Radio Controlled
Soaring Digest
December 2009 Vol. 26, No. 12

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Front cover: A One Design Racer (ODR) flies through the starting gate at the 16th Annual Midwest Slope Challenge.
Photo by Jim Harrigan
Canon EOS, ISO 400, 1/350 sec., f13, 55mm

Back cover: Tony Utley snapped this shot of Gordy Stahl putting together his HKM High End for a day of soaring. <http://www.hkm-usa.com>
Canon EOS 40D, ISO 400, 1/1600 sec., f7.1, 80mm

R/C Soaring Digest

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RC Soaring Digest is published using Adobe InDesign CS4

In the Air

Despite our best efforts, we missed crediting Tony Utley for some photos he provided for Gordy Stahl's article, "An adventure of Istanbul, a Rainbow, and a Constellation," in the last issue. Tony's photos are a joy to reproduce in *RCSD* because of their quality as well as their content, and another exceptional submission from Tony graces the back cover of this issue.

> FAI has received the following Class F (Model Aircraft) World record claim:
> Claim number : 15650
> Sub-class :F3 Open (Radio Control Flight)
> Category: Glider
> Type of record : 161: Speed in a closed circuit
> Course/location : to be advised
> Performance : 133.2 km/h
> Pilot : Alexander VASILIUK (Russia)
> Date :18.10.2009
> Current record : 129.70 km/h (23.06.1997 - Zufar VAKKASOV, Russia)
> The details shown above are provisional. When all the evidence required has been received and checked, the exact figures will be established and the record ratified (if appropriate).

We are continuously looking for material to be published in future issues of *RCSD*. Guidelines for submitting material can be found in the Submissions PDF <http://www.rcsoaringdigest.com/pdfs/Submissions.pdf>.

Time to build another sailplane!

16TH ANNUAL MIDWEST SLOPE Challenge

May 14, 15, 16 & 17, 2009

Sponsored by Wings Over Wilson

Text by Alex Paul, alexanderpaul52@gmail.com
Photos by Joe Chovan, Dave Garwood, Jim Harrigan, and Alex Paul

The 2009 Midwest Slope Challenge sponsored by the Wings over Wilson flying club was once again an excellent event. The winds were good, the weather was sweet, and both the local folks and the pilots/friends were in great form. This year, due to time constraints, I varied my travel to and from the event from the Bahamas by flying into Wichita International with a checked "Sport Tube" loaded with a couple of planes. They arrived unscathed. The drive from Wichita to Lucas took just over two hours and the drive was beautiful.

This year's event was organized by Erik Eaton, Larry Purdy, and Larry and Darla Blevins. Alden Shipp was also actively involved with them this year. As always, the WOW flying club did an excellent job with event management while promoting fun for participants through the three day event. This year the winds and weather were being cooperative throughout the week and allowed the official flying portion of the event to be completed in two days.

May 14th was practice day and was held at the main hill overlooking the Wilson Dam at the Wilson Lake State Park. There were a couple of newly designed planes being flown and their pilots were demonstrating great performance with them. During the course of the day planes from every class were being flown. A number of pilots with Warbird planes were half piping and flying formation for relaxation toward the end of the practice day. Event registration was held that evening, and it was great to see friends and meet new people.

May 15th began the first day of competition which was ODR racing held at the main hill at Wilson Lake State Park. The winds were out of the SE. The pilots meeting was held at 8am and racing began at 9am.

The morning races were excellent with some tight racing action, but late morning brought a slight cross-wind direction and so in the afternoon the ODR race was moved to Minooka Park.

The competition continued to be full of good racing action. The final results were: 1st Larry Blevins of Magnum Models flying his new "Cobra Hybrid," 2nd Joe Chovan flying is CR Aircraft "Fun

One," and 3rd Erik Eaton flying his "Bad Voodoo." It was a great ODR race and held a number of very close finishes. The winds remained good so the Unlimited class race was run shortly after ODR finished.

This was another example of excellent racing action. The landing zone is tight at Minooka and the pilots demonstrated not only their racing skills but also their ability to bring the big birds in with precision.

After some toe curling action that had many of us cheering the pilots on while they headed to the finish pylon, the end result was 1st Andrew Williams flying a Carbon "Opus," 2nd Joe Chovan flying an F3B "Trinity." The race between Andrew and Joe could have gone either way. Andrew took first by inches. 3rd went to Jim Baker flying a Brian McLean "Extreme." The top three finishers put on an amazing display of talent and all of the unlimited pilots flew great rounds.

The Unlimited class racing was a blast to watch and it proved to be an adrenaline rush for both pilots and spectators.

Good close racing action!

May 16th The pilots meeting was held at 8:30 am at Wilson Lake and based on the wind direction the decision was made to move the Combat Match to a different hill (name unknown) which turned out to be another of many outstanding flying hills.

The Combat Match began at 10am and among the many pilots flying (mostly foam wings) into the fray, it was another event of good competition and I am sure the laughter over the pilot antics could be heard through the valley below. The hill proved to be steep enough that the chasers were getting a good workout.

The results were 1st place for Joe Chovan flying a Windrider "Bee," 2nd David Day flying a Combat Gliders "Cyclone," and 3rd Rick Daulton also flying a Windrider "Bee."

With the winds cooperating for the hill all day, the Foam Warbird race took place in the afternoon after Combat was completed.

There were some outstanding looking planes being flown, including a beautifully scratch-built Folk Wulf Ta-152 built and flown by Dennis Brown. The competition was another display of good action and flying ability. With winds varying in strength, each race was different and every pilot made the best of what they had to work with.

The final results were 1st Dennis Brown with his “Ta-152,” 2nd Alden Shipp flying a DAW “ME-163,” and 3rd Dave Day flying an MM Glider Tech P-80.

The award banquet was held that evening (Saturday May 16th) at a local assembly hall and it was another highlight of the event. Lots of laughs, exchanging contact information and making plans for future events.

The dinner was catered by Linda’s Café and it was about as good and as big as a Midwestern meal gets! Linda and husband Jean, owners of the restaurant, along with their great staff, took care of every detail perfectly.

During the awards ceremony, Erik Eaton mentioned some of the local folks that were instrumental in making this year’s event a major success, and all that attended openly agreed.

The list includes Mike Tallman, AMA VP District 9 Contest Director, Kent and Anne Palmer for their continued generosity and support, Jim and Marge Lawson for their continued support, Lester Tacha of the U.S. Corps of Engineers for continually helping us maintain event access to the Wilson State Park and also for providing assistance helping the event run smoothly while on Government land. Thank you Lester. Also special thanks were given to all the folks that volunteer for taking care of flag stations and the many other various tasks involved in operating a successful event.

As seems to consistently be the case at the MWSC event, the local community, the pilots, family, the spectators, and the WOW club members have a great time. I can’t emphasize enough how much fun this event is.

If you fly slope and or want to relax and enjoy the many vistas of the area it is a great event to take part in. It is competitive, yet always includes good fun with friends both current, and new.

Thanks from all of us to the many land owners who graciously allow us to use their hills for the event, to the many rental property owners that treat us very well, to the WOW club for conducting this event, the Army Corp of Engineers for allowing us access to some special sites, the many companies (listed in the sidebar) for their generous product donations to support the raffle for the event, and finally to the folks in and around Lucas for being the best hosts we could ever hope for.

Lucas welcomes us into their home every year. That means a lot. Thank you so much.

RAFFLE PRIZE CONTRIBUTORS

Aerospace Composite Products
www.acp-composites.com

AeroWorks
aero-works.net

Bob Smith Industries
www.bsi-inc.com

Eaton Air RC
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www.slopeflyer.com

SoaringUSA
www.soaringusa.com

Steve Drake RC Sailplane Products
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Windrider Aviation
www.windrider.com.hk

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Tom Wild, Lincoln Nebraska
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Troy's Grocery
Lucas, Kansas
785-525-6255

US Army Corps of Engineers
www.nwk.usace.army.mil/wi/PhotoAlbum.cfm

RCSD author/photographer Alex Paul

Dave Garwood


1


2


3

Opposite page:

1. Launching two Ka-6s on practice day. Alex Paul
2. Practice day at the Wilson Reservoir and overlooking the Wilson Dam. Alex Paul
3. Dave Day and Dave Garwood do some combat practice. Alex Paul

This page:

1. Dave Garwood's Ka6. Alex Paul
2. Warbirds at the top of a half-pipe. Alex Paul
3. Flinch, no flinch. Practice day. Joe Chovan

Warbird formation flying at the main hill on practice day.
Alex Paul

Opposite page: A pair of Ka-6s flown by
Dave Garwood and Terry Dwyer. Alex Paul


HB-1948
8
HB-1089
9


1


2

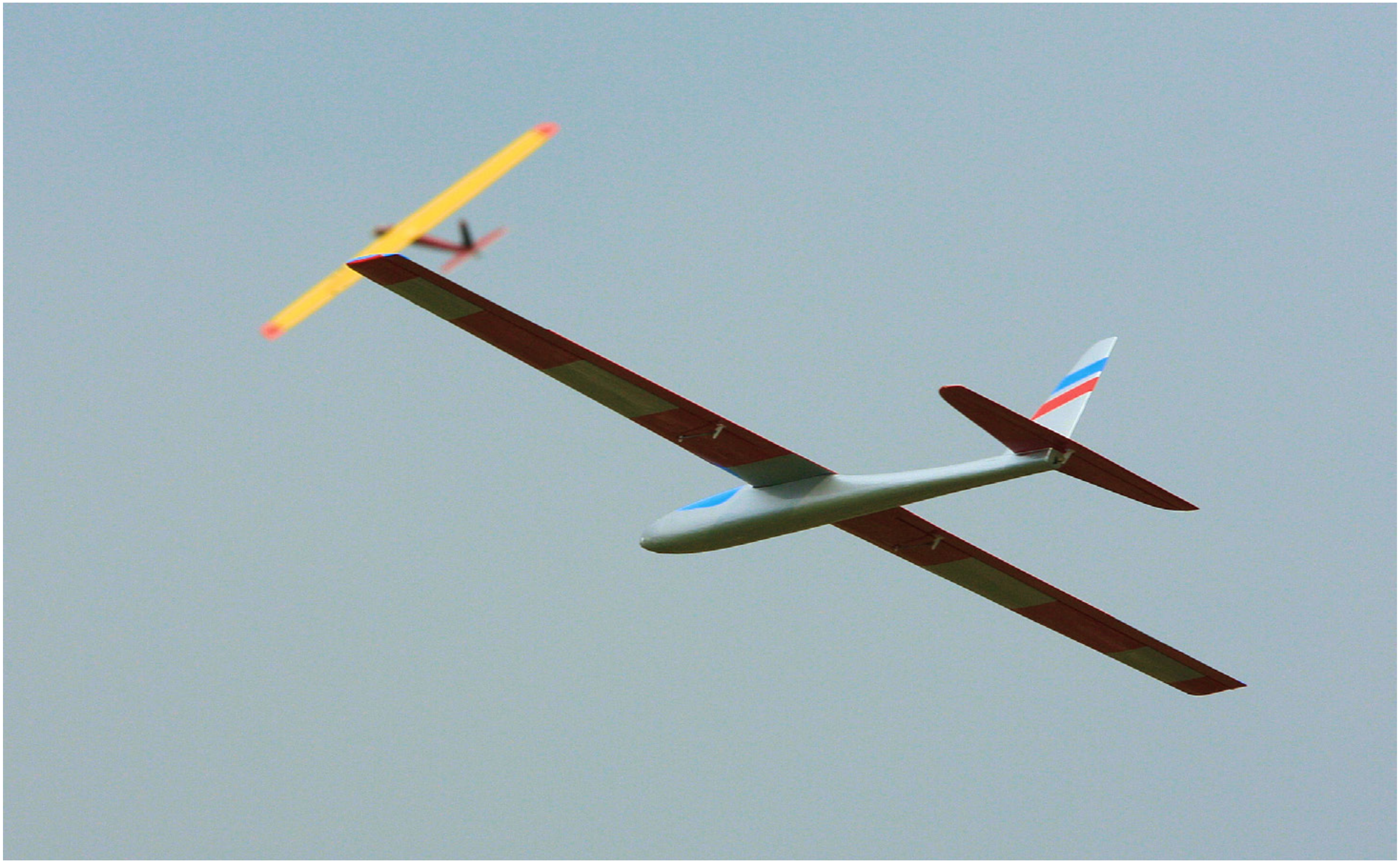

3

Opposite page:

1-2. Aircraft identification prior to races. Dave Garwood

3. ODRs in a turn. Alex Paul

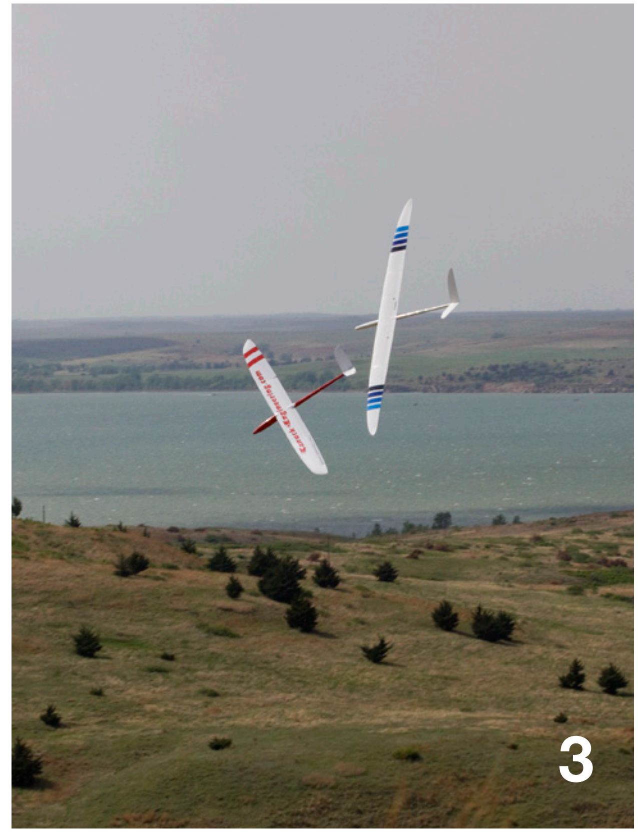
Flaggers at the far turn. Dave Garwood



ODR racing at its best. Dave Garwood

Opposite page:

1. ODR racing. Dave Garwood
2-3. ODR racing. Alex Paul
4. Steven and Alden in concentration during the ODR race. Dave Garwood



1. Dave Garwood (L) gets a launch for his Thunderbird. Alex Paul

2. Launch for some Unlimited racing. Alex Paul

3. Tight Unlimited racing. Alex Paul

Opposite page: Unlimited racing over Wilson Reservoir. Alex Paul

The Combat line. Alex Paul

Still photos from the Combat matches. Alex Paul

Larry Blevins' MiG-3. Photo at left by Dave Garwood, below by Alex Paul

Right: Dennis Brown's scratch-built Ta-152 which took first in Warbird racing.
Alex Paul

Below: Joe Chovan's P-80 does a victory lap after a very close Warbird race.
Alex Paul

1. Dwyer and Garwood in a close race. Alex Paul
2. Win or lose in the turns. Dave Garwood
3. Launch for Dave Day and Terry Dwyer. Alex Paul

1. Joe Chovan’s P-80. Dave Garwood
2. Rounding the turn. Alex Paul
3. Launching the P-80s for a Warbird race. Alex Paul

Unlimited racing at Minooka State Park. Alex Paul

Anton Benning's

P.S.S. *Impala*

A.B. Models in South Africa <http://www.abmodels.co.za/> puts out a scale model of the Impala for slope soaring. It spans 1400mm/55", has a length of 1200mm/47", and weighs 1.5kg/3.3 lbs. It flies in winds of 10-30 knots and greater.

The scale of this larger Impala is 1/6. The original was designed in 2000 as a slope soarer in basic foam and veneer construction. Two years ago I started the plug for a completely molded turbine model using fiberglass. The slope version is much easier to make since the wing is standard foam and glass construction. I do prefer slope soaring over engined models!

The wingspan of the turbine model is scale at 1.8m/71" and the slope version is slightly larger at 2.0m.

There will be three of these Impalas at Hermanus 2009!

Funny weekend, that one

Kevin Farr, kevin@fvdv.co.za

I rolled out of bed on Saturday morning and intercepted a phone call from Bill Dewey telling me the southern peninsula was blessed with a nice South Easter.

Red Hill should be cooking. Best get out there soon.

But the Cape is never what it seems and each nook and cranny delivers a differing story.

So sitting up at Red Hill in zero wind conditions and watching an approaching frontal system kick the life out of the South Easter, Bill and myself stared gloomily at the horizon.

What to do with a glorious but windless day?

The mercury was peaking at about 30 degrees, so it was not exactly cool, either.

So we went hiking.

For those who have stood at the Red Hill site and looked over your shoulder, you would have seen what looks like old forts on the hill top at the back.

So off we went for a little walkie, uphill... right up to the forts.

As we got there, Bill unfolded the amazing story behind them. Apparently built when the marines were based in Simonstown and were tasked with carrying all the rocks, cement and water to the top and building these miniature medieval styled forts.

There are three forts in total on top of the highest rocks in the area.

“Bugger me” is about the best summary of that physically draining feat.

Those guys sure must have been fit.

The view is spectacular, and uninterrupted and well worth the wee walk when you’re hanging around waiting for wind.

In the end we also did a wee bit of 4x4 driving up the back of the hill and had a good giggle, followed by a round of beers at Dixie’s. Not a bad day after all.

Bill Dewey at the top of the hill in fort number one.

Looking down at the third fort.

And so we moved on to Sunday... Based on Saturday's performance, we were not too sure what was going to happen.

So as the cold front had now made landfall and a North Wester now gathered strength, we made a dash for Chapman's Peak

Still seriously hot from the day before and with the wind slightly off line, the conditions were somewhat miserable.

So a change of tack was required.

Because Cape Town has so many mountains there is always the possibility of finding a more exposed area and the Sandy Bay slope proved to be that place. A fresh WNW wind, although still a bit weak in the lift department, caressed the slope and those who made the journey across the bay were rewarded with one hell of a fun day.

A new sport was born – Trail Gliding (well, that's what we're going to call it anyway). Brendan Nielsen started the lark, and soon Damian Hinrichsen, Marc Beckenstrater and myself flew and walked our planes for a good kilometer and a half up... and then down the trail to test out the lift conditions on each part of the lengthy slope bowl.

Now you can get fit and fly a glider at the same time!

Looking back at the second fort.

On the slope walk. Brendan Nielsen is on the left, Damian Hinrichsen in the middle and Marc Beckenstrater on the right.

Notably, one could realistically walk/fly/hike from Llandudno all the way across Klien Leeuwkoppie to Sandy Bay and eventually to the Sentinel at the far end on a good North Wester, without landing once, while hiking a mountain trail!

Possibly 5km's of flying... Who's up for it?

We are planning to try this once we get the right conditions on a good northwester and are planning a dry run/walk first to sort out the trail and the accessibility, then doing a run with EPP BEE wings, and finally do a full session with glass 'ships.

One landing will be permitted for a food and pee break, but other than that it's going to be a "hand-eye-leg" coordination test.

There are at least five interested individuals at the moment, so once more we can set out to have a load of fun.

Combat was furious as usual, the 'glass 'ships screamed around in the ever improving conditions and in the end five happy, smiling and relaxed individuals left the slope at the end of the day. Too much laughter had by all!

All in all, a possibly awful day turned out to be a peach of a day, and brilliant fun all round.

To see how hard the wind was blowing, check out Damian's aerial!

The initial trail walk followed the path illustrated on the title page - from the Sandy Bay slope to the end of the road and back.

This is the next task... 4.5km's long and what we propose to do when we get the right wind.

Servicing Thermic Sniffler*s*

Peter Carr WW3O, wb3bqo@yahoo.com

The Thermic Sniffler was a cutting edge product brought out by Dr. Walt Good and Don Clark. It operated in the two meter amateur (Ham) radio band at about 144.00 MHz and had a companion receiver.

The Sniffler was installed in a sailplane and sensed the change in altitude. It didn't give absolute altitude, just the change, up or down, by varying an audio tone. A higher pitch tone indicated lift while a lower tone showed sink.

The RF circuit was tunable over several kilohertz so that nearby interference could be avoided. The Sniffler was sensitive to height changes as small as several inches, so a pilot with sharp ears could fine tune the sailplane's path in the smallest puff of good air.

Since the Sniffler operated in the Ham radio band, non-Hams were not supposed to use it. However, many sailplane pilots bought them and used them to learn how to thermal.

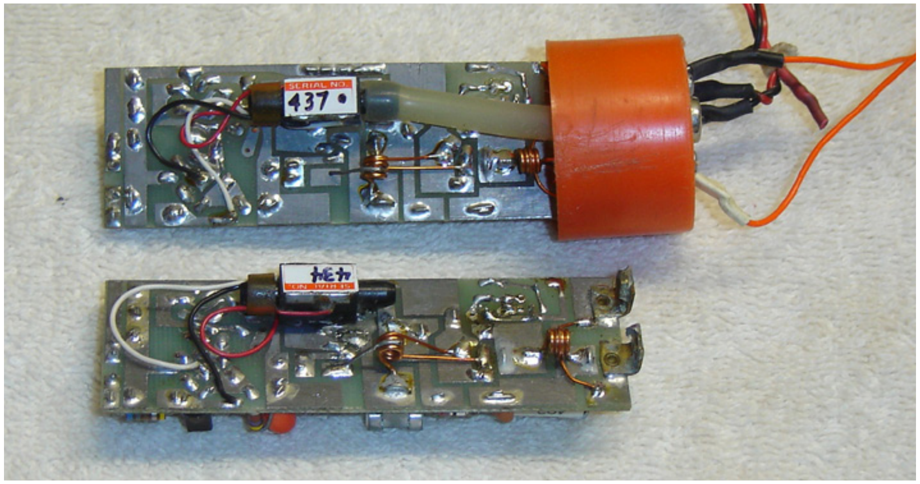
It was such an effective tool that some contests in the '60s and '70s actually outlawed their use as unfair technology. Those pilots without a Ham license could fly the Sniffler at their home field but couldn't compete with them because they were not licensed.

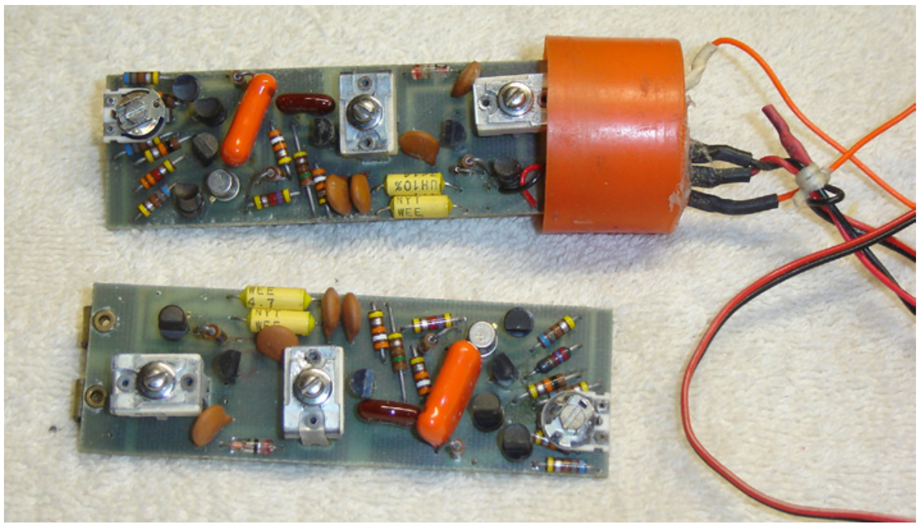
Later, Don and Walt sold their design to Ace RC Incorporated of Higginsville, Missouri.

Ace decided to rework the RF section and move the operating frequency to the 49 MHz band which didn't require a Ham license. They also did away with the fragile "pill bottle" housing and installed the electronics in a square white plastic shell.

A companion receiver was used to pick up the fixed RF frequency signal from the airborne unit. Normally an earphone was used with the receiver so the pilot wouldn't share the Snifflers' data with other competitors.

The Sniffler was comprised of an audio oscillator with a temperature/pressure sensor module that varied the tone frequency. This circuit modulated an RF oscillator on about 144.00 MHz which was the carrier. A variable capacitor matched the RF oscillator output to the two antenna wires that extended out from the pill bottle housing. These were about 3.5 feet in total length or a half wavelength (468/frequency = 1/2 wave) at two meters. The two antenna wires were usually taped to the bottom side of the wing in a swept "V"pattern. Some sailplanes had pieces of inner Nyrod





Upper: These are two Sniffler circuit boards, one with the pill bottle cap in place. This is the bottom side of the board with the black sensor module in the middle. You can see the rubber tubing that brings air to the sensor. The bare board has the two elbow-bent screw terminals for the antenna wires shown.

Lower: This is the top side of the circuit board with the three tunable capacitors. The capacitor furthest from the end cap sets the resting tone frequency. The middle capacitor determines the RF frequency and the one closest to the end cap peaks the RF output.

installed inside the wings for the antenna wires to slide into as the ship was assembled at the field. Since a straight dipole like the one on the Sniffler has a signal null off the ends, the "V" pattern would lessen the null and make the tone readable all the way around the thermal circle.

There are several thermal sensing telemetry devices on the market today. They make use of microprocessors, improved sensors and multi-channel data formats, but mainly they give the same information as the Sniffler. They do seem to have better range and also are not prone to the signal fades of the antenna system used on the Sniffler. The downside is that they use the R/C airborne pack for power instead of the separate 9-volt battery in the Sniffler. For power hungry aircraft with a lot of servos this is a serious consideration.

A typical flight would begin by switching on the aircraft and also the Sniffler, then the ground receiver. A tone of about 400 Hz would be heard in the receiver earphone when the sailplane was resting on the ground. When the ship was raised to launch position a small tone increase could be heard telling the pilot that the Sniffler was operating. At launch, as the ship rotated and went up the line the Sniffler tone would go to maximum pitch and remain there until the ship came level and released the tow line. The tone would then settle back to around 400 Hz and go up or down as the ship went in search of lift.

The Sniffler would basically sense two types of rising air. First, it would sense the warm rising air of a thermal. This would make the tone rise at a fairly rapid rate and stay high until the ship came out the lift. Second, it would sense gusty turbulence. There would be a sudden rise in tone pitch followed by a rapid decrease as the wind gust blew through. This second type would fool many a pilot into starting a thermal turn where there was no lift. In both situations the ship would move its wings and tail indicating that dynamic air was in the area.

I found the Sniffler particularly useful for coming down out of big lift. I originally used mine in a Sailaire 12-foot span sailplane that loved to get high. When diving the flying stab has been known to come off, especially with the spoilers up and adding rough air over the tail. If I couldn't fly out of the lift then I'd pop spoilers and begin a shallow dive while in a wide circle. The dive was just steep enough to shut off the Sniffler tone and I used that low growl or hiss of the blank RF carrier in the earphone to monitor the descent. If an flutter developed in the airframe the resulting vibration could be "heard" by the Sniffler and the tone would "warble". That was very effective at giving alarm before things came apart.

Those pilots who are involved with the League of Silent Flight LSF tasks know what a challenge they can be. In my view the two toughest tasks are the 10000 meter cross country and the two hour thermal. The cross country or goal and return task requires that the sailplane be flown to a goal over 6.2 miles distant and then return to the launch point. The pilot chases along behind the sailplane in a vehicle and tries to keep the ship in view and in rising air at the same time.

A Sniffler will tell the pilot if lift is there while warning him if it starts a dive or steep turn for some reason. Of all the tasks, this one needs the ship to fly high and the pilot to maintain visual contact. When bouncing down a road at 30- 40 miles per hour with the wind making your eyes water, it's a comfort to hear that the ship is doing fine.

The LSF two-hour thermal is best flown with several people at the same time. That way each sailplane can show conditions in a separate part of the sky. If sink happens in one spot then maybe another ship is finding lift so everyone can fly toward it. The Sniffler used by an experienced pilot can maximize the good air while helping him avoid the bad stuff.

You will notice in the pictures that the top of the circuit board has three variable capacitors on it. The one nearest the edge is the tone-set cap. This allows the pilot to choose the "resting" tone of the unit as the ship sits on the ground. The middle capacitor sets the RF frequency of the unit. I set that to the middle of the tuning range of the ground receiver.

The capacitor partly hidden by the pill bottle cap is the matching capacitor. That is adjusted for strongest signal from the Sniffler to the receiver. I like to use an AC millivolt meter plugged into the receiver earphone jack and tune for maximum on the meter.

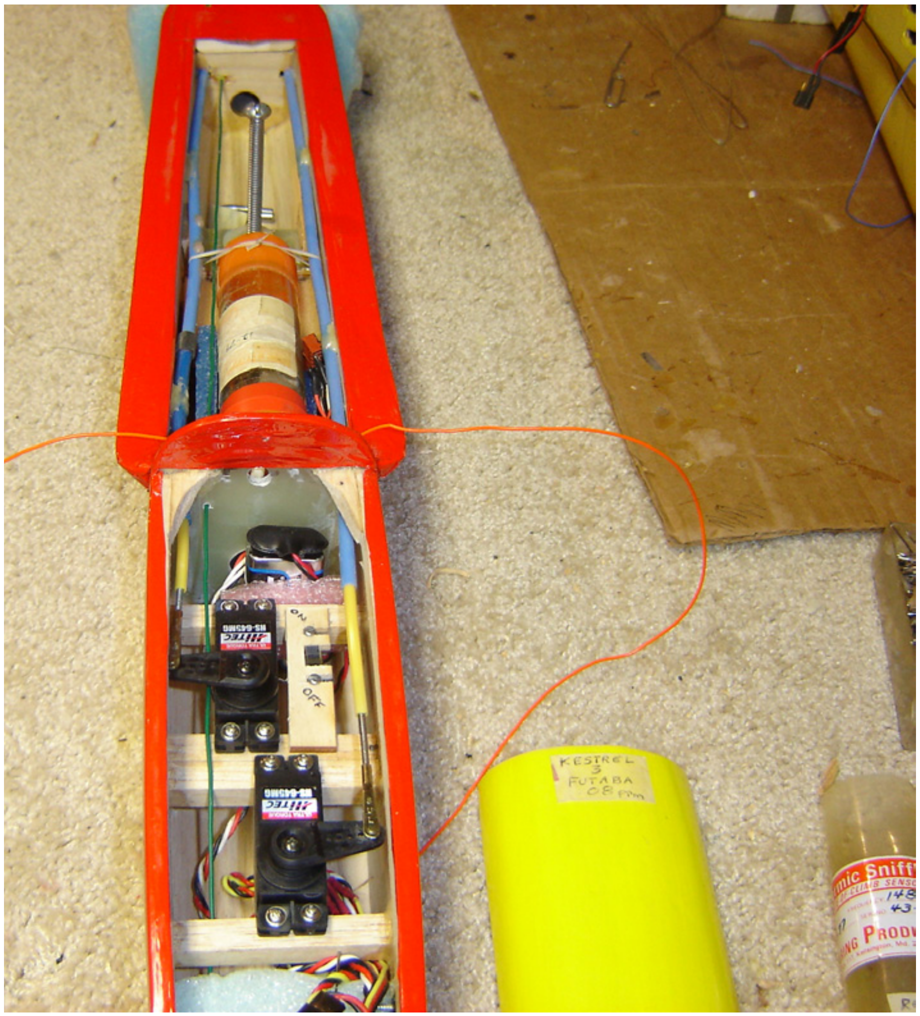
The 9-volt battery in the Sniffler will last for several days making it a useful airplane tracker if you happen to land in a corn field or the woods. The rod type antenna of the receiver will null or loose signal when pointed at the plane so is easy to use for searches.

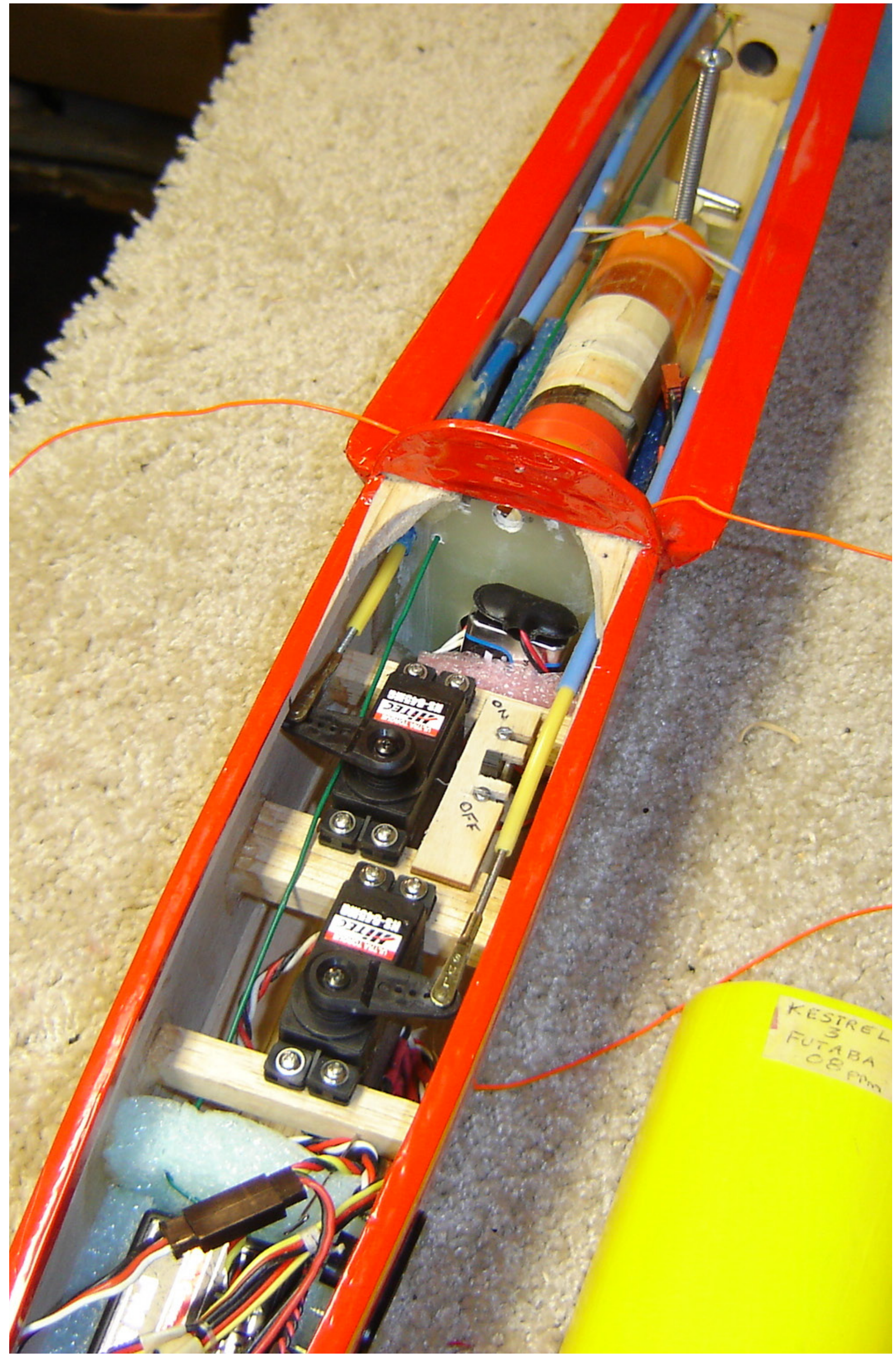
When you change the battery be extra careful not to reverse the polarity. The battery snaps should only go onto the battery one way, but if you aren't using an on-off switch and touch the battery to the snaps the wrong way it will take out a diode on the circuit board. (Ask me how I know!)

There is a piece of rubber fuel tubing that connects the sensor to the drilled bolt in the plastic cap. This routes outside air to the sensor. The case or pill bottle must be air tight so that the pressure inside is a steady reference for the sensor. Similarly, the rubber tubing can't have any holes and the fit around the bolt end must be tight. Also check that the hole in the bolt is clear.

Right: *The R/C system antenna blue wire goes toward the tail and crosses directly over the right side Sniffler antenna wire. They cross at 90 degrees so coupling is minimal and no interference has been noted.*

Below: *This is a view looking aft from the nose. The rudder and elevator servos are mounted with enough room for the Sniffler power switch to sit beside the rear one. The 9-volt battery sits between the rear servo rail, and the bulkhead and is secured with a bit of foam.*





The following is a brief sequence for repairs of the Sniffler.

First, Do a complete visual inspection of the outside including the battery wires and switch if used.

Second, if the Sniffler is dead, start by replacing the battery. Hook the negative lead of a multimeter to the battery minus terminal, then use the positive lead to follow the voltage across the circuit board. You should see a voltage drop across the diode. From there check voltage to the sensor, and the various transistors. Snifflers are not hard to work on. I have not been able to locate a schematic for them, but use standard troubleshooting procedures to find problems.

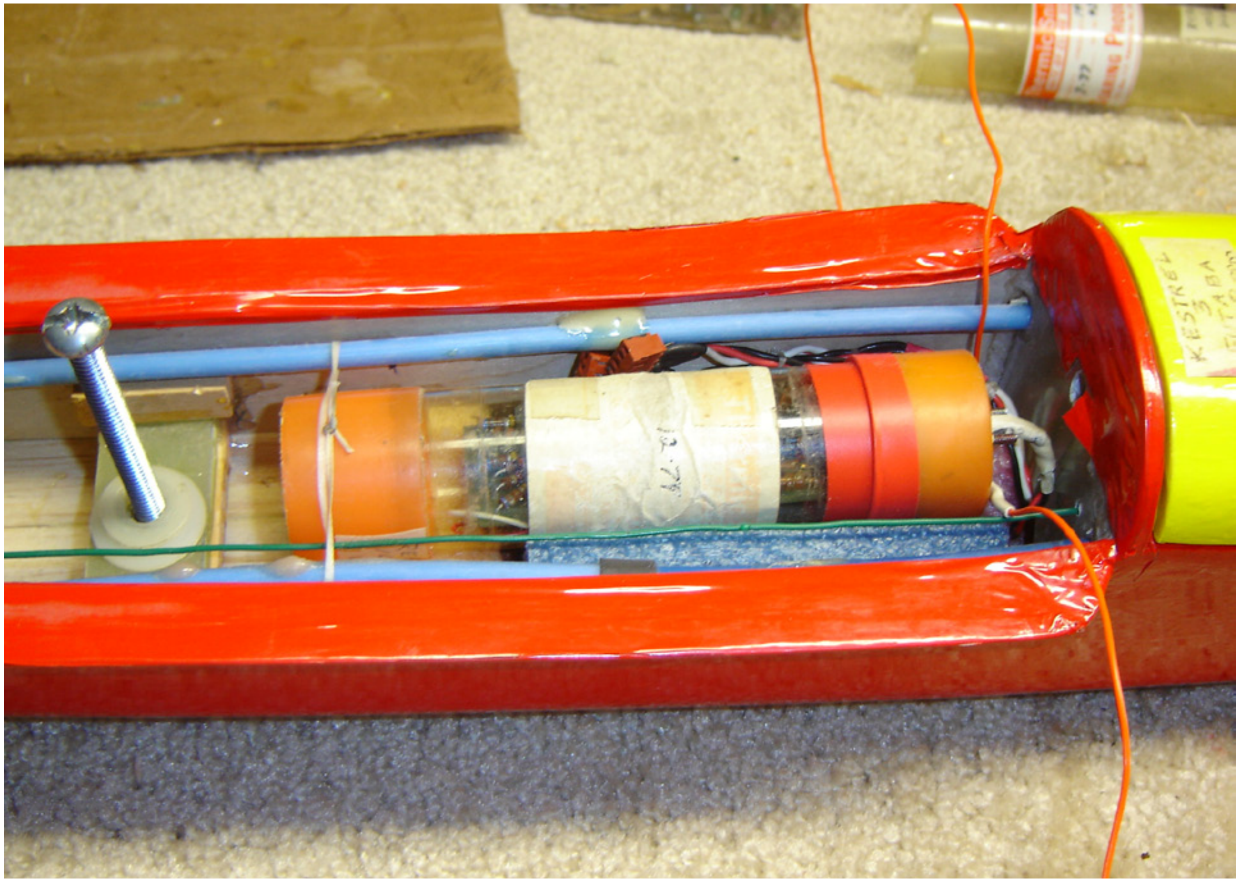
Third, if range is the problem, hook up the AC millivolt meter to the receiver and tune the capacitors for max output. I've had "firm" landings detune one or more of the capacitors. Sometimes a readjustment is all it takes.

If that's not it, then check for broken antenna wire connections under the white shrink tubing. If they are okay there may be corrosion on the two screws that terminate the antenna wires to the pill bottle cap.

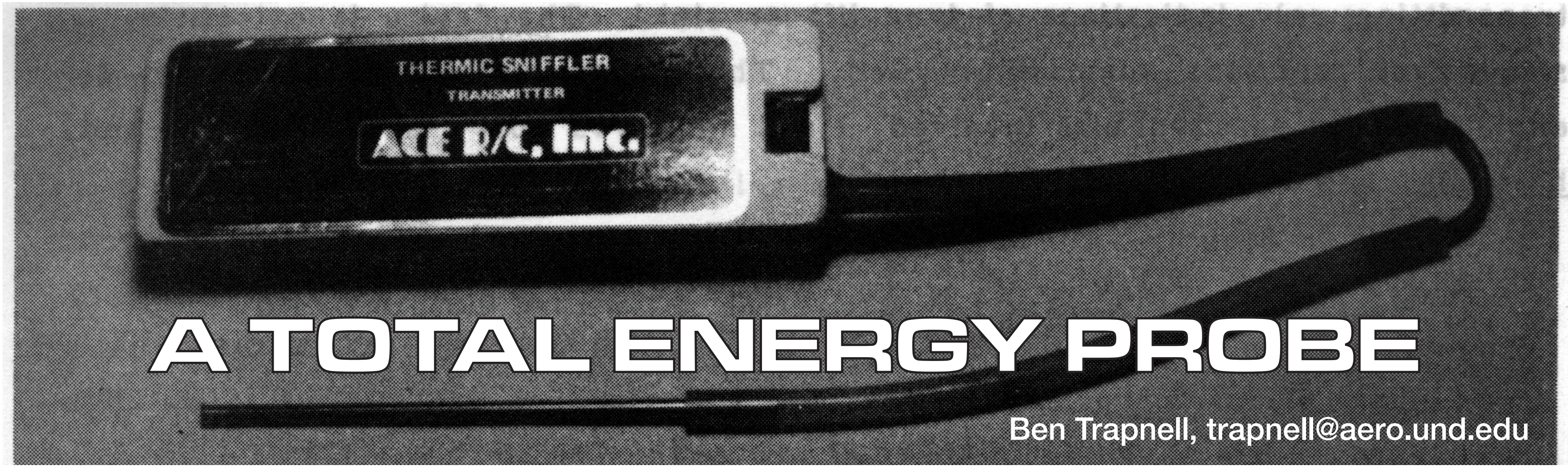
I also had trouble with the receiver. The swivel at the base of the telescoping whip has gone open on occasion and dirt has made it noisy at other times. I use a product called Deoxit <http://www.deoxit.com> that removes oxidation from electronic connections and is great stuff. As with the Sniffler, it's always best to change the 9-volt receiver battery first.

It is a challenge to keep this old gear working, but well worth it. When doing maintenance or moving the Sniffler to another ship I can appreciate the skill and devotion that Don and Walt put into it.

It's fun but also a privilege to work on the stuff they built.



005: The complete Sniffler is installed in a 12-foot span Kestrel sailplane. It is well padded. The wires to the switch and battery are passed forward into the radio room. Space was provided for the two flap/aileron wing wiring connectors so that they don't press on the Sniffler when the wing is bolted down.



A TOTAL ENERGY PROBE

Ben Trapnell, trapnell@aero.und.edu

Joe Wurts' reputation in cross-country soaring is legendary and justified.

Ben Trapnell is a frequent contributor to RCSD (Big Wing review, August 1988) and a friend of Joe Wurts. Ben is also an accomplished soaring pilot and enjoys testing new ides and equipment.

In this article, Ben describes a new (to R/C soaring) device adapted by Joe Wurts from full scale soaring. It has already proved to-be an effective and outstanding addition to the R/C soaring pilot's "kit." Using Ben's instructions you can build one yourself. This is believed to be an RCSD "first" scoop.

Earthbound soaring pilots have long been at a distinct disadvantage to their airborne counterparts when It comes to recognizing lift. While the full-scale pilot can feel the lift, the model pilot must react to the visual actions of his aircraft.

When the plane's reasonably close, this may or may not be too difficult. On the other hand, an aircraft at high altitudes (during a crosscountry contest for example) is relatively difficult to see. Whether it's "cored" is often very difficult to determine. Visible or not, there still remains the problem of "thumb thermals."

These pilot inputs may serve to mask or give false indications of lift. The dilemma, then, is how to tell when the sailplane encounters true lift (or is just reacting to pilot inputs) and how to keep the plane in that lift.

Devices, new and old, have attempted to "tell" the model pilot when his aircraft encounters lift. Two of the most popular are the Thermic Sniffler produced by Ace R/C, and the Thermal Navigator.

Both are electronic devices which are placed in the model, but operate quite differently. The first sends a signal to a ground receiver which translates it into an audible indication of climb and

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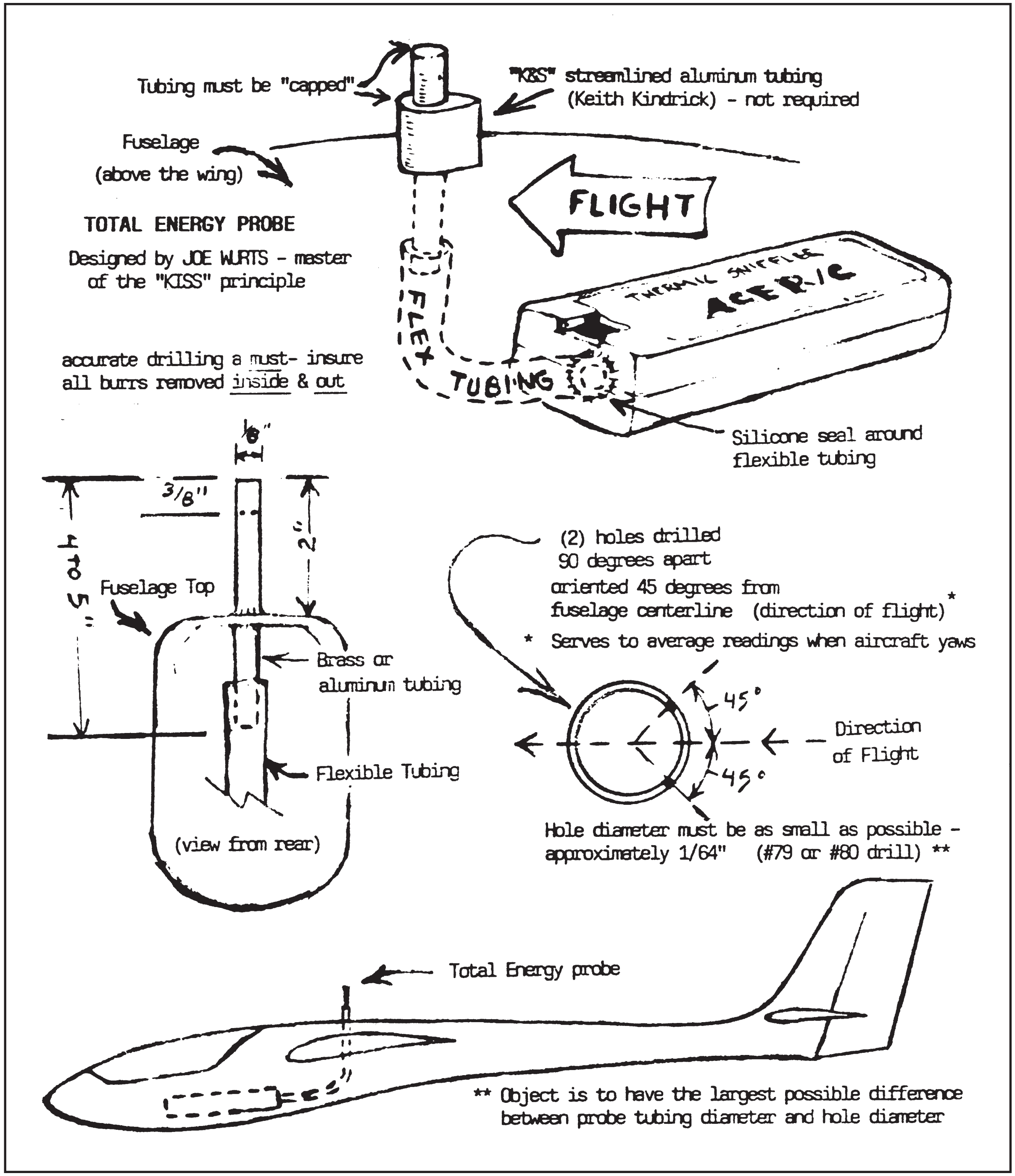
descent. The Thermal Navigator, on the other hand, sends an input to the aircraft's radio which causes the aircraft to turn, thus, "showing" the pilot that he's in lift.

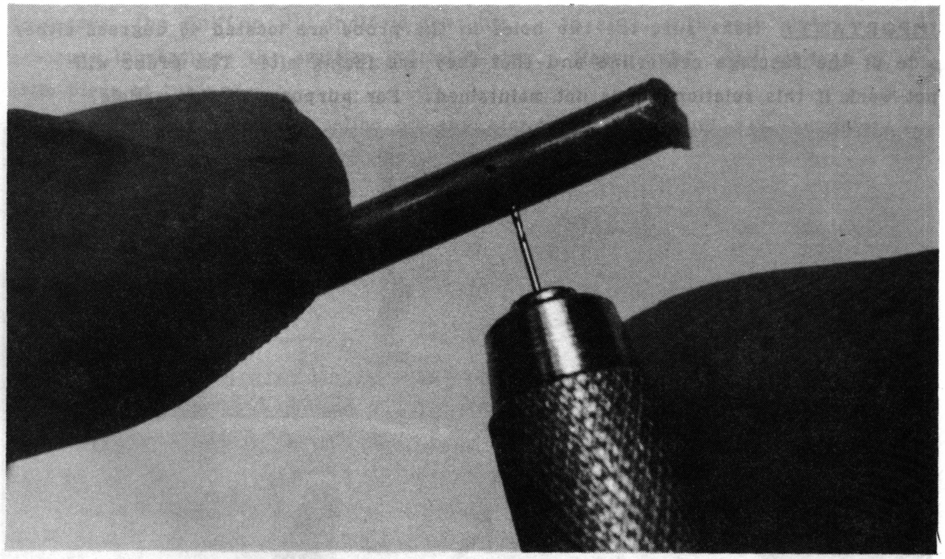
Both work relatively well but suffer from the fact that each will falsely interpret spurious pilot inputs as lift or sink. If the pilot pulls back on the stick, both devices will indicate lift, while doing the opposite indicates sink. These "thumb thermals" have fooled even the best and, up to now, were considered something to live with.

Enter "The Boss."

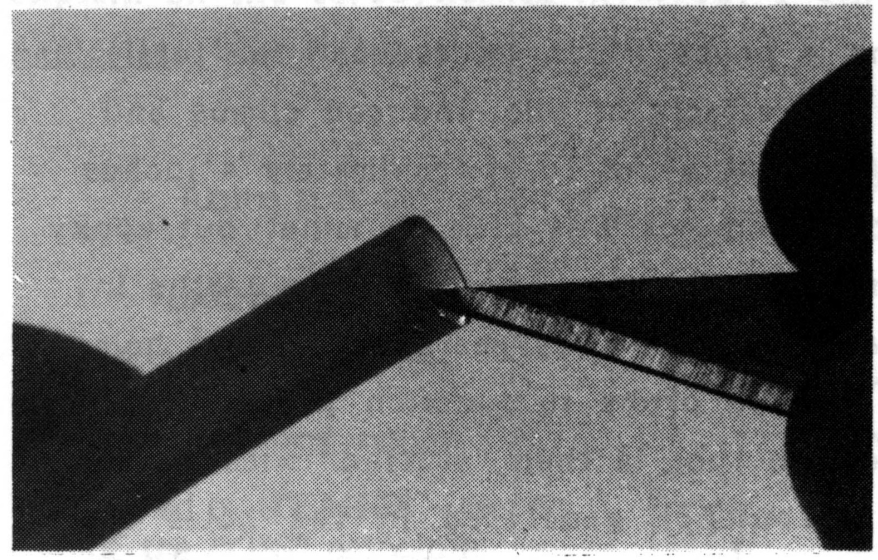
Famous for his cross-country exploits and fiberglass construction techniques, Joe Wurts has been winning nearly everything in sight with his transmitter in one hand and Thermal Sniffler in the other. Realizing the limitation of his Sniffler, he knew there had to be a "better mouse trap." Borrowing from full-scale soaring's total energy probes and using his own aeronautical engineering talents, Joe proceeded to modify the Thermic Sniffler allowing it to, in effect, disregard any of the pilot inputs, thereby transmitting only indications of true lift or sink!

The device is extremely simple yet functions surprisingly well. Though not enough of an expert to explain all the aerodynamics involved, I will show you how I made my probe and, basically, how It functions.





A #80 drill bit in pin-vise used to drill 1/8th inch K&S aluminum tubing. Holes are 90° apart, 3/8th inch from top end. Note tubing is “capped” with hot-melt glue.



Close-up of chamfered end cutting process.

The heart of the system is the standard Thermal Sniffler. If you’re not familiar with it, the device is a transmitter with a small orifice at one end which allows air to enter or exit a plenum chamber with changes in atmospheric pressure (translate: climbs or descents). The rate at which the air enters or exits is “measured” and transmitted back to the pilot as an audible signal. The higher the pitch of this signal, the faster the air is leaving the cavity, hence, the faster the aircraft is rising. Just the opposite occurs when the aircraft is descending.

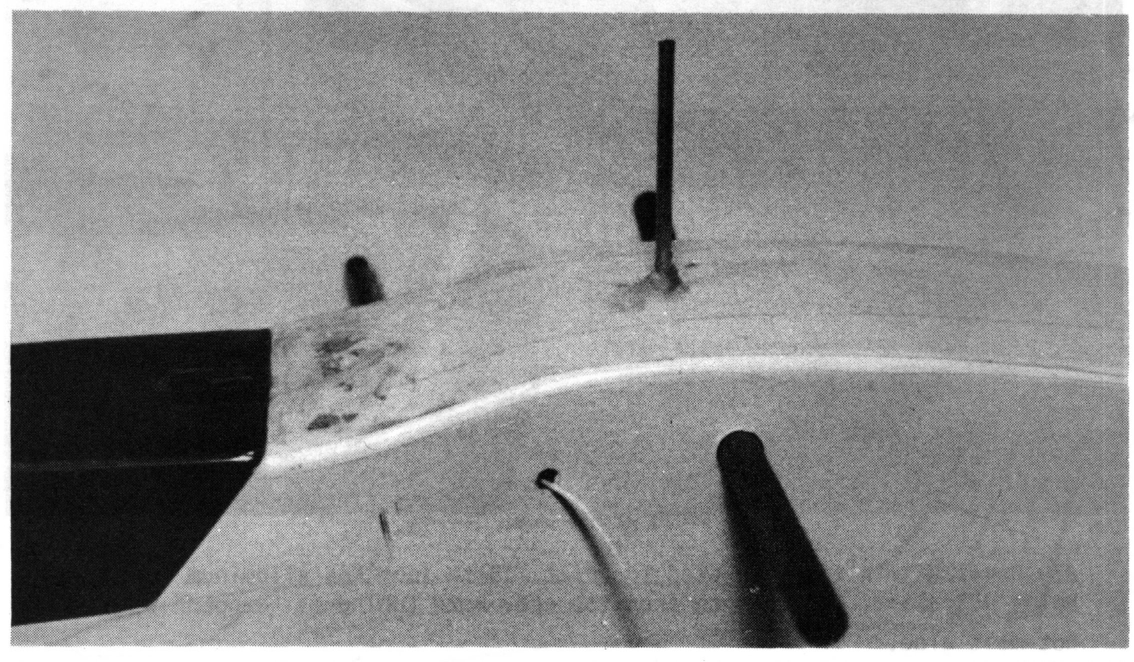
Joe’s modification starts with fabricating a probe which “measures” the total energy of the system and cancels out the effects of pilot-induced climbs and descents.

The probe is a piece of 1/8" tubing cut to approximately four inches in length. One end is then plugged. I used hot-melt glue on mine, but epoxy might work, or solder if the probe is made of brass.

Approximately 3/8" from the plugged end, two tiny holes are drilled 90 degrees apart. These holes must be as small as possible in order for the probe to function properly. (I used #80 bits on mine.)

The open end of the tube is then “stuffed” with a small amount of foam. This prevents any turbulence generated in the holes from reaching the Sniffler’s orifice. Just how much foam needed is mostly a product of experimentation. Joe recommends enough to provide a time constant of 1 (meaning: if you were to draw a vacuum, it would take 1 second for the vacuum to decrease by half). A segment of cigarette filter has proven to be very effective.

Left: Tubing tack-glued with gap-filling CyA then caulked with silicone adhesive.



Completed unit installed in aircraft. Drag of 2" probe "negligible." (<2% max. for planes of approximately 1000 in^2.)

The second part of construction is getting the Thermic Sniffler ready for the probe. A piece of large fuel tubing (What Is that?) is chamfered at one end so it can more easily be fit over the orifice of the Thermic Sniffler. A sharp #11 blade works well. I used a little bit of gap-filling CyA to hold this tubing in place, then applied a bead of silicone adhesive around the tubing. Be very careful in these operations that you don't plug up the tiny hole in the Sniffler. As the final device may be required for more than one airplane, I use a relatively small length of tubing for this and splice a longer piece in later.

Mount the probe on/in the fuselage with approximately 2" protruding from the top. This is to keep the small holes away from the boundary layer. VERY IMPORTANT: Make sure the two holes in the probe are located 45 degrees either side of the fuselage centerline and that they are facing aft! The probe will not work if this relationship is not maintained.

For purposes of this article, (I was in a hurry) I mounted mine with hot-melt glue, but any adhesive should work.

If you're wondering about the drag of such an arrangement, don't! Joe's calculations indicate that on a ship of approximately 1000 squares,. the drag created is less than 2% of total at high airspeeds. At max L/D, the drag is less than 1%! The potential gain by being able to remain in the lift far outweighs the drag produced. The probe is now spliced to the "modified" sniffler and the unit is mounted as usual in your aircraft. That's all there is to it!

Operation is simple. Turn the system on, launch the plane, then listen for any change in the neutral tone once established in a glide. A change in pitch indicates a change in rate of descent due to the air mass the plane is "floating in."

Theoretically, when moving through the air, the pressure behind a cylindrical body is less than that in front. As the velocity increases, the negative value rises. In our sailplane, one reason for an increase in velocity is due to pushing the stick forward, causing a descent. The normal Sniffler, sensing the increase in static pressure, would Indicate sink. The design of the probe overcomes this because as the static pressure is increasing due to a loss in altitude, the dynamic pressure (negative value) is increasing due to the resultant increase in velocity. Amazingly, this happens simultaneously, cancelling out any change in "total energy." The exact opposite occurs in a climb.

If true lift is encountered, the aircraft's velocity shouldn't change appreciably. Dynamic pressure remains the same while static pressure decreases and the Sniffler will indicate that lift. In sink, with only static pressure increasing, the Sniffler indicates sink. Neat, huh? And all from a little piece of tubing! Well, not an engineering treatise by any standards, it should get the point across.

If you're like me, the advantages of this type of system is Incredibly obvious. If not, check with your competition! Very few things these days are revolutionary. This is certainly one of them.

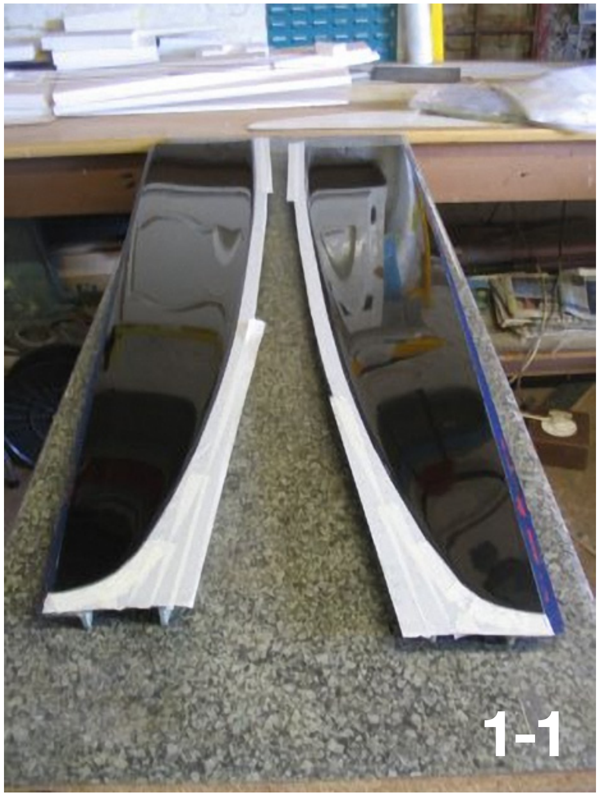
Thanks again to Joe for "having no secrets."

Constructing the Shongololo Wing

Evan Shaw, evan@amtcomposites.co.za

The Shongololo is a high performance fully molded composite radio controlled glider with a hollow core sandwich wing construction. As we own the molds for this model, we are able to use them to teach people the art of working with high tech composite materials. To do this we have created a building group where four people at a time work on the model over 10 sessions. The building group meets once a week and each person will get to build his own glider while being taught how to work with advanced composite materials. The building group structure works in such a way that there is always a turnaround of people and each person first gets to help and learn on two other models before they get to build their own. (See Evans' article, "Composite F3B Glider Building Group," starting on page 71 of the November 2007 issue of *RCSD*.)

A number of photos will illustrate the different aspects of making this model glider. Photo Series 1 deals with the actual laying up of the wing, Series 2 describes the joining of the wing halves.



Series 1

1-1: Molds polished and edges taped.

1-2: Ready for spraying.

1-3: Multiple thin layers of 2K paint. Allowing drying between coats.

1-4: Molds painted and drying. Kept in the vertical position to minimise dust settling on the surface. The paint is allowed to dry for a minimum of one hour to a maximum three hours.

1-5: The first layer of 25 gram glass cloth is laid on.

1-6: Resin is then applied to the surface and squeegeed out using old credit cards.

1-7: All excess resin is squeegeed off.

1-8

1-9

1-10

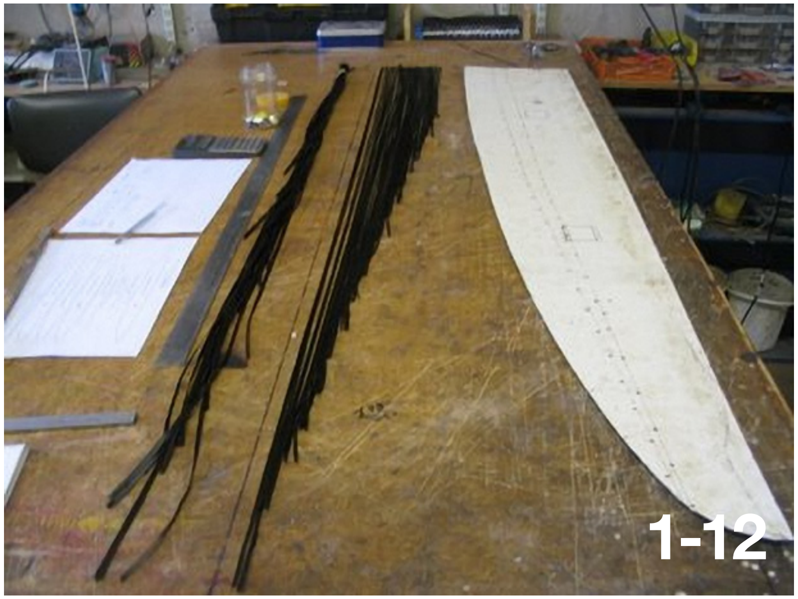
1-8: In the case of the Shongololo, we use a 71 gram carbon/aramid hybrid cloth for the skin. Plain carbon cloth can also be used depending on your requirements. A template is used to cut this hybrid cloth to the exact shape of the wing because if any aramid is left sticking out of the finished wing it is very difficult to remove afterwards.

1-11

1-9: Next, the hybrid cloth is applied and wet out over the 25 gram glass.

1-10: The Herex sandwich pieces are chamfered all around.

1-11: Dust is carefully removed from the Herex before placing on the lay-up.



1-12: For the F3B Shongololo there are 50 12K tows on the top and 40 on the bottom to form the spar caps.

1-13: The carbon tows are then placed on the Herex sheets and wet out one by one.

1-14: Care is taken to wet the carbon properly and remove all air bubbles. The Herex sheets are also checked for alignment.

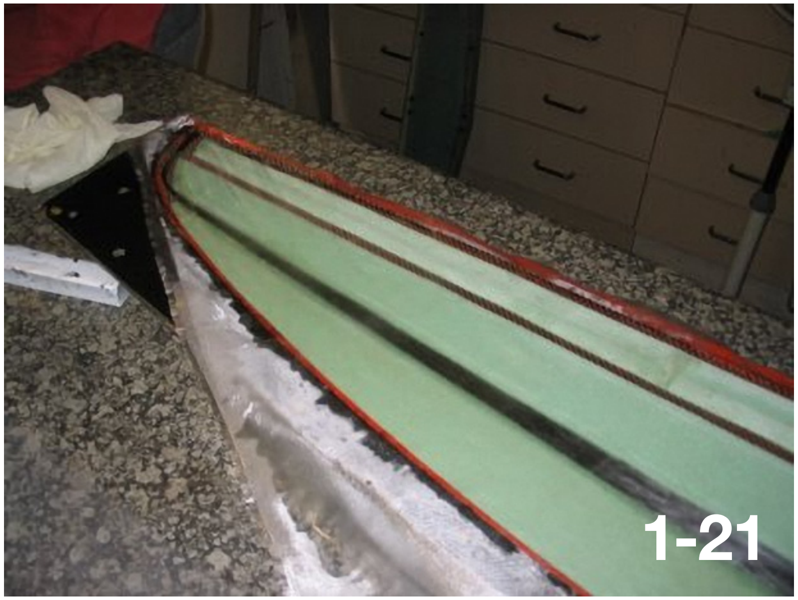
1-15: The inner 49 gram glass cloth skin, which completes the sandwich, is wet out on separate plastic sheets.

1-16: The shape of the wing is drawn on the underside of a plastic sheet as a guide and the glass cloth is laid onto it and wet out. (This is often referred to as a “wet preg.”)

1-17: Where necessary, local reinforcement is applied and wet out.

1-18: Then the wet-preg is transferred, on the plastic sheet, to the rest of the lay-up in the mold. The plastic keeps the glass cloth in shape. Note the local reinforcements (hard points) for servos and in the root area already on the Herex.

1-19: The plastic is then slowly peeled away.



1-20: Then the cloth is stippled down making sure not to disturb the alignment of the Herex sheets.

1-21: Careful inspecting for alignment and trapped air bubbles.

1-22: Peel ply is then applied over the entire lay-up. Not shown unfortunately, but on top of the peel ply, a layer of separator film is added and then the whole mold is wrapped in a breather cloth.

1-23: The vacuum bag is prepared.

1-24: Then the molds are inserted into the vacuum bag.

1-25: This bag is big enough for two molds. So far just one in.

1-26: Once the molds are in, the bag is sealed and vacuum is applied and then the bag is checked for leaks and even distribution of vacuum. The lay-up is left to cure under vacuum for 24 hours. Then the vacuum is switched off and the the molds are removed from the bag and the lay-up is left in the molds to cure for a further six days in a warm environment.

That's it for the wing skin lay-up. The next series of photos will detail how the wing skin halves are joined.

2-1

2-2

2-3

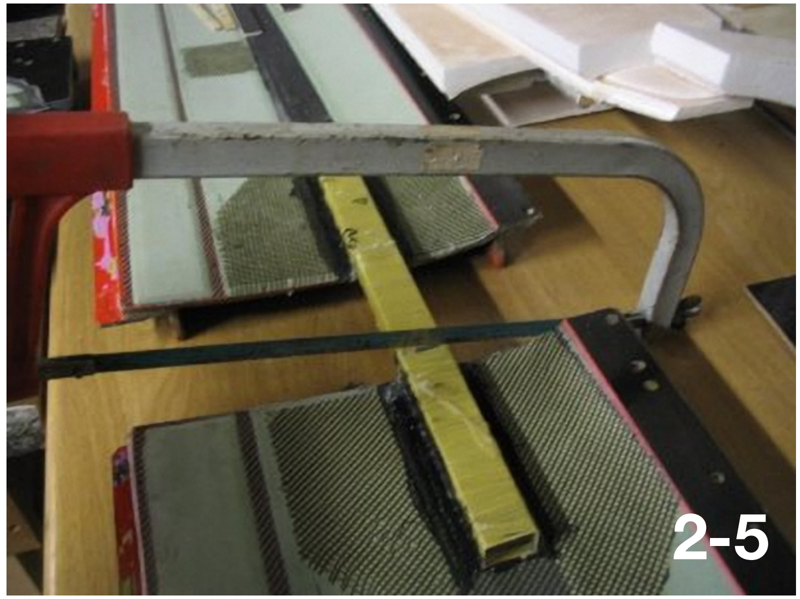
Series 2

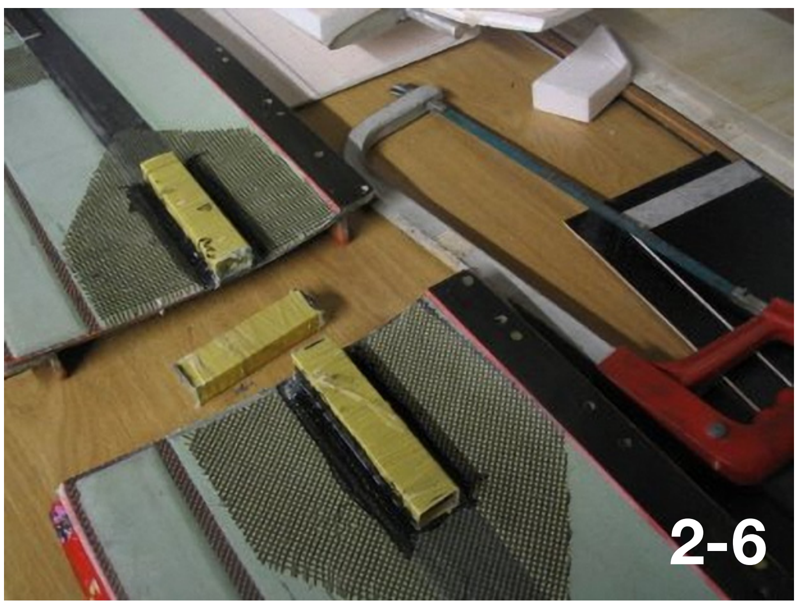
First a joiner box has to be constructed.

2-1: The joiner is constructed over a split steel mandrel, show above. The two halves of the mandrel are tapered to aid removal form the inside of the finished joiner box.

2-2: Two layers of 163 gram glass cloth cut at 45 degrees are wrapped around the mandrel and then the whole thing is wound in aramid tows which squeezes the cloth tight. These aramid tows are then wet out thoroughly.

2-3: This is left to cure on the mandrel for a few days.





2-4: When cured the mandrel is removed and the joiner box is carefully aligned and glued to the top wing skins in one piece. H9940 epoxy adhesive is used. In the photo above the peel ply has been removed from the lay-up and the excess glass cloth trimmed flush with the molds at the root and leading edges.

2-5: When the adhesive is cured the excess joiner box is cut off flush with the root of the wing.

2-6: The next step is to install the sheer webs. But before this can be done they have to be made. The easiest way is construct pre-laminated end grain balsa sheets and then cut the sheer webs from these. For the main sheer webs, 3 mm balsa is sandwiched between 200 gram carbon cloth which is orientated at 45 degrees. The hinge line sheer webs are made from 2mm end grain balsa between 163 gram glass cloth at 45 degrees.

2-7: The height of each sheer web is carefully calculated and then cut from the pre-laminated sheets.

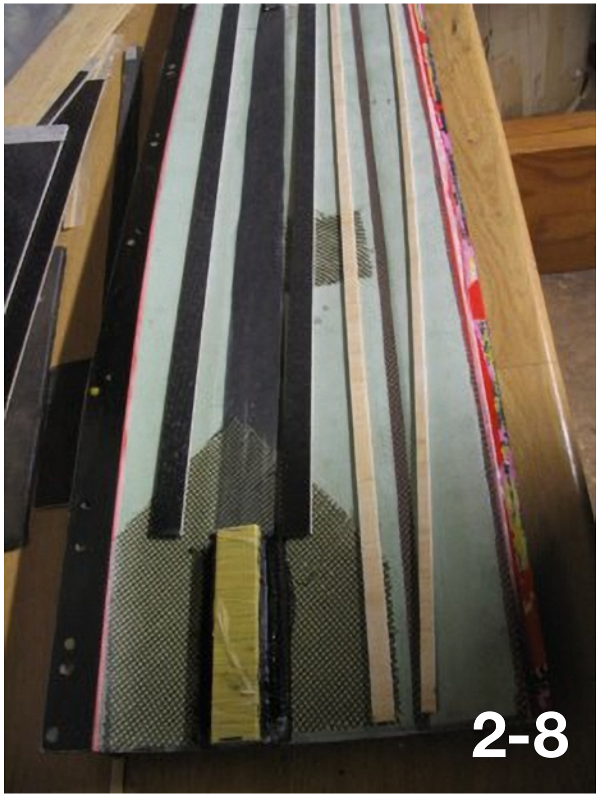
2-8: The sheer webs prior to being glued in.

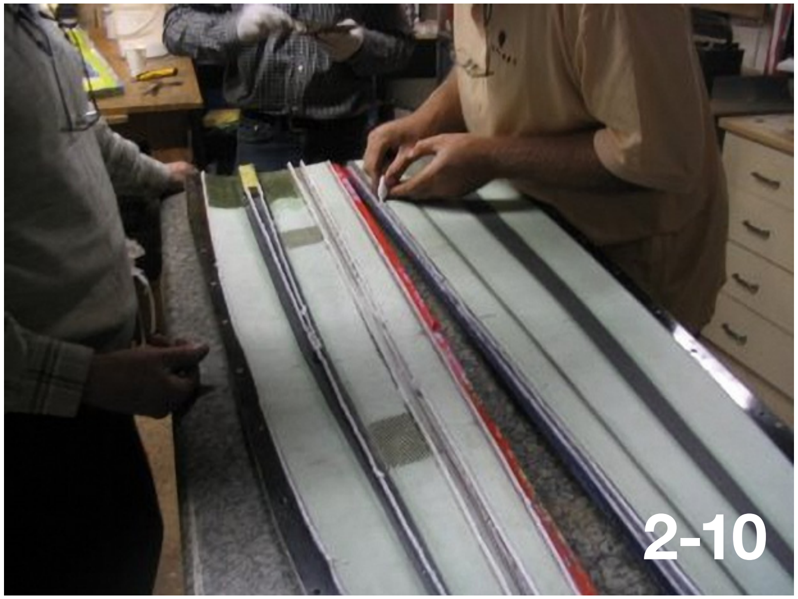
2-9: Once again H9940 Epoxy adhesive is used to glue the sheer web in. Weights are used to hold them in place while the glue dries. Careful alignment is critical to a strong and true wing.

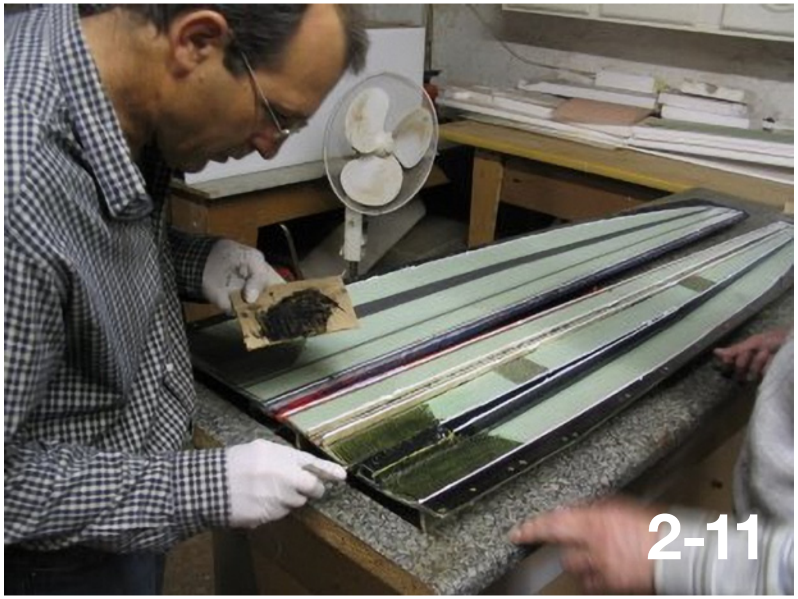
Now comes the joining of the two wing halves. Before this can be done the molds are trial fitted together to check that they close properly and any high spots are sanded off the sheer webs.

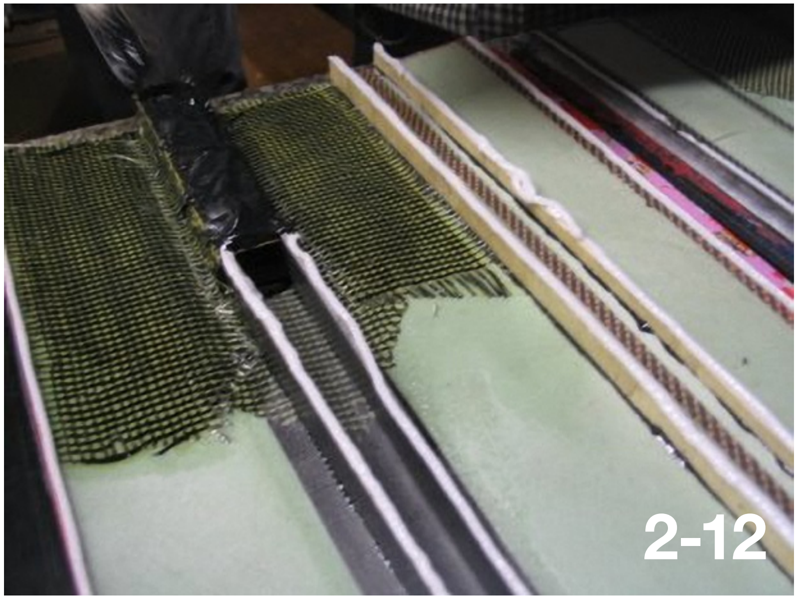
2-10: Once it has been determined that the molds will close, a mixture of epoxy, Cab-O-Sil, cotton flocks and microballoons is made and put into a bank bag. Then the corner is snipped off and the goop is piped onto the areas that will meet.

2-11: The goop must be just thick enough so it stays on the top of the sheer webs in a bead without running down the sides.







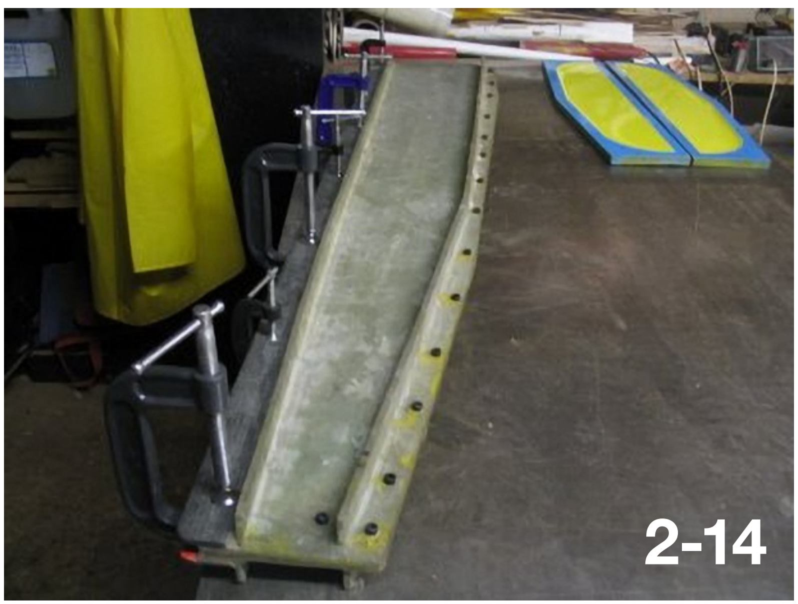

2-12


2-13

2-12: Again, H9940 epoxy adhesive is used on the joiner box.

2-13: Although it is not clear in the above photo, reinforcing “C” shaped pieces of carbon/aramid hybrid cloth will be applied in the junction between the top skin, joiner box and bottom skin. These “C” are lying flat next to the joiner box in this photo.

2-14: Finally the two mold halves are mated together and bolted and clamped tight.


2-14


2-15

2-15: A week later the bolts and clamps are removed and the molds twisted slightly to loosen the wing from the molds.

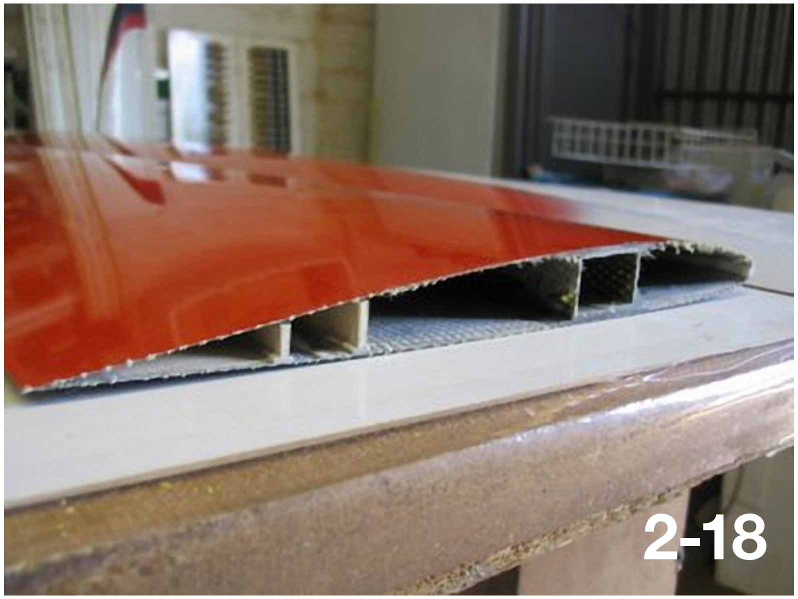
2-16: The molds are then opened to reveal the wing.

2-17: The owner (on the left) finally gets to see all his hard work revealed. All that remains is for the flashing to be removed.

2-18: The root area is cleaned up and sanded square. A pre-laminated carbon root rib will be bonded to it later on. It can be seen in the last photo, 2-19.

2-19: The control surfaces are having their wipers installed.

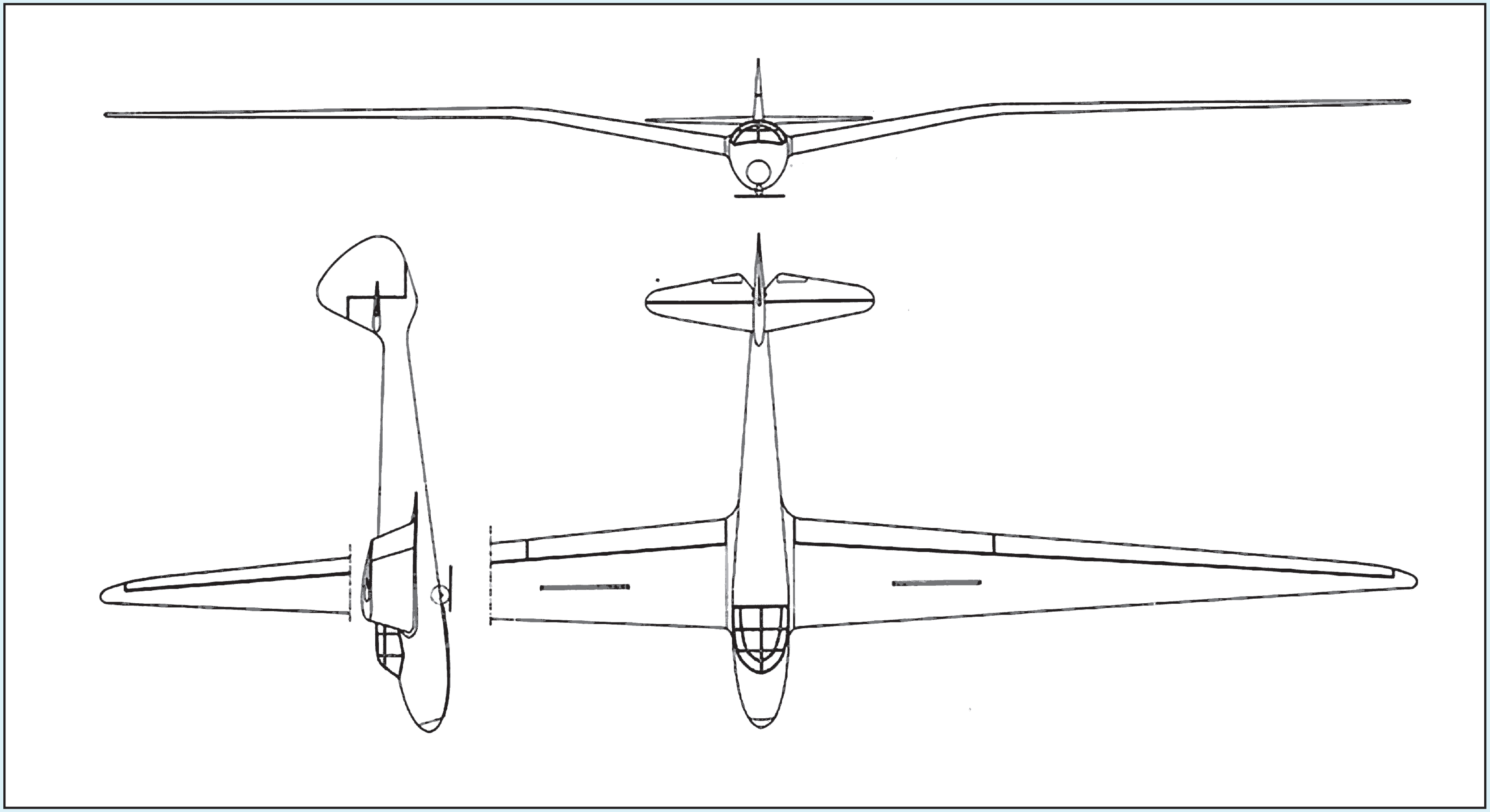
That's it!



BOREA

Luigi Frederico Teichfuss

Vincenzo Pedrielli, vincenzopedrielli@gmail.com



This two-seater side by side named Borea was expected to be the real masterpiece of Luigi Teichfuss, the result of all those years of designing and building sailplanes.

A glider of large dimensions (21m span) and remarkable aspect ratio, conceived for record-breaking, was inspiring to Wolfgang Huetter and Wolf Hirth for the Goppingen GO-4 of 1937.

Unfortunately, this masterpiece, which was planned to be test flown by Adriano Mantelli, actually never took the air due to WWII events.

In fact in 1943 with the fall of the fascist regime and the subsequent German occupation, the Borea could not be test flown and it was destroyed along with all of the other sailplanes which were stored in the Pavullo airfield.

Before leaving Italy, the Germans blew up all the buildings of the Pavullo airport and with them all sailplanes of the school. The sailplanes stored in the "Aie" had the same fate. So in few minutes nothing was left of an entire life.

At least some drawings and photos remained to testify to the activity of such a unique man such as Luigi Teichfuss who highly contributed to the development of gliding in Italy.