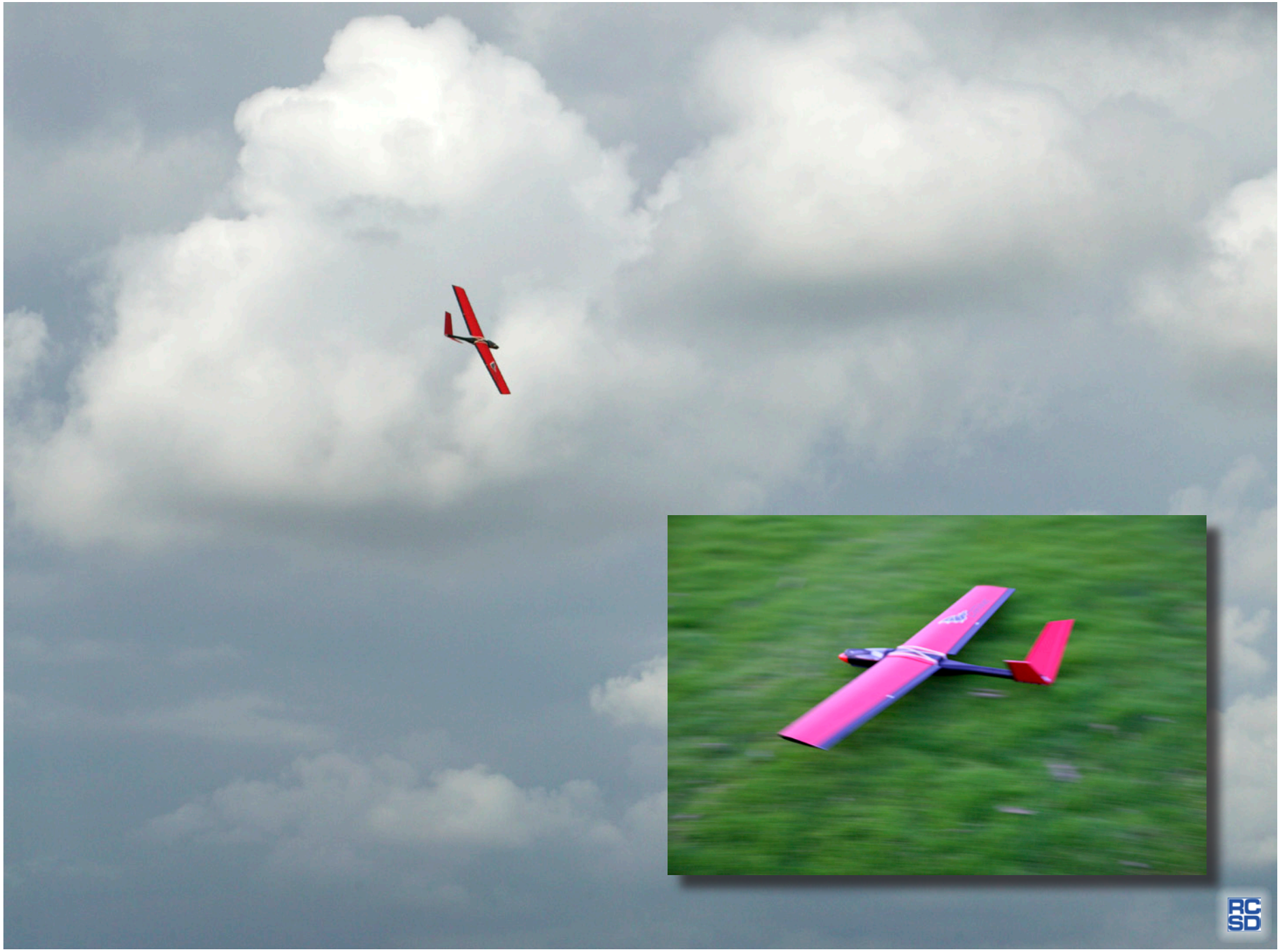
(7) Using a hole saw, Larry fabricated a special wood ring to strengthen the nose behind the spinner. See the article for details.

This is view of the fuselage with all parts installed and waiting for the wing.



Upper: You can see the pushrods come out at the tip of the bat handle. I cut the bat handle off with a chop saw but a handsaw would work fine for this. One of the flutes of the Coroplast is partially cut away on the bottom of the stab to make the hinge for the ruddervators and ailerons.

Above: I had a friend of mine in the sign business make up my decal design in vinyl. The word electric can be removed when I use this decal on a non-powered slope glider.



I had to document this tree climbing episode at the slope. Rolly is retrieving his plane while Rodger and I make monkey noises below. You would think I would be more respectful to a fellow who has climbed the same tree to pull out one of my mishaps. Well guess what? This tree is now gone! As Sgt. Shultz would say, “I know nothing.”

— Larry Weller