Radio Controlled

Soaring Digest

February 2018
Vol. 35, No. 2

CONTENTS

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Front cover: Thomas Moller's 4M ASH 26 soaring off the cliffs at Torrey Pines. Thomas is an extraordinary builder. You can always recognize planes he has built and painted by his great attention to detail. Thomas is a member of the Torrey Pines Gulls.
Photo by Ian Cummings

R/C Soaring Digest

The journal for RC soaring enthusiasts

February 2018

Volume 35 Number 2

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Published by B²Streamlines
http://www.b2streamlines.com
P.O. Box 975, Olalla WA 98359

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RC Soaring Digest is published using Adobe InDesign CS6

In the Air

Last month, "In the Air" provided a bit of the history of *RC Soaring Digest* which of course included its twenty years as a printed publication. As the publishers of *RCSD*, our archives contain at least one copy of each of those printed issues, and we know a number of others who have similar collections. We recently received a message from Alex Haro asking if we would consider running an ad in *RCSD* for one of these collections, this one from the estate of Bob Rondeau, art director and frequent contributor to *RCSD* in the early years, who passed away about a year ago.

> SET OF PRINT BACK ISSUES OF RCSD AVAILABLE
>
> I am looking to “donate” an almost-complete series of printed (paper) back issues of *RCSD* to an interested party who will appreciate, care for, and make use of them; clubs/educators/"historians" preferred. Issues include Volume 1 (1984) through Volume 17 (2000); there are about 8-10 issues missing between Volume 1 and Volume 14, and about half the issues missing between Volume 15 and 17.
>
> I’m willing to ship the issues (via ground, book rate) to a location within the continental US at no charge. Interested parties outside this zone will need to pay for shipping.
>
> Please contact me for further details:
> Alex Haro: ajharo198@gmail.com

If you have an interest in acquiring this collection we urge you to get hold of Alex at your earliest convenience.

Time to build another sailplane!

B²

IT'S ALL ABOUT LIFT

Chris Bryant, chris@palanquin.plus.com

If you read this piece, please bear in mind that it is based partly on my experiences in the United Kingdom. Where you are it could be different. Our knowledge of lift systems is growing all the time and it could be you that breaks new ground. Understanding the atmosphere is the key to all of this.

The descriptions of the various types of lift that you may encounter are here deliberately simplified. The interaction between them is fascinating and it would take a book to fill in the complete picture. The curious are recommended to read the literature that exists on the subject. More is being discovered all the time.

Hill lift

What would Leonardo, Cayley, Lillienthal and Chanute have done without hills? Toil to the top with your aerial contraption and hurl yourself off confident that you will reach the bottom again in one piece. It must have taken some blind faith to do that. If you did not know what you were dealing with in meteorological terms it becomes even more remarkable.

Wind flows over the surface of the earth in a mass and when it meets an obstruction like a hill it either goes round it or over it.

How come the choice? It all depends on what is going on in the airmass near the hill. Most of the time the air rises up to get over the hill (Illustration 1) increasing its rate of flow compared to the rest of the air mass.

However, if it meets a hill steep enough then some of the air may flow down the face from the cliff edge, out at the bottom

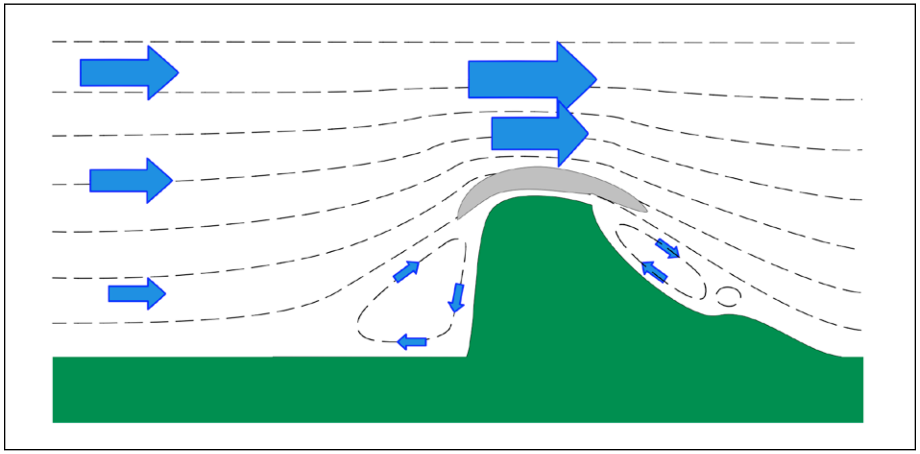


Illustration 1: Cliff and back face rollers with orographic cap cloud

in the opposite direction to the main flow and back round towards the top of the face again some distance before the face, forming a rolling pillow of air up to clifftop height. Not good for soarers, as you may imagine. We need something less dramatic.

Alternatively, the hill may not work because there may be a strong inversion lurking in the atmosphere that will put a lid on upward movement cause air to flow around individual peaks. (Illustration 2)

Most of the hills I have seen that are used for soaring are around the 45-degree angle for slope. This gives a clifftop wind velocity about twice what it is at the bottom of the hill and the

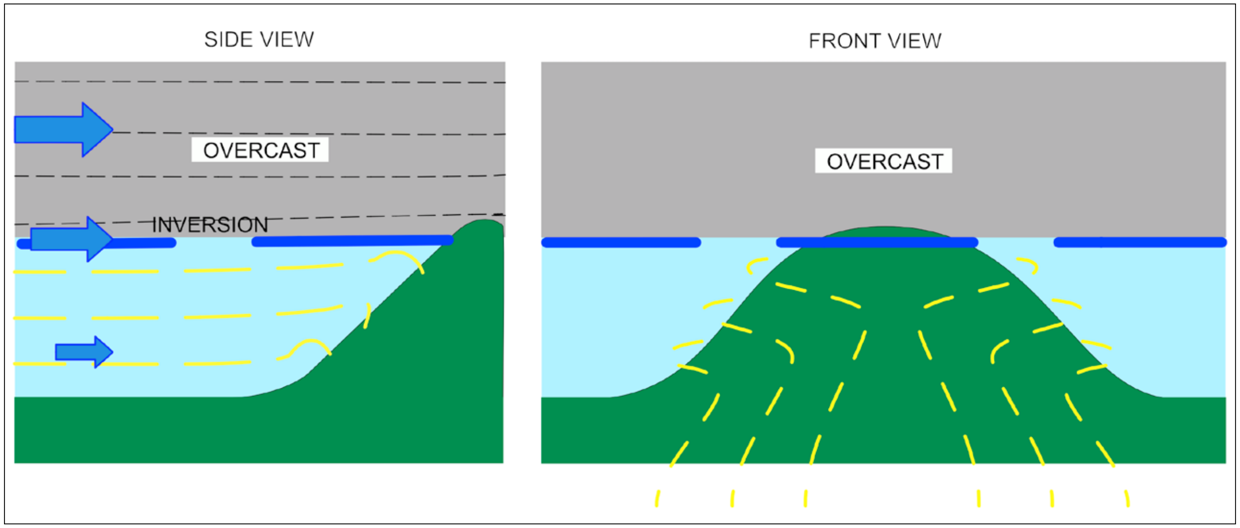


Illustration 2: Rising air limited by inversion seeks alternative route

line of maximum lift lies along a plane sticking out from the hilltop again at 45 degrees up into the atmosphere but into the wind. (Illustration 3)

Now pushing air up in this way can force it temporarily above its condensation level. If so, you will see a cloud capping the peak of the hill that stays there despite the wind blowing through it. This is called orographic cloud and it can appear and disappear with great rapidity. There may or may not be a gap between it and the hill big enough in which to fly a model but that gap can close in seconds. Besides which, orographic clouds are usually rough to fly in.

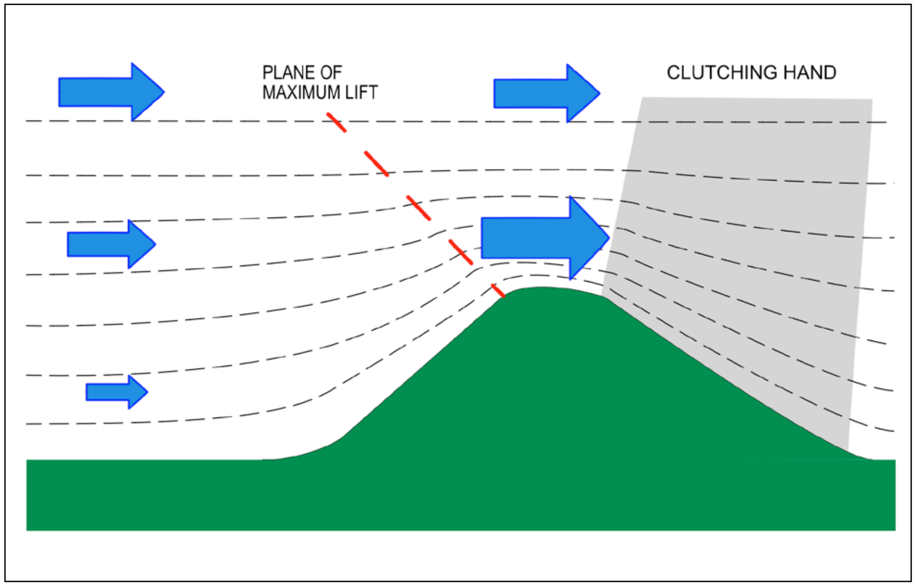


Illustration 3: Plane of maximum lift

Once the wind has climbed the hill, then it tries to recover its lost energy by diving back down again so as to catch up with the rest of the airmass. Even if the top of the hill is flat there may be a curl over where it tries to do that. If there is a drop on the downwind side as well then the curl over can be vicious. Strong sink – the clutching hand they call it – which can snatch a full-size glider out of the air in a trice. On the other hand there may be another rolling pillow just behind the soaring edge which has the air flowing back the other way at ground level. Tricky stuff. I have seen windsocks at different heights but in the same place pointing in opposite directions on the top of a hill.

Of course, it all depends on the strength of the wind, its direction relative to the face and how wet the airmass is. Local knowledge is king as to how far off the perpendicular the wind can be to the face before it becomes unsoarable.

An up to date grasp of the weather forecast can be vital. The stronger the wind, the more turbulence will be generated by the irregularities of its surface; the more curl over and rollers you will find. If there are hills upwind of your chosen site, then there

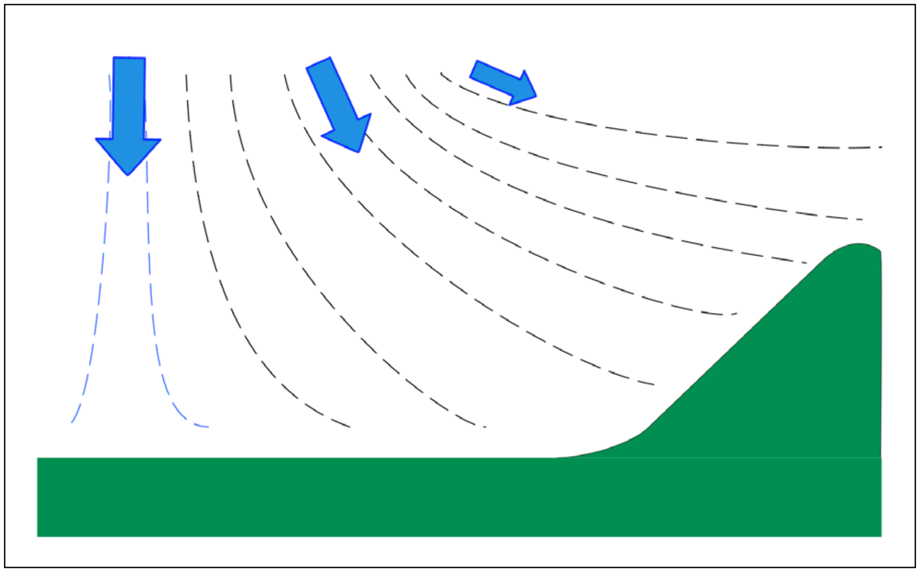


Illustration 4: Downdraft from collapsing thermal kills hill lift

may be occasions when sinking air from waves may kill off the lift. Similarly, collapsing thermals can stop the hill from working for a while. (Illustration 4)

So far, we have looked at lift generated by the general motion of the airmass over hills. There are, however, other ways that hills can generate lift when there is no overall wind present.

Think of a mountain valley descending from a peak down to the plains. It has two steep sides and a narrow floor. When there is little or no upper wind to speak of there can be lift within such a valley that undergoes a daily cycle. Let the sun shine obliquely on this valley and one side of it will be heated by sunshine and the other perhaps not. Add to that the temperature and density differences between peak and plain and flows can start that will provide lift close to the valley wall. (Illustration 5)

This can be aided by diurnal ebb and flow on the valley floor in the morning and evening. Thus air can flow down the valley floor at night, reversing in direction after dawn. This, in turn, affects the lifting and sinking flows on the valley walls. These wall flows occupy a narrow band close to the wall perhaps a couple of hundred feet thick. Called anabatic (upgoing, morning and daytime) and katabatic (downflowing, evening and nighttime) flows, they are well known in the European Alps, particularly to the birds that live there.

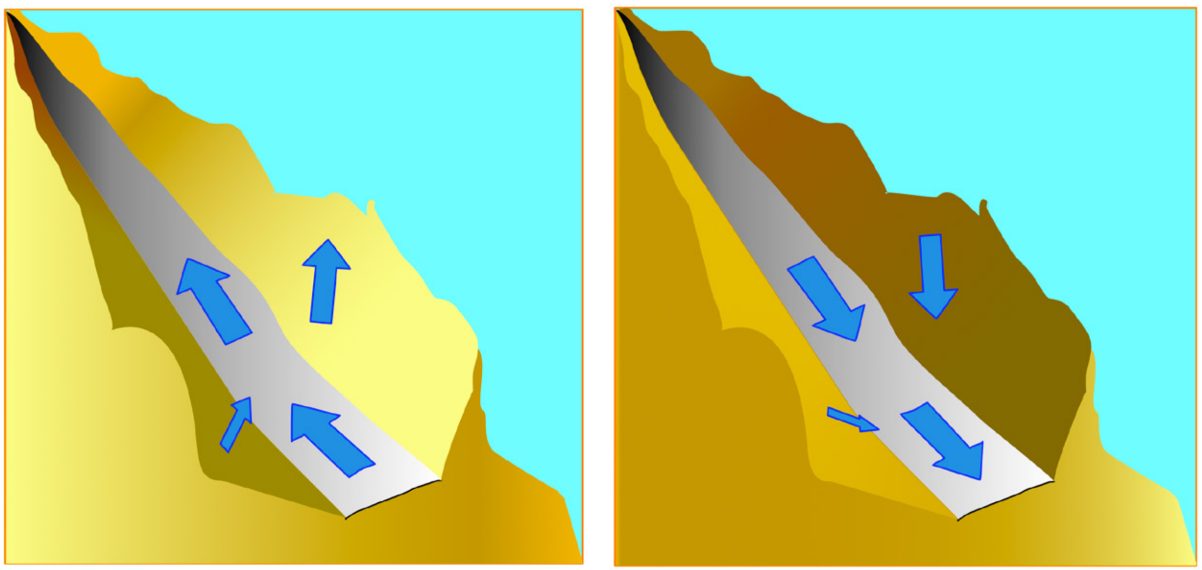


Illustration 5: Anabatic and katabatic flows

Wave lift

This is a subject in development for aviation in general, let alone models, but the gains for the soarer in all of us are immense. Airbus is currently supporting the Perlan Project which is exploring wave lift in the upper atmosphere. The special pressurised Perlan glider is

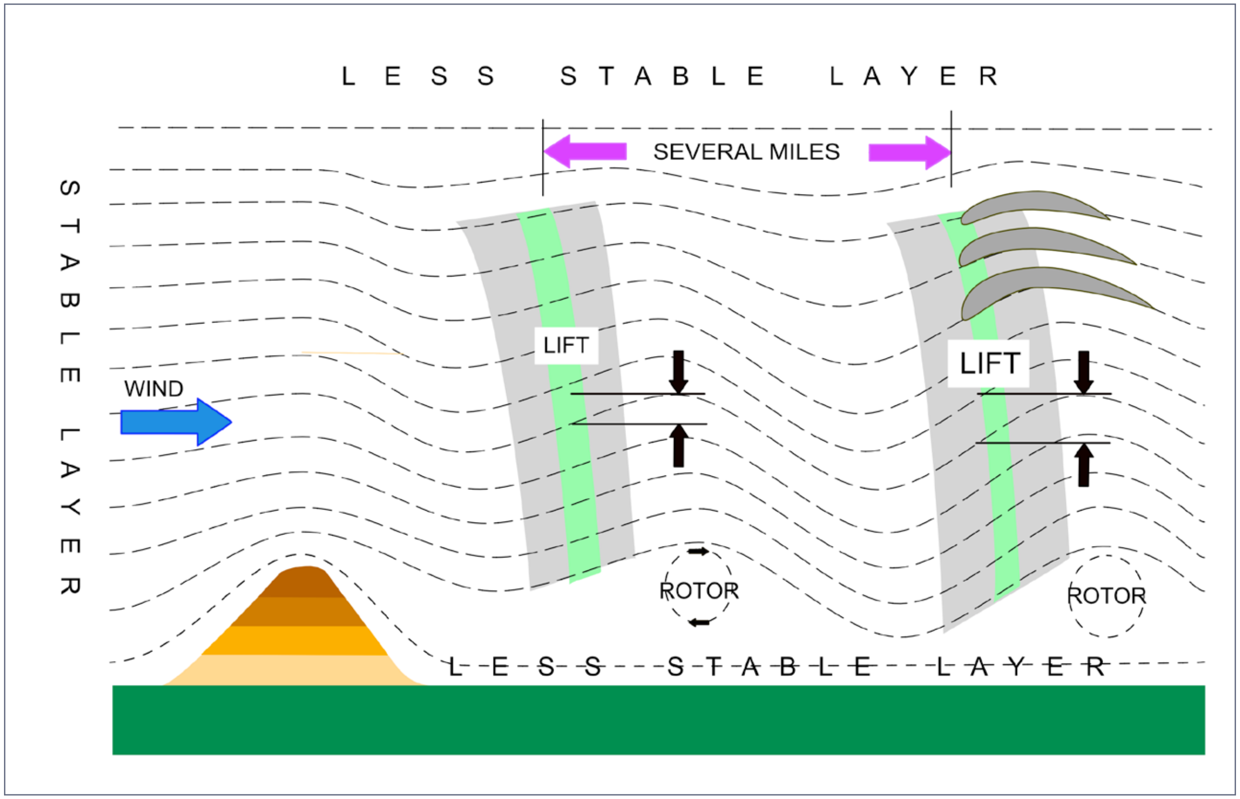


Illustration 6: Standing wave system

seeking to break world records for height achieved with the ultimate goal to reach 90,000 feet. OK, what has this got to do with you or me. Well, plenty as it turns out.

Illustration 6) Wave lift takes place when a more stable layer of air lies between two less resilient and resistive layers. The stable layer oscillates vertically in a series of peaks and troughs spaced at regular intervals down the wind direction, forming a set of standing waves that are geographically fixed in relation to the hill that forms them. The air mass bounces up and down as it blows through them much like a car with shot dampers.

The trigger for this sinusoidal action is upwind of the peaks and troughs and can either be an obstacle like a hill or mountain which is, of course, anchored to the earth, or can be something in the atmosphere like a thermal or wind shear that acts like a hill as it moves up through the airmass. If it causes upward or downward motion over a sufficient area it promotes resonance.

Mountain wave is much easier to use than atmospheric wave. The latter is fleeting and fickle and can last only minutes. You have to be in the right place at the right time to use it and it usually occurs too far up in the atmosphere to be of use for modellers. However, mountain wave can reach down to levels we can access and even if we can't it can exert a major influence over other sources of lift that we will use, like hill and thermal lift.

Thus wave systems can be geographically fixed in position or mobile in the moving atmosphere. In the mountain case the extent of this activity is huge; it can occur at ground level and reach far up into the stratosphere. (Illustration 7)

The wavelength from peak to peak is usually measured in miles. The breadth of a wave system can be a few hundred yards or many miles across.

The essential ingredients are wind and hills: no wind – no wave. Systems have been seen to persist for hours on end, although they can change wavelength suddenly and without warning.

Where wave from one source adjoins another they may be out of sync and mutually destructive. The lift band often

Illustration 7: Looking north in a westerly flow at the gap between two banks of wave cloud. Sinking air on the left and rising air on the right. About three miles between peaks. Aboyne, Scotland, 1990.

moves forward into the wind with height and gets stronger in the second wave as the resonance really gets going.

On rare occasions satellite pictures of the UK have shown lenticular wave cloud systems persisting over much of the country. Lenticular clouds are indicators of wave activity. They are lens-like in section and conform to the shape of the peaks in the system.

Many lenticulars can form one on top of another until the whole looks like a stack of pancakes. New Zealand is called the “Land Of The Long White Cloud” because of the spectacular lenticular stacks that form downwind of the central mountain ranges.

Full-size gliders have been using mountain wave since the 1950s, when the performance of gliders was good enough to stay in the wave and actually rise. Before that they sank so fast at the flying speeds necessary to keep up with the wave that they simply dived out of it.

The problem is that the strength of the lift is roughly proportional to the strength of the wind: the stronger the wind the stronger the wave is likely to be. Though not always. There are plenty of windy days without wave. Perhaps the wind is in the wrong direction or the atmosphere is not right.

When it is right – and you can find an entry point – the result is usually

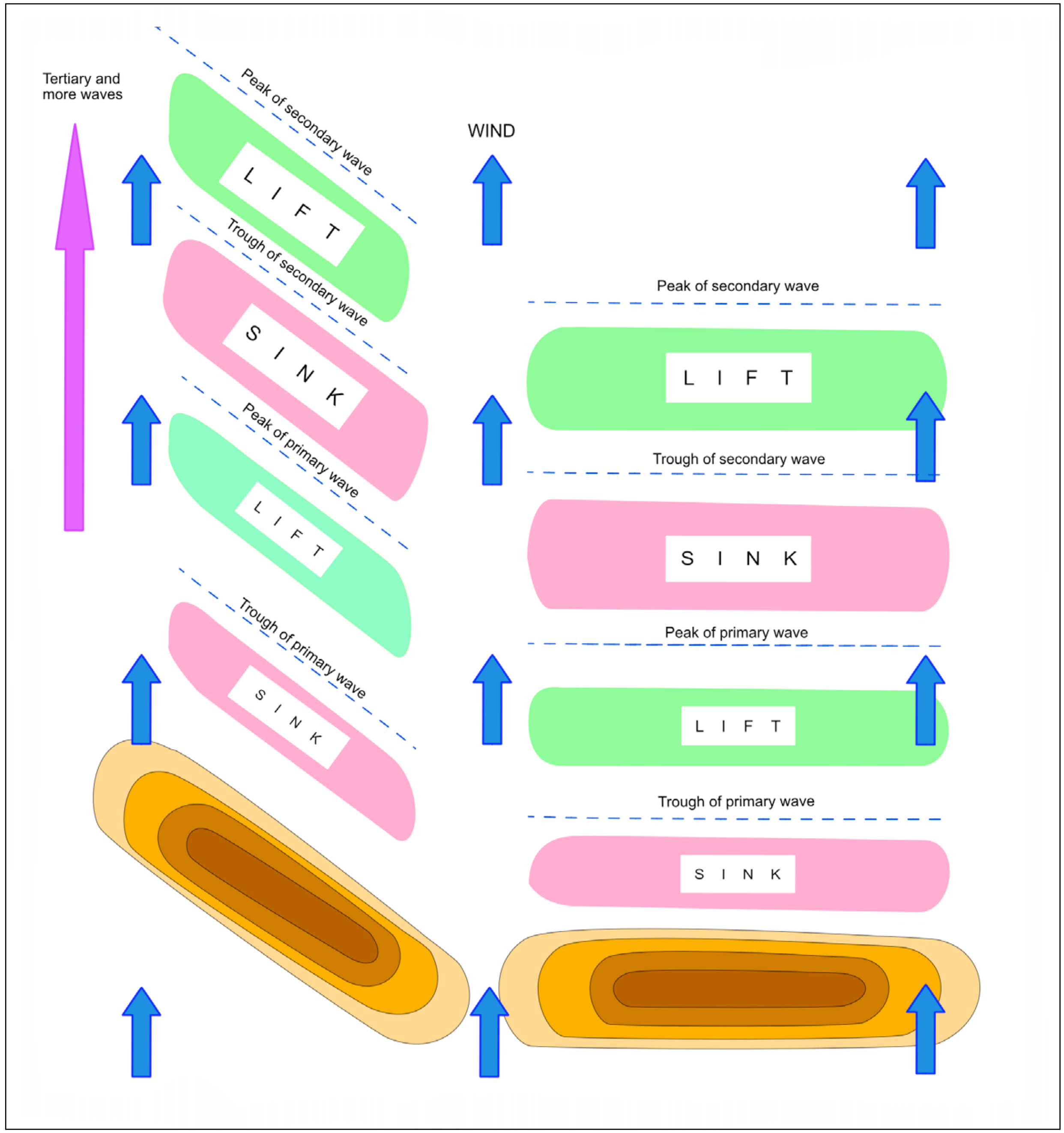


Illustration 8: Map of wave system

spectacular. I know; I've been there in a full-size glider in Scotland. From the ground roll to topping out at 24,000 feet took 36 minutes. At times the rate of climb was over 1100 feet per minute. The wind speed at height was between 30 and 40 knots so I just stooged up and down the front of an enormous cloud at about 50 knots and did not go anywhere. And yes, I did take an oxygen bottle with me.

How do you use wave? By flying up and down the upgoing air in the system. You are looking for the rising part of the curve and you soar it as you would a hill. The first problem is to find it.

If you have the luck to fly on a day when lenticulars are visible then you need to get underneath their leading edge and high enough to contact the bottom of the wave. Thermals can be going off underneath a wave system early on in a day but eventually, either the wave will overpower the thermal activity or the thermals will break up the wave. (Illustration 8)

If the wave wins then nothing for it but to go as high as possible on tow. In the case of that Scottish wave I was talking about just now, I was lucky, I only needed 2,500 feet to reach it, but on occasion the wave can come right down to ground level. In that case it may not go very high by full-size standards but that will be more than enough for a model. Sometimes the best time of day to look for wave is as soon as it is light, before the thermals start.

What are the signs? Everybody else's models are going up over a wide area. The air is smooth. There are no discernable cores and there may or not be clouds around. If there are then they may look different to other clouds in the area.

Wave lift only produces lenticular clouds under a fairly narrow set of circumstances. If there is wave then the clouds will be staying put over the landscape. Yes, they will appear to be moving along in the wind but, in fact, the wind is blowing through them and they do not move. Mostly they just look like a collapsed thermal, all woolly and confused.

If you see a stationary woolly mass below the main cloud mass watch out. It could be a rotor cloud which is the roughest and meanest thing in the sky.

Rotors are created underneath the wave system and below the peak of the wave. Air is dragged up to altitude by the massive system overhead and then pushed back down by the descending part of the sine curve. In the course of this roughly circular journey, the air can pass above its condensation level, releasing lots of energy. Then it goes back down below it and more energy is involved, hence the rotor cloud.

Of course, you may not get any cloud at all but, either way, you will get sorely roughed up if you enter the rotor. Again, I know just how rough. I had to use full control deflection in all directions to stay behind my tug in Scotland. Any worse and I would have had to pull off and return to the field. I was the rat and the rotor was the dog.

Trouble is, that a rotor is a sure fire sign of wave. You just have to use it to climb up or be towed up into the wave proper. Pilots know when this happens as it is usually quite eerily smooth. If you close your eyes there is no sensation of motion. You might as well be on the ground. The only clue is the sound of the air passing over the airframe – a faint hiss. It's magical.

Where is it? Some miles downwind of a sizable hill or mountain. If the lump takes the form of a ridge then you fly up and down but parallel to it. If the ridge is at an angle to the wind direction then so will be the corresponding area of lift.

Now here comes one of the hardest things to adapt to when you start trying to fly in wave. With thermals you go with the wind: with wave you fly through the wind in order to stay on the right geographic track.

This can produce some odd situations. Take the example in my illustration. (Illustration 9) Flying along our invisible ridge but into the wind you will have to fly fast to stay in position. Turn round the other way and you creep along as slow as is safe in order to

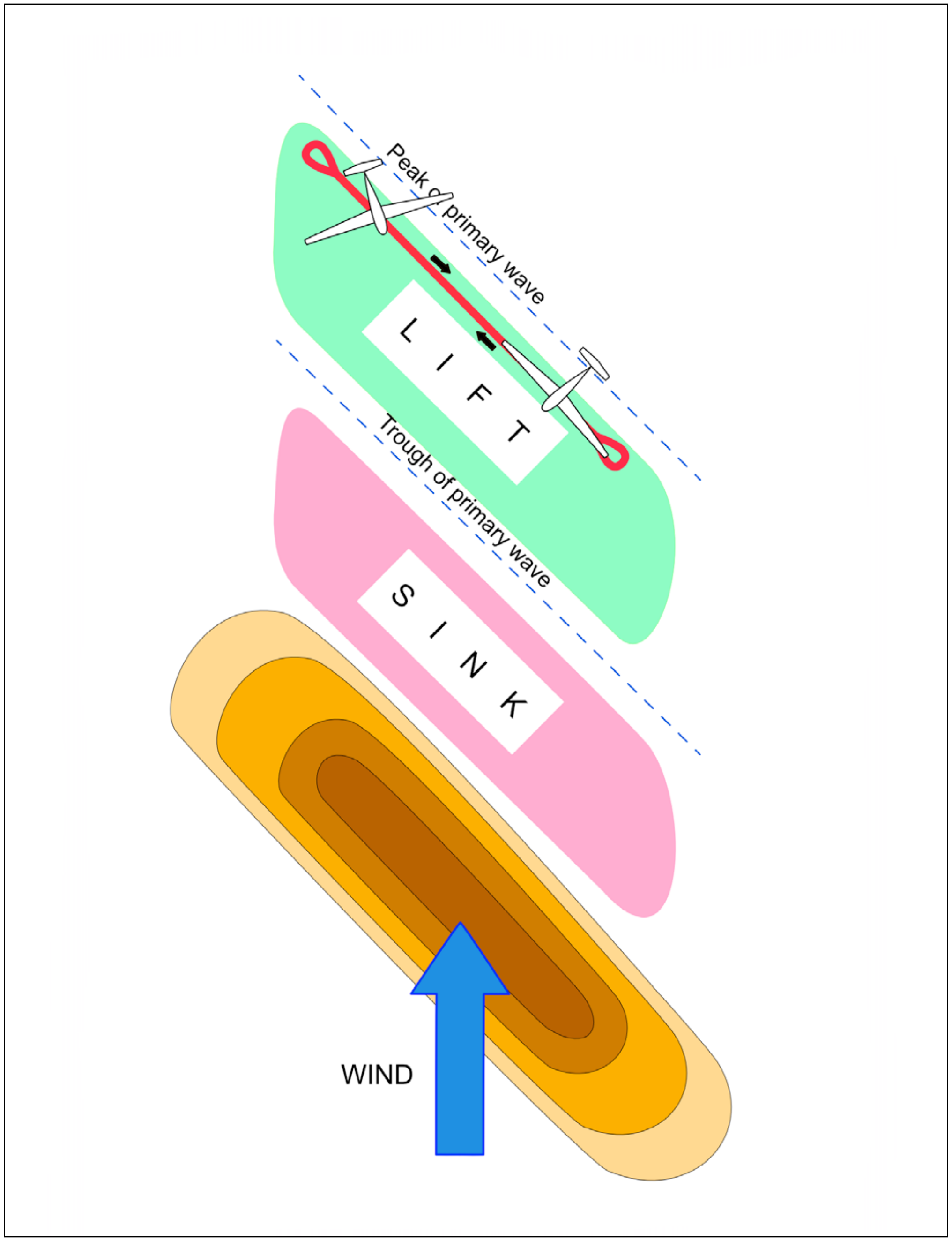


Illustration 9: Optimum flight path

prolong your time in the lift band, time is height gained, remember, all the while maintaining your position over the ground.

You will find yourself crabbing slowly over the ground at an odd angle. You might be flying backwards relative to the ground if the wind is strong enough. If the lift ends before you reach the end of your beat, try pushing forwards into the wind to regain it.

If you don't fly fast enough you will fall into the clutches of the strong sink that accompanies these systems. Going forward is the only way.

Wave can occur at any time.

It may be present in an overcast or going up through layers of cloud.

It can be there under a blue sky.

The lift band may move forward with increasing height.

Certainly, it can be very confusing to work out what is going on at times if wave is present.

It can kill thermals and hill lift.

Above all, it can be incredibly beautiful.

Finally, flying in wave clouds is not a good idea as, full-size or model, you may ice up. Frozen controls are frightening.

The other thing that happens is that the wave system can change wavelength in a few seconds and without any warning. If you are soaring a hill and this happens you may find yourself in cloud, in strong sink and just off the hill. The only safe thing to do is turn directly into the wind and fly away from the face, always supposing that you can still see the model or the hill face!

Sea breeze fronts

This is something we get occasionally in the UK on hot summer afternoons and are enormous fun.

Because we are an island, nowhere is far from the sea. In the anti-cyclonic conditions necessary for sunny weather, there is little wind day or night and air can flow from the land to the sea overnight.

This is because the sea retains its heat better than the land and tends to be warmer than the land at night.

Conversely, after a good morning soaking in sunshine, the land gets to be warmer than the sea and air can flow inland, slowly pushing up the already very warm air it finds there into a low level front that is usually soarable.

What is more, you can often see it because cloud may form on its slopes. So if it is a hot day, not far from the sea, the thermals have been dismal or non-existent and it is getting to be mid-afternoon, look towards the sea for signs of low light cloud in a line roughly parallel to the distant shore. Look again in five minutes time and if the low cloud has got nearer you may be in for a nice surprise.

Sometimes these sea breeze fronts are faintly visible on radar because they can suck up lots of insects which can attract flocks of birds.

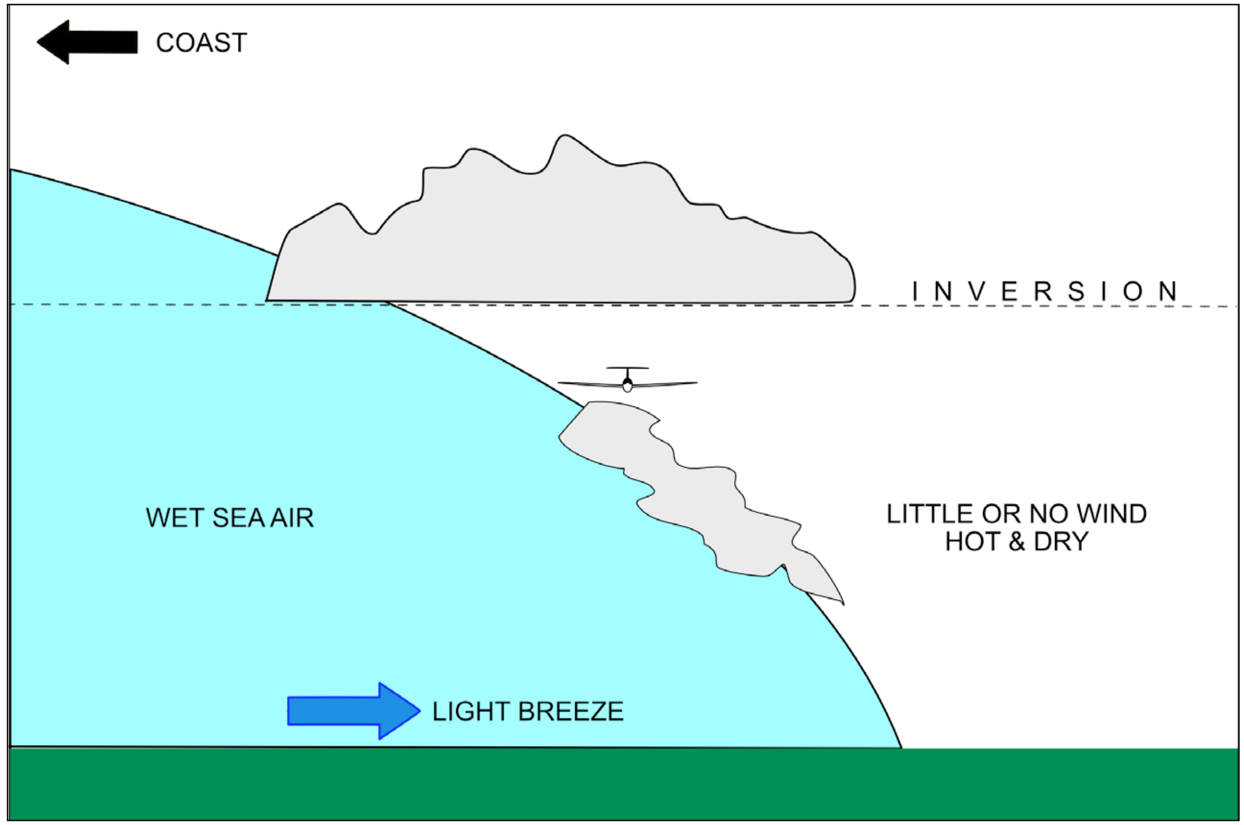


Illustration 10: Sea breeze front

Sometimes you can see the slope if you look at it at a fine angle because it may be rather dusty.

Most of the ones I have seen never went higher than a few thousand feet and moved forward in pulses. They can be several miles long, however. Because the air in them is wet, there are no thermals on the seaward side. (Illustration 10)

Once the front has passed your position the air is dead.

Sea breeze fronts have been known to persist late into the evening long after all other activity has ended. By then they can be over a hundred miles inland.

You soar one of these as if it was a hill, cruising up and down in moderate lift.

Of course, nothing is for ever. While you cruise away from your home site on this seemingly endless magic carpet, climbing gently until the lift runs out, when you turn round to come back, the sea breeze may have disappeared, either through exhaustion or by moving on in a pulse that takes it much further inland. They usually move quite slowly averaging a few miles per hour.

Air mass changes

The United Kingdom is one of the most difficult places in the world to forecast weather for. The air it receives can be classified as coming from one of six different directions: Maritime Arctic, Maritime Temperate or Oceanic, Maritime Tropical, Continental Arctic, Continental Temperate and Continental Tropical.

If you are lucky and fair weather persists for more than a few days, the chances are an anti-cyclone is somewhere nearby.

Now anti-cyclones are typified by light winds and a rate of propagation that slows down as time goes by and that can mean a stagnant airmass and no thermals. Indeed, it can mean a persistent overcast, haze and increased pollution in the major cities. What you need then is a change of airmass.

Knowing when this is going to happen is the worst headache most weather forecasters face, because it can come from any of the six directions I listed earlier and anti-cyclones don't give many clues.

When you are getting desperate for a bit of aerial fun you try anything.

I remember hiring a glider for a week at my club and sitting out most of it on the ground in a flat, depressing week of anti-cyclonic gloom. The forecasters had been saying that the weather would break every day and got it repeatedly wrong.

Nothing happened.

On the last day, they forecast a change of airmass at about noon and I decided to believe them. I readied the glider and took it to the launch point and waited. Somebody said there were birds circling just north of the airfield and I took a winch launch.

The air was lumpy and broken and, despite some puffs of lift there was just not enough there to keep me up, so I landed back at the launch point and waited some more.

I don't remember what got me to the second launch but this time there was just enough lift to stay up and I got to about 1500 feet and gingerly set off north more out of instinct than anything else.

The lift persisted in rough patches lacking the structure of a normal thermal. So, I drifted away from the airfield at a marginal height to get back but the lift got a little better – and so did the visibility.

I began to see that I was probably in some sort of cloudless front and that the fresher, newer air was mixing with last week's stale stuff all around me. I was in a front and gentle climbs were possible.

I worked out that the front lay roughly north south and that west was the direction to go.

I could see some 25 miles away a massive cumulus going up and I started to edge towards it. If it did not work when I reached it then a field landing would be a certainty.

But the glider shook itself, the visibility got even better and so did the lift so that, after half an hour I arrived at the big cumulus and went roaring up to cloudbase. I think I was surfing a hill of air that had a very gentle slope at the top of which was the cumulus.

The whole flight only lasted about 1.5 hours but it was one of the most satisfying I ever had. I had proved that you could soar a front and reach soarable conditions on the other side.

Survival.

The key to it was keeping up to date with the forecast and deciding to have a go.

RC SD

FLUTTER II

Chuck Anderson, chucka12@outlook.com

Sloppy proof reading was responsible for my identifying Mark Miller as the inventor of the Aquila Miller Mod in the December Flutter article because I know both Mark and Skip.

I got to know Skip when I was part of the National Soaring Society team running the 1976 FAI team selection and flew with him at several Nats in the 70s and 80s.

I flew with Mark at Visalia and Phoenix from 1993 through 2002 and corresponded with him on RC Groups build threads. Mark came to my rescue in the frigid 1998 Visalia contest when I did not bring a jacket and it was exceptionally cold.

But back to flutter.

I learned about the deadly results of extreme flutter about 40 years ago.

Jerry Ritz was a world famous free flight modeler I met when he retired to Tennessee to manufacture a kit plane for the new ultralight class. We were both members of the Coffee Airfoilers Model Airplane Club and the Tullahoma chapter of the Experimental Aircraft Association. He demonstrated building a rib of his ultralight design at a club meeting when he built a complete wing rib in 10 minutes. I also witnessed early test flights of Jerry's first 90 pound prototype powered by a 7 hp engine. He died when the wing of the production version of his plane failed in flutter when excited by aileron flutter.

Jerry started building and flying models in the 1920s and moved up to building and flying real ones in the 1930s. He developed a gas model propeller carving system at the suggestion of Carl Goldberg. He manufactured gas model propellers and thousand s of target drone propellers in WWII. After the war, he manufactured wood furniture while becoming an FAI free flight world champion.

I followed Jerry's chase of the FAI tow line glider championship and used some of his recommendations in my own free flight models.

Jerry also published a series of articles on airfoils in *Model Airplane News*. (The plans for the WC model show Jerry used his own airfoils for the design.) Some of his airfoils were used in larger sailplanes when we started flying cross country after the SOAR club's great race.

After he retired, he decided to use his expertise in woodworking and aerodynamics to develop better airplanes for the new Ultralight Class. The Model A was designed as a very low-cost aircraft to comply with the US FAR 103 Ultralight Vehicles rules within the category's maximum empty weight of 254lb (115 kg). The Ritz Standard A had an empty weight of 200 pounds.

Jerry said he became alarmed at the dangers of the floppy sails and wire frames of the converted hang gliders used by many of the first ultralights, so he designed and built a rigid wing ultralight. His wing was wood with tight covering similar to the geodetic structure used by some light airplanes in the 1930s.

Jerry developed what he called “structure-in-the-slots” construction, a system of machined slots and mating pieces for fast, simple and clampless assembly of geodetic structures.

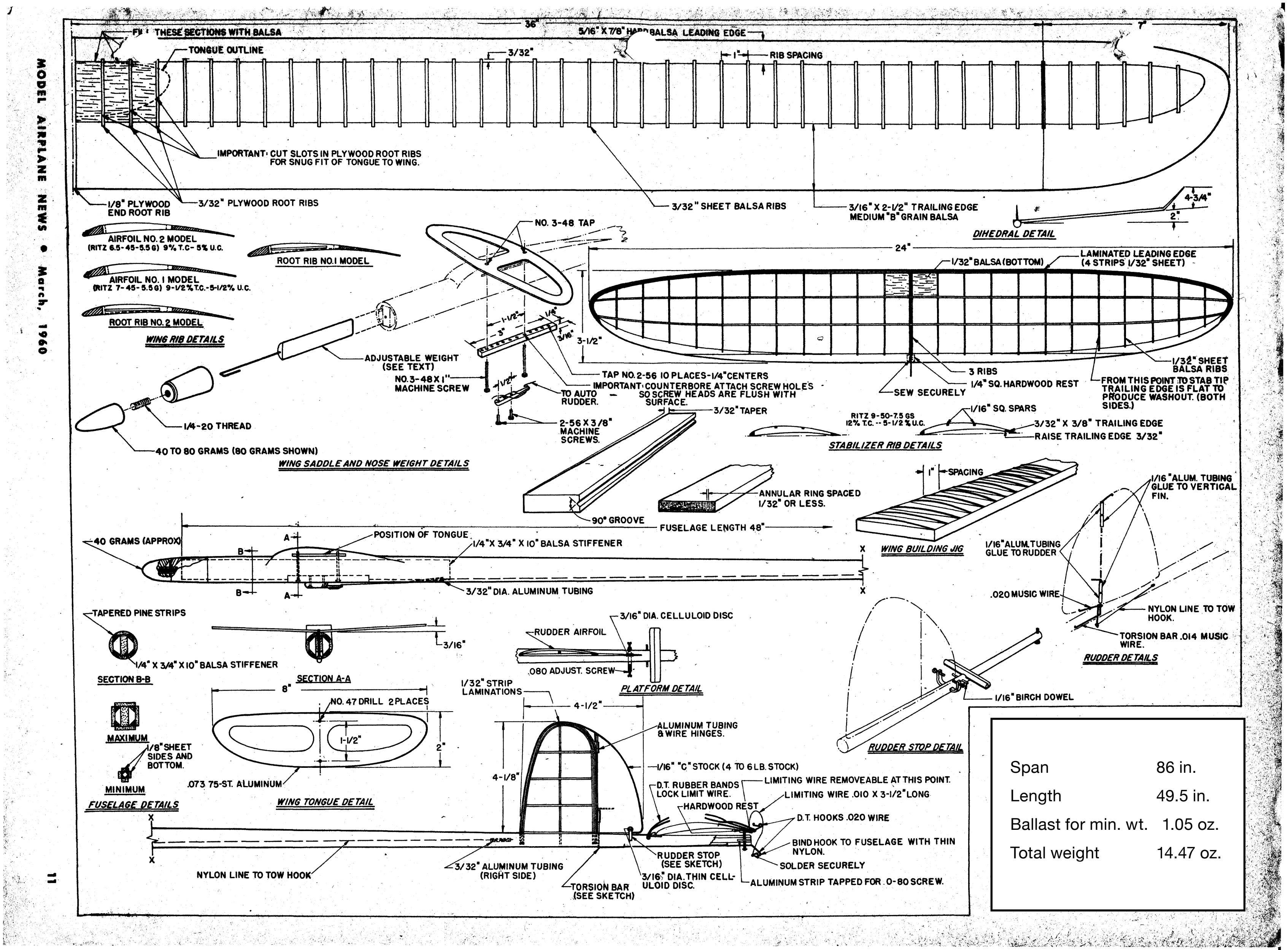
Unfortunately, he also used single acting ailerons used by a number of light aircraft in the 1930s. Single action controls used only a pull cable with springs to return them to their neutral positions when the stick was released.

After four years of development and building eight prototypes, the plane that finally evolved was called the Ritz Standard A and retained the 36 foot wing span with 3 axis control. After trying many different engines, the 252CC Zenoah engine was recommended as the best in the size needed. This 22 hp engine coupled with the low drag of the plane was ample to get the plane to the 65 mph maximum speed allowed.

The Ritz Standard A wing used extremely rigid geodetic construction and would not flex so it failed when it finally fluttered. He had completed development and was starting to sell kits of the airplane when he was killed while flying his Standard A to obtain flight photos for an aviation reporter. The photographer urged him to fly faster for better videos so he put it in a dive and fluttered the ailerons in a low flyby.

Flutter is the most destructive force other than simple overloading to be encountered in the air. All it takes is a fluctuating force at the natural frequency of the structure to initiate destructive flutter so any flap or aileron flutter can be dangerous. I would have not expected Jerry’s geodetic wing structure to fail at any airspeed achievable with the 22 hp Zenoah G25 engine he was using to power his Standard A ultralight.

The cover of the December 1959 Model Airplane News *featured Jerry Ritz immediately following his F1A Nordic first place win at the 1959 Free Flight Championships held in Brussels, Belgium, held August 21-24. Kuhlman collection.*



Plans for the winning model as printed (with skew, unfortunately) in the March 1960 Model Airplane News*.*

Data replaces notice of availability of full size plans. Kuhlman collection.

A 1912 Farman HF.20 biplane with single acting ailerons hinged from the rear spar. The ailerons hang down when at rest and are pushed up into position when flying by the force of the air, being pulled down by cable to provide control.

<https://upload.wikimedia.org/wikipedia/commons/thumb/4/4d/Bulgarien_Farman_M.F.7.jpg/600px-Bulgarien_Farman_M.F.7.jpg> / <https://tinyurl.com/ycp2bfhl>.

A revised aileron linkage and other modifications were designed to correct the aileron flutter problem and there were at least two Ritz Standard A still flying in 2013, thirty years after Jerry died.

All Ritz Standard A flight reports I could find emphasized its ease of construction, low cost, and good flying qualities but any chance of additional production died with its inventor.

The Ritz Standard A kit was advertised for $1000 without engine and the performance was almost the same as the J3 Cub I learned to fly in 1951. It achieved this with a third the weight and a third the horsepower of the J3. Its design concept was close to the original Aeronca C2 and C3.

What could the Ritz Standard have evolved into if the reporter had not talked Jerry into the high speed flyby that resulted in the fatal crash?

Jerry Ritz at the controls of his Ritz Standard A.

Just another example of the law on unintended consequences. Jerry built a better and stronger ultralight wing that failed in flutter when excited at the critical frequency. A weaker more flexible wing might not have failed when the ailerons fluttered. Modern jet transports have very flexible wings as everybody has seen if they looked out the window in turbulent air.

Rock Bouncers!

Attention manufacturers: Designing slopers for survivability

Philip Randolph, amphioxus.philip@gmail.com

If you are a truly expert pilot, and if you only fly where you have deep grassy landing zones, and if you fly high in gentle air rather than playing with strong and interesting air currents near trees and rocks, or if you have enough bucks so you don't care if you break a few planes, ignore this article, please.

But if you are a manufacturer who might for one reason or another want to cater to the smallish market of slopers who'd like planes that might survive less-than-sweet landings in potentially difficult landing zones? Or a customer who would like to reward a constructive manufacturer with your purchase power? Or a private builder? Allow me to list a few design elements that might make the difference between carrying home a pile of sticks and flying it again.

Design for survivability has several elements: Hard landing survival, good landing characteristics, ease of assembly and repair, and materials.

More survivable crunchies! 'Cuz they fly better, especially when they survive.

And it's even possible to make more survivable crunchies – composites – bagged or molded. Which is important, as they generally fly so much better than foam.

The disposable alternative? But even the disposable planes could be made tougher.

Alternatively, some outfits are supplying slope planes so inexpensive that they may be considered disposable. Several CEWAMS have bought 2.6 meter Phoenix Evo 2.6 meter electrics with blow-molded fuselages for $110 from Amazon (now a bit more), plus a couple similar planes. Add battery and Rx and fly. One guy wrecked two and bought three more. Yet obviously even disposables could be made tougher.

Hard landing survival

Shock-absorber, tough nose cones. Too many landings are nose first. Spreading the impact over an inch or two of compression seriously lowers the force on a wing root.

Up in the mountains of Eastern Oregon I did a bad discus launch. My old Encore nosed straight in. But I had set it up with a nose cone. The cone split and slid back over the front of the fuse, lowering the impact and probably saving the plane. I flew it again with only a bit of electrical tape as a repair. That was fortuitous accident, but such a shock-absorbing nose cone could be intentional.

Shock-absorber nose rough math. Suppose your plane's solid nose hits hard earth. It digs in half an inch. Or it hits rock and crumples a quarter inch. You repair it and add a shock-absorber nose cone with 1-1/2" of slide. You again plow into hard earth a half inch, but with the force spread over 2", for about 1/3rd the force. Your wing root survives.

Similarly, on your next flight your shock-absorber nose cone hits a rock. Compared to the quarter-inch crumple of a solid nose, the 1.5" slide gets you about 1/6 the force on your wing roots. You fly again.

Tough nose cone materials. You'll need the weight up there anyway. Whether Kevlar or blow-molded nylon, it doesn't need to be delicate.

Nose toughened against breaking off. One of the most frequent fuselage breakages is right in front of the leading edge. Second is right behind the trailing edge. Those two spots are where a wing's rotational angular momentum or side-slipping momentum can put a lot of force on a suddenly arrested fuselage. So that's where extra strength is needed.

Two of our CEWAMS slopers have broken the noses right off their EPP Super Scooters, three times each. One now sports external longerons.

I've seen a number of fuselages cracked or busted off right behind the trailing edge. One that clipped a small clump of willows with a wing had a fuse crack just aft of the wing. It had a 33' wingspan! No, it wasn't being used as a sloper. Aerotow. But that's another story.

High wings, dihedral, and taller fuselages for belly landing survivability. All may keep wings above rocks and sticks in belly landings.

One-piece or three piece wings! No-two-piece wings with weak joiners! The wing root takes the most wing stress in a hard landing. That's where the moment arm is highest. Putting a weak joint there invites joiners to rip wing roots apart.

Wings atop fuselages rather than through. No little hook over the top of the wing leading edge. Designs where the wing slides through the fuselage don't allow the wing to sheer free, so all the force of impact hits the wing root. The wing should be able to sheer its bolts and slide forward on a hard nose impact.

Sheerable nylon wing bolts. 12-24 or 1/4-20 nylon wing bolts will sheer and potentially save a wing in a nose impact or a mid-air collision. If something has to give it's better if it's a couple bolts rather than a wing root.

At least two companies use a similar strategy for aircraft survivability. Vantage Robotics' Snap Drone is held together with magnets. AeroVironment holds its Raven UAV together with magnets. It lands by hard stall, and may come apart without permanently breaking.

Shock absorber ballast tube. A ballast tube with foam rubber or a compression spring at the front end will lessen the force of ballast on the airframe during impact.

Protective tail skeg. A hangy-down bit of some tough skeg material, easily replaceable, may keep tail surfaces up from small rocks.

V-tail. A V-tail keeps the tail surfaces above obstructions during normal landings.

Motors & props? Not in the nose. Motors don't make good shock absorbers. Twin folding props on wing leading or trailing edges might be optimal. A folding pusher on a pylon would work. Or maybe two pylons, to get a pair of folders behind the trailing edge and slightly up. Or a folding pusher between twin tail booms.

Electric ducted fans? Inlets should be where they won't suck sand and dirt on landings, so preferably on the topside rather than in the belly.

Good landing characteristics

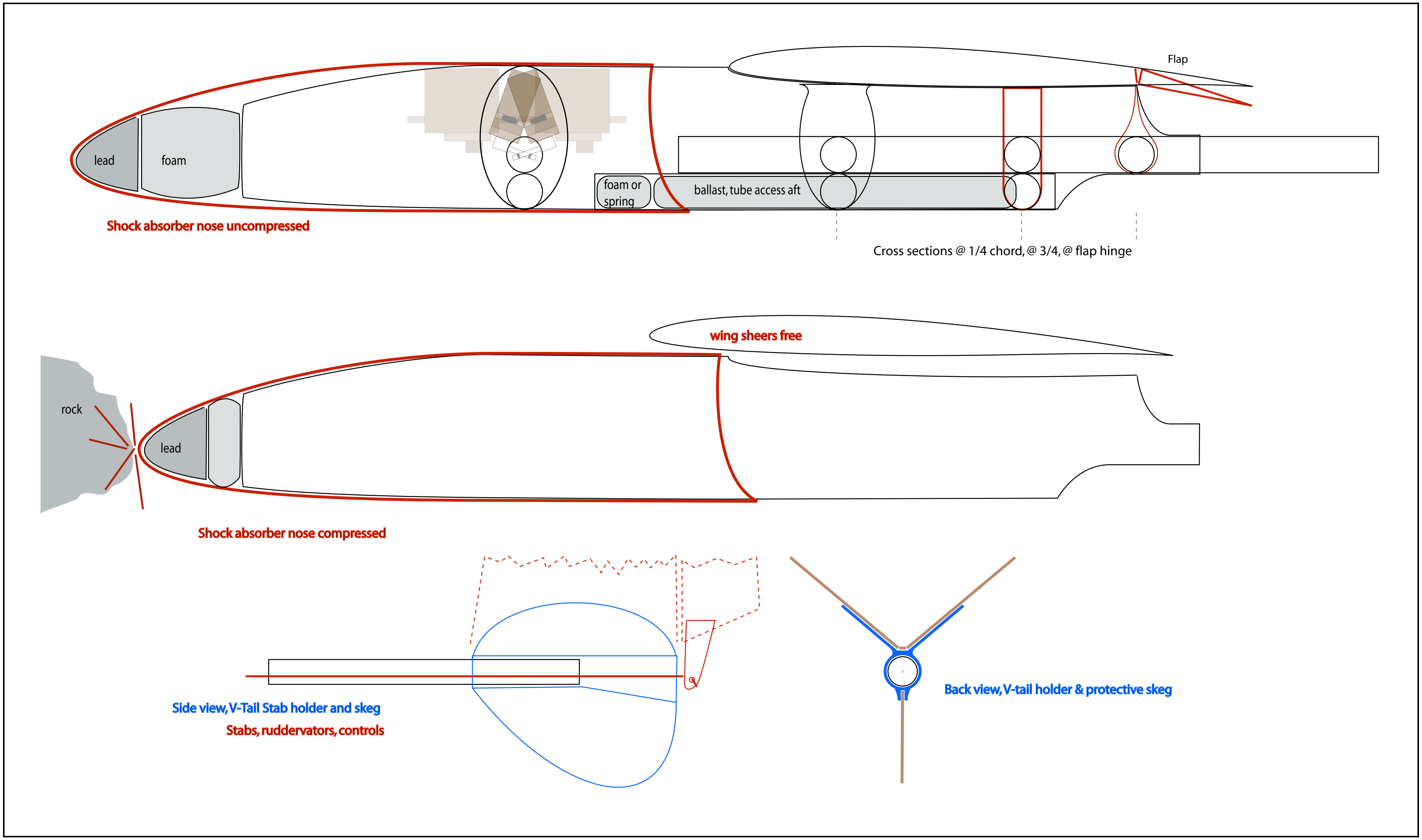
One-piece center flap/spoiler versus dual flap/spoilers on a top-mounted wing. The advantages of a single center flap: it's simple to build, program, and repair. Dual flaps linked as flaperons might add a little roll rate? Either, perhaps with crow, add survivability to a sloper. Flap deployment doesn't degrade aileron control during landing, unlike flaperons.

Sufficient tail surface may help a plane headed downwind slew around on either aileron or rudder input for a good upwind landing.

A skeg may help.

Ease of assembly and repair.

Easily accessible electronics. Nose cones make fine access hatches. A hole in the wing saddle is needed for access. All such holes in fuselage surfaces make weaknesses that need to be reinforced.



Rock Bouncer fuselage with shock absorber nose cone and wing that sheers free on impact. Not to scale. Serving suggestion only.

Another option would be to put the ballast tube above the tail boom, under the wing, still accessible from the back.

Build me, please!

Low interference drag fuselages!

A minimum drag teardrop shape of fuselage with strong taper under the wing lowers interference drag! One further note: Why I sketched in a carbon boom rather than the usual fuselage integrated with tailboom?

And why did I sketch in a strongly tapering fuselage under the wing? It's because of an excellent article on lowering interference drag between wing and fuselage. It's in the January 2018 issue of RCSD, page 23.

I'd like to see a follow up article with the title, "Minimizing interference drag with strongly tapered fuselage design."

The guys modified a full-scale ASW 27 with a fuselage that tapered strongly starting forward of the wing leading edge. They explained this increased turbulence. Maybe that's to keep flows attached and well aligned – turbulence increases skin friction but flow separation or deviation are worse sources of drag.

Plus the strong taper makes the fuselage closer to a minimum drag shape. It's narrow enough under the wing so that they described the wing as sitting on a 'half pylon.'

They also found that a smooth transition between upper fuselage and a high wing leading edge lowered drag. And that high wing position made half the interference producing intersections of a mid wing – two intersections between wing and hull rather than four. Thus we can skip those 'through wing' designs that also don't allow wings to sheer free on impact.

So I drew the fuselage tapering strongly under the wing to a moderately narrow carbon boom.

Tail set up to be easily replaceable. Easy repairs are half of a slope plane's survivability quotient.

Blow-molded electronics trays. Make it easy to mount or replace batteries, switches, receivers, LMA (Lost Model Alarm), servos, and ballast. Make a place for everything.

And make them resilient. Up on Wagner Peak in north-central Oregon a buddy's Evo had a laser-cut plywood servo tray in splinters after an impact in which its blow-molded fuse suffered little.

Electronics trays for EPP or EPO flying wings? Well, I'd like that. A spot for everything and a lid? A couple fore-aft holes for carbon rods on which to hang a central fin, and a couple spanwise tubes for carbon spars. Or for planks, maybe a fuselage with a shock absorber nose and some of the other aids to survivability?

Air dreams.

Materials

Blow-molded nylon fuselages have great survivability.

Metal-gear servos. Plus avoiding long heavy push rods. In a sudden stop the inertia of a push rod can strip gears.

Strong servo and electronics trays, preferably blow-molded. As said.

EPO and EPP. Great stuff, and the molding is getting better. Some of the molded EPO wings, as by Durafly, have a hard, smooth surface.

EPP chevron and delta flying wings. I'm still waiting for someone to put an oversized EPP plug between heated mold halves and squeeze until the surface is melted hard and tough. In the meantime, our old EPP flying wings are superb for flying above cliffs and talus slopes.

Composite planes are great. We all need some of those. They fly best. They usually aren't what one flies from a basalt cliff. But with design for survivability we'd fly them in rougher places.

First Annual F3RES International

11-12 November 2017, Albuquerque, New Mexico

Greg McGill, glidermang@gmail.com

RC Soaring Digest has featured F3RES (aka "F3B-RES") several times in the past two years, including an extensive article by Gordy Stahl. The format and design specifications have aroused considerable interest and discussion.

Reading of F3RES, and following the experiences of several of its members, the Albuquerque Soaring Association hosted our first F3RES International Contest. On November 11-12, at the Albuquerque Balloon Fiesta Park, we conducted a contest for radio-controlled sailplanes according to the rules of the F3RES class of sailplanes becoming popular in Europe.

Members of the Albuquerque Soaring Association have been following F3RES sailplanes since 2014, when one of us received our first example, a PuRES. The ease of construction of the CNC-routed PuRES, coupled with the delightful performance attracted immediate local attention.

That original PuRES (still flying locally, still winning, too) was soon joined by more; then several Slites from the same manufacturer, and then models from other designers as well.

The local popularity of F3RES got a big boost when Gordy Stahl published his article in *RC Soaring Digest*, in February 2017.

F3RES Airplanes

F3RES sailplanes are in contrast to current expensive sailplanes: models are limited to 2-meter span; must be made primarily of wood (carbon tubes and rods are allowed for spars and booms – no extrusions or molded parts); controls are limited to rudder, elevator and spoiler. F3RES sailplanes typically weigh around 15 ounces, but low drag allows them to run fast when desired.

Kits are available from suppliers in Germany, the United Kingdom and the USA; and cost $200 or less (even with shipping!). Kits are laser cut or CNC-routed for a strong, straight build. Add three or four small servos, battery and small receiver, you can soar with eagles.

For us here in Albuquerque, F3RES has two main attractions. First, the cost is hugely reduced compared to what is normally flown, so obtaining a model comparable to what the group is flying is relatively easy. Second, for two months of the year, our normal soaring venue (the Albuquerque Balloon Fiesta Park) is not available to us – in September and October, we fly at Domingo Baca Park, where we are limited to flying sailplanes of 2-meter span or less. Other attractions include excellent performance for both climb and glide, the pleasure of building CNC-routed and laser cut kits, and the pride of flying what you have built.

How F3RES Contests Work

A typical F3RES contest starts with contest teams. Under F3RES rules, a flyer is allowed "helpers" such as: a timer, a person to retrieve the hi-start for re-launches, and a helper to run off field and bring back a sailplane from a land out.

So, flyers form teams among themselves, acting as each other's helpers. Team members do not compete against each other directly, but actively root for and directly assist in helping each other achieve better results.

In my team at the November contest, for instance, as soon as someone announced his stop watch was ready, another would head down to the end of the hi-start, ready to untangle (if needed) and retrieve the line, while the third helper started scouting lift or assisting

The Mandatory Group Photo: I believe there is an FAA regulation that requires all contests to take a photograph of everyone. So, here it is. One of the nice things about F3RES is the colorful airplanes. Note how nearly everyone is wearing a hat and dark glasses.

Team in Action: Chris Pyle hooks up Kirby House's Slite, while Robert Zeller stands ready to time. This is how the team functions in F3RES, with no one sitting idle, just waiting for the next flight. The payoff is that each team member steps up to the launch with current information on lift and wind.

Teams Work: Another example of how teams work. Skyler Raver, about to release Terry Pierce's Slite, points out the likely lift as the window clock counts down. Skyler eventually finished first, and this may be the launch that netted Terry his first 1000-point round.

with launch. For me, every heat of flying meant active participation: line-running, timing, thermal –spotting, whatever. Whether flying or not, I was involved with my team. No doubt about it, having a cheering section will boost anybody's spirits.

For our contest, if someone requested being on a specific team, we complied. Otherwise, all we did was make sure every team had some one local so that everyone had the best information available about the local soaring conditions.

Teams are not required. I have had folks contact me who are concerned that the format "requires" a 4-man team. That is not so. A flier is allowed as many as three other helpers, but is not required to use any.

When we fly locally, we have conducted man-on-man contests with as few as two hi starts, and four fliers. We take turns flying and timing/retrieving, and fly until each of us has flown against the others at least three times.

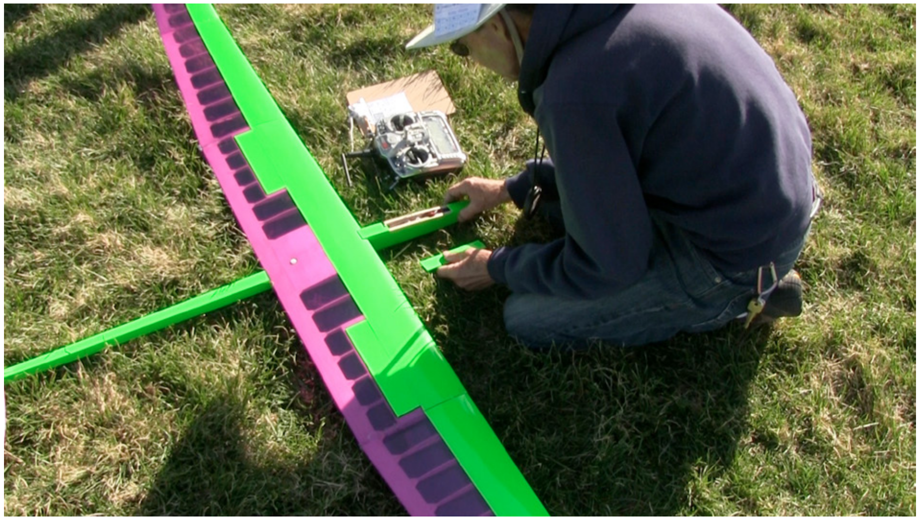
We also use the same airplanes in a beginner's contest we call "Hiss-n-Boink." In a Hiss-n-Boink, flyers are limited to 2-meter, wood airplanes with either RES or RE configuration. The task is 4 minutes, with no penalty for flying over. There is a single hi start, and the limit of allowable stretch is clearly marked on the ground. We have used the same hi start now for Hiss-n-Boink for nearly thirty years. Contestants take

Another Good Launch: Brad Juntunun releases his Yellow Jacket for another good launch. The Yellow Jacket is an American kit, manufactured in Phoenix, AZ, by Sonoran Laser Works. This is just a good launch photo, frankly.

Launch Line Action: This is a good shot of what the launch line looked like. In the foreground, Karen Vila watches her husband Efrain guide his PicaRES, launched by Larry Jolly, while Carolyn Goldsmith times.

turns alternately flying and timing, and as soon as one flyer has launched, another steps up and follows. At the end of a four-minute flight, landing points can be earned for landing within 100 inches of a 20-foot rope staked out on the ground, aligned with the wind. A landing that "hisses" in along the grass, earns points; a landing that is a dork ("Boink", the sound made by a dork landing) does not earn points. Hisses and boinks are assessed by popular acclimation.

Back to F3RES, contests use standardized hi-starts, providing everyone equal energy for launch. There is a working window of nine minutes, and the flyer is allowed unlimited launches in the window in order to achieve a maximum flight time of six minutes. Only the last flight is scored. For every second in the air up to six minutes (360 seconds), two points per second are awarded for a possible maximum of 720. After six minutes, two points per second are deducted from the maximum. Landing points are awarded – 100 maximum, decreasing to 30 points at a maximum of 15 meters from the designated target. Landing points are awarded only if the airplane remains upright with the tail touching the ground, and is airworthy after landing. Any airplane still airborne after the end of the working window receives zero landing points. Any airplane still airborne more than 30 seconds after the end of the working window receives a total score of zero.



A Closer Look: Kirby House checks out the guts of his X-RES, before his next flight. There is always something to do with your airplane, even with these simple models. This particular X-RES is one of those once belonging to Jeff Granone.

Loren's Slite Shows Good Launch Technique: Loren Mills releases his Slite very nose high, allowing the wing to instantly translate launch tension into height. This works best for these light models. Older models typically need to build speed before transitioning to climb.

After each flight group, the flyer with the maximum points (as much as 720 time points plus 100 landing points) is awarded 1000 contest points. Flyers with fewer points are awarded contest points proportionally.

Detailed rules, translated into English from the generally accepted rules used in Germany, can be seen in the *RC Soaring Digest* issue of December, 2016.

Leading to Our Contest

I myself participated in a contest in Europe last summer, and experienced the format first hand. F3RES contests encourage interactions between contestants, and provide a nearly level playing field. It is an ideal competition for developing skills and proficiency.

The desire to conduct our own contest back in Albuquerque solidified when two of our members attended the F3RES mini-contest organized by Larry Jolly in Muncie, Indiana, as an adjunct to the Soaring Nationals held in July, 2017.

Larry himself has participated in F3RES from the beginning, when it was being developed in Turkey.

It was while in Germany that the idea of staging a truly "International" contest first emerged. I mentioned to my new friends in Germany that we were going to hold a contest in Albuquerque in November.

I got puzzled looks: no one, they declared, can actually soar in November – it's too cloudy/rainy/cold/miserable. Not so, said I. We have 340 soaring days every year. On days in Albuquerque

What a 100-Point Landing Looks Like: Corky Miller records John Armstrong's Yellow Jacket after a 100-point landing. Corky designed the Yellow Jacket, and it is proving to be an excellent performer. No less than five contestants came to the contest from Phoenix, all bringing a Yellow Jacket.

Victory Dance!: This is Caroline Goldsmith, doing her Victory Dance after finishing up a perfect 6-minute flight with a 98-point landing, netting her 1000 points for the Round. Getting all the dominos lined up just right sure feels good.

when it's cloudy, it is still often soarable; making up for sunny days when it might be too windy.

I could tell they were skeptical as a group, but even so, three signed up for the long trek to Albuquerque: Josef Gergetz, who designed the PuRES and Slite; his soaring partner, Josef Schweiber; and Robert Zeller (from Austria) owner of Zeller Modellbau, who distributes a large selection of F3RES sailplanes world-wide. Josef Gergetz and Josef Schweiber each brought their families, and Robert came with his wife, Doris. Competitors from the US came from as far East as Ohio and Indiana, and from California and Washington, as well as the usual suspects from the Four Corners States.

Flying F3RES in Albuquerque – in November

Albuquerque weather came through for us: conditions were very challenging both days. Albuquerque maintained its reputation for sunny flying days even in the late autumn, but season and atmosphere made achieving six minutes tough. Thermals were soft, but made up for it by being narrow as well.

The colorful airplanes made an exhilarating sight with up to six or seven airplanes circling together in mix-master fashion.

Clouds shifted and changed constantly, providing dramatic backdrop. On Saturday, an afternoon breeze helped launching quite a bit. On Sunday, winds remained light, eventually shifting to

Balloon on Final: Flying from the Balloon Fiesta Park gives rise to interesting air traffic control situations. Here, Robert Zeller contemplates right-of-way with a local balloon. The balloon guys are always fun to be around. And, balloons have right-of-way.

the point that the CD switched launch directions. Switching eight hi starts from south-launching to north-launching took about thirty minutes with all hands pitching in (having teams really helped).

Until the switch, we all had the thrill of trying for six minutes from the dizzy height of maybe 40 meters, instead of the more usual 100 meters or more. Conditions challenged everybody.

As an aside, the configuration of the field I flew at for the contest in Germany made any change of launch direction impossible. And, sure enough, two of the four rounds required down-wind launches. Heading for the tree line was a real act of risk-taking, faith and determination, but the tree line was where any of the weak lift could be found. But, here is the catch: everyone flew the under the same disadvantage of reduced launch height, and no one (except me) even mentioned down wind launches.

The tricky conditions in Albuquerque had hard-core flyers stepping up their game. Local competitor Skyler Raver and Austrian Robert Zeller steadily climbed to the top. Skyler, flying an AndREaS, ultimately finished first, for his first-ever contest win. Robert, flying mostly his X-RES, took a close second. Peter Goldsmith, recently retired from Horizon Hobbies, flew his own design, the Opal, to third place. Corky Miller of Sonoran

Atmosphere Shot #1 – the Calm before the Storm: The small fleet of German airplanes await their first rise into New Mexican lift. All three got a hard work out before the end of the contest, but all three survived in good shape, and are back in Germany.

Laser Arts donated laser-etched beer mugs for first, second and third. Skyler, Robert and Peter each received one of Corky's mugs.

Corky also donated the "Jeff Cup," dedicated to Jeff Granone. Jeff Granone inspired our interest in F3RES. He was injured several years ago in a motorcycle accident, and asked me to build one of the new F3RES airplanes for him. However, he kept finding new, interesting designs and the build queue kept growing, each represented with a build thread on RCGroups. His favorite movie character was the Joker, from the Batman pictures, so he wanted his airplanes finished in green and purple.

We awarded the Jeff Cup to the contestant finishing highest with an airplane finished in green, purple or both. The winner of the Jeff Cup turned out to be Skyler Raver, flying the AndREaS originally built for Jeff – Skyler finished first overall, and his sailplane was finished in both green and purple, just as Jeff requested. Unfortunately, Jeff passed away recently.

Peter Goldsmith donated one of his Opal kits, awarded to the person most needing encouragement. We decided that the person finishing exactly half way between the top and bottom was the one who deserved the Opal. That was John Armstrong, from Arizona.

Atmosphere Shot #2: This is (I think) Mark Mills' Slite on final approach. The sense of pride displayed by each contestant in their own airplanes was evident always. There was some gorgeous workmanship flying around.

DJ Aerotech also donated a kit: their Chrysalis Lite, designed for F3RES. We intended the Chrysalis Lite for the highest placing "legacy" sailplane, such as a Gentle Lady. However, with no legacy designs flown in our contest, we gave the Chrysalis to the last-place finisher, Terry Tombaugh.

Doing something for the first time takes special effort. There were many opportunities for mistakes, but our committee had the courage to carry through all tasks. Contest Director Steve Moskal headed the team of Richard Dick (Contest Manager), Rocky Stone (Grounds and Hi-Starts), Richard Shagam (Scoring and Registration), Kirby House (Food and Water), Dan Tandberg (Sanitation and First Aid), and Don Kawal (Awards). Bob Galler organized the Saturday Night dinner at the County Line BBQ. Tom Tichy and Ed Dresner generally scurried around, helping.

Albuquerque Soaring Association had outside help. The managers of the Albuquerque Balloon Fiesta Park did a fine job making sure we had a safe flying venue with minimum interference.

We purchased ten hi starts from Robert Zeller in Austria, and all of them turned out to be incredibly close in

Josef Catches for a Fast Re-Light: Josef Gergetz catches his Windy Slite, getting set for a quick re-launch and another attempt at six minutes. He got his six minutes on the next launch. The 9-minute window allows for making mistakes, and is encouraging to beginner flyers.

Atmosphere Shot #3: Terry Pierce's Slite comes in for a landing, with the Sandia Mountains in the background, as always. The great New Mexican scenery is matched by many days year round of excellent soaring weather. We have got it great.

performance. Measuring tension while setting up the field revealed each hi start generating the same tension as the seven others, within +/- 2%, which we think is outstanding. (F3RES specific hi starts are now available in the United States, from DJAerotech.)

We used GliderScore for record-keeping, score computation and on-line posting. The owner/operator of GliderScore provided instant support at all hours of the day and night, even though he lives in Australia. Jordyn Mason of Jordyn Mason Photography put together amazing video footage.

In Conclusion

We are enjoying F3RES a great deal. The delightful performance of these new designs has everyone interested.

One local flyer, after over a year flying only his pair of top-of-the-line F5J models had this to say about his first flight with an F3RES airplane: "Don't bother me, I'm in the groove. This airplane is showing every single bubble of lift, like nothing I've ever flown." His big hesitation in starting F3RES was concern over the "complicated" business of launching from a hi-start. Now, he knows that the good launch is hands-off, and he is on his way.

We are seeing here in Albuquerque a wide variety of the F3RES ships available: PuRES, Slite, X-RES, PicaRES, AndREaS, Fresh, Baba Jaga C, Samba EVO, MadRES and even RESoholic.

We staged a comparative flight test evaluation of four of these designs, along

Team Green Chili: There were eight teams, but in the interests of space, I will only show the teams that had an International participant. Robert Zeller (holding an X-RES), Mike Carris behind, Chris Pyle (with his Samba Evo) and Kirby House (and his PuRES) pose for their team photograph. Mike's airplane was his own design, not shown here.

Team Red Chili: Josef Gergetz (with his PuRES, which he designed and kitted), John Lueke (with his X-RES) and Terry Tombaugh (with his Slite, also designed and kitted by Josef Gergetz) pose for the camera. This was Josef's first trip to America.

with several legacy sailplanes — Gentle Lady, Gnome and Lil Bird. Based on sink rate (flying multiple times from the same hi-start, on the same morning, one after the other), there were two, clear performance groups: The legacy designs all flew pretty much the same; while the F3RES designs all flew significantly better, staying up almost a minute longer.

We learned a lot. We learn best from our mistakes, but we think we have captured most of them, and we will do better next year. We know the rules better, the nature of hi starts better, and contest logistics better.

Next year, the 2018 F3RES International in Albuquerque will be 10-11-12 November, which is (for US citizens) a 3-day weekend. We are considering options for 2018, including possibly extending competition to three days to make it more attractive still for people outside the US. Another option is a symposium for techniques of RC soaring, and clinics for launching and trimming so that new comers to competition can expect direct help and support in setting up their airplanes for best performance.

We enjoyed conducting and participating in the First F3RES International Contest. We found out that Teams Work. Yet again, the Albuquerque Balloon Fiesta Park provided a great venue for RC

Team Taco!: Team Taco was Joseph Schweiger (with his own design); Skyler Raver (flying Jeff Granone's AndREaS); Terry Pierce (flying his Slite); and Sean Guthrie (flying Jeff's PicaRES). Skyler went on to win! Another round, and I think Josef might have caught Skyler.

And... the Winners Are: From left to right, Robert Zeller, Skyler Raver and Pete Goldsmith share second, first and third place, respectively. Etched beer mugs donated from Sonoran Laser Works. We believe in "useful" trophies, not just dust-catching plaques.

soaring. Purple and green aren't that bad for glider color schemes, and we aim to do this again next year. We are grateful to Jeff Granone for getting us in touch with these wonderful and accessible sailplanes.

F3RES rules:
<https://www.rcgroups.com/forums/showatt.php?attachmentid=9481781&d=1477856657>

F3RES models available from:
- Hyperflight:
<https://www.hyperflight.co.uk/products.asp?cat=RC+Models&sub-cat=F3-RES+Thermal+Soarers>
- Sonoran Laser Art (Yellowjacket):
Email <sonoranlaserart@cox.net>
- Kennedy Composites (Opal):
<http://www.kennedycomposites.com/opal.htm>

GliderScore available at:
<http://www.gliderscore.com>

F3RES Hi-starts available from:
- DJAerotech:
<http://www.djaerotech.com/hi-start-rubber/>
- Zeller-Modelbau:
<https://zeller-modellbau.com/home/res-hochstartset-megaspule-komplett.html>

Little slope, big model

Tomasz Lis, listomasz85@gmail.com

During last Christmas there was beautiful weather in Poland. So I flew my WWS3 Delfin 1:3.5 scale model on a little slope in Gliniska.

This slope has only 25 m height, but gives strong lift. That was a sunny day, with wind at 6-8 m/s, and temperature approximately 8 degrees Celcius.

I used rubber ropes to start and spent two hours in the air!

Big models and little slopes? Why not!

For me it's a perfect combination.

Now I know that little slopes are beautiful.

WWS3 Documentation:

<https://www.j2mcl-planeurs.net/dbj2m-cl/planeurs-machines/planeur-fiche_0int.php?code=1623>

<http://www.piotrp.de/SZYBOWCE/dwws3.htm>

<https://en.wikipedia.org/wiki/W.W.S.3_Delfin>

I was flying my WWS3 Delfin from this 25m (82') slope in Gliniska Poland.

My WWS3 Delfin (Dolphin) model: 4,57 m / 15' span, 7.5 kg / 16.5 lbs. weight, NACA 4415-4409 airfoils


SP-1300
delfin


SP-
1300
SP-1300
„delfin"

Ready for a bungee launch

Coming off the bungee

Heading out into the lift zone

The WWS3 gull wing shows off nicely in this front view

Landing at the top of the slope

After a two hour flight over the low Gliniska slope

Slope Soaring Candidate

Hughes XF-11

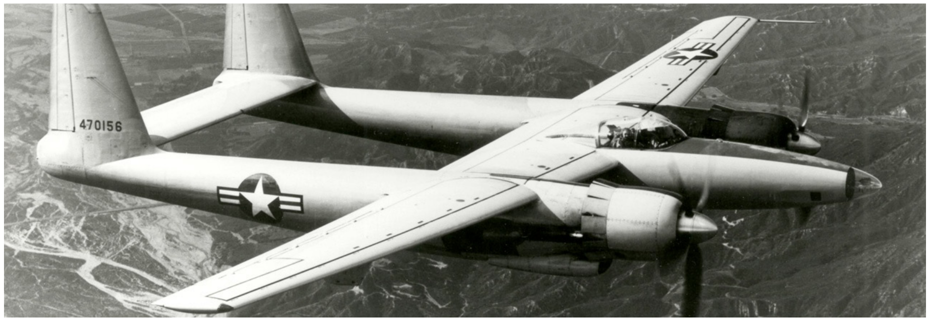
https://theaviationgeekclub.com/wp-content/uploads/2017/04/XF-11.jpg

https://static.thisdayinaviation.com/wp-content/uploads/tdia/2013/07/Hughes-XF-11-44-70155-7-July-1946-engines-running-at-Culver-City-California.jpg

The first of two Hughes XF-11 prototypes was once again brought to the attention of the public in late 2004 when it appeared in “The Aviator” motion picture and was truthfully characterized as the aircraft which nearly killed Howard Hughes on July 7, 1946. At the time of the incident, movie house newsreels projected images of the crash site and included commentary describing the probable cause, eventually confirmed to be an oil leak which reversed the pitch of the starboard rear propeller.

Following recovery from his injuries, Hughes insisted the counter-rotating propellers of prototype number 1 (shown in the photo at left), be replaced with standard propellers. The second prototype with conventional adjustable propellers is shown in the title photo.

The development of the XF-11 was plagued with difficulties from the start. The original design was designated Hughes D-2 and was a privately funded project with the goal of developing a high speed twin-boom twin-engine interceptor.



http://www.boeing.com/resources/boeingdotcom/history/images/xf_11_hero.jpg

https://www.flickr.com/photos/sdasmarchives/4559759262/sizes/l/

Most of the airframe of the D-2 was made of Duramold plywood, a plastic-bonded plywood molded under heat and high pressure. This material was advantageous from an aerodynamic and a metals-shortage standpoint, but was difficult to work, and rejected as insufficiently robust by the US Army Air Corps.

Despite the rejection, Hughes carried on development, and the first flight occurred in 1942. Testing did not go well as it was found control forces were high and reducing those forces to acceptable levels would require extensive modifications, including a complete redesign of the wings and a change in airfoil section. The single D-2 prototype was destroyed in a lightning-caused fire in November of 1944.

The Army was somehow impressed with D-2, however, and entered into a contract with Hughes to develop a similar aircraft made of aluminum to be used for reconnaissance. The Army contracted for 100 of the airplanes to be built, but after the end of World War II, the contract was cancelled, and Hughes was left with two very expensive prototypes.

Hughes carried on development of the XF-11. The counter-rotating propellers were not initially set correctly, leading to some anxious moments during taxi tests. Then, as described previously, Hughes was seriously injured while maidening the first prototype.

Overcoming the near tragedy, Hughes went on to successfully test fly the second prototype with its conventional propellers on April 5 1947. This test flight was uneventful, and the aircraft proved stable and controllable at high speed. It lacked stability at low speeds, however, as the ailerons were ineffective. This latter point should be kept in mind when contemplating a PSS model of the aircraft.

The surviving XF-11 prototype airframe was transferred to Sheppard AFB, Texas, on 26 July 1949 for use as a ground maintenance trainer by the 3750th Technical Training Wing. It was scrapped in November 1949.

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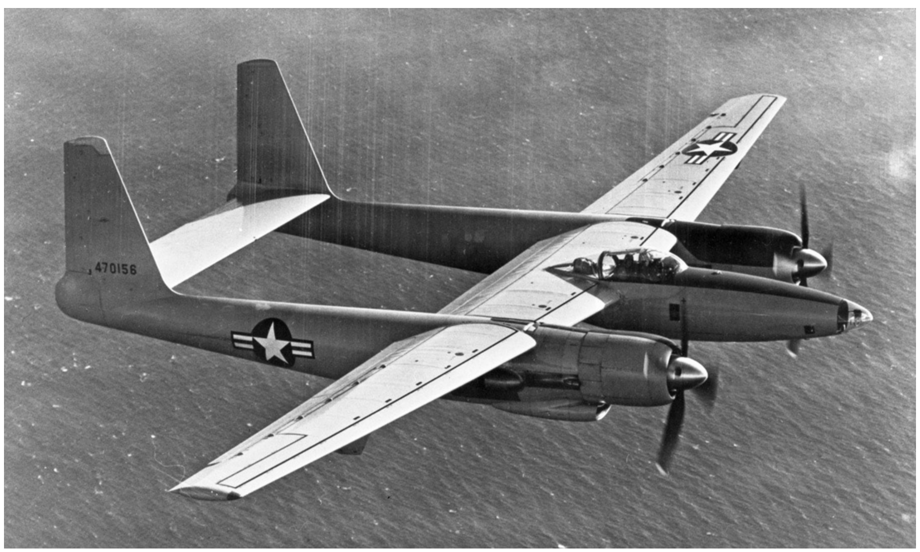
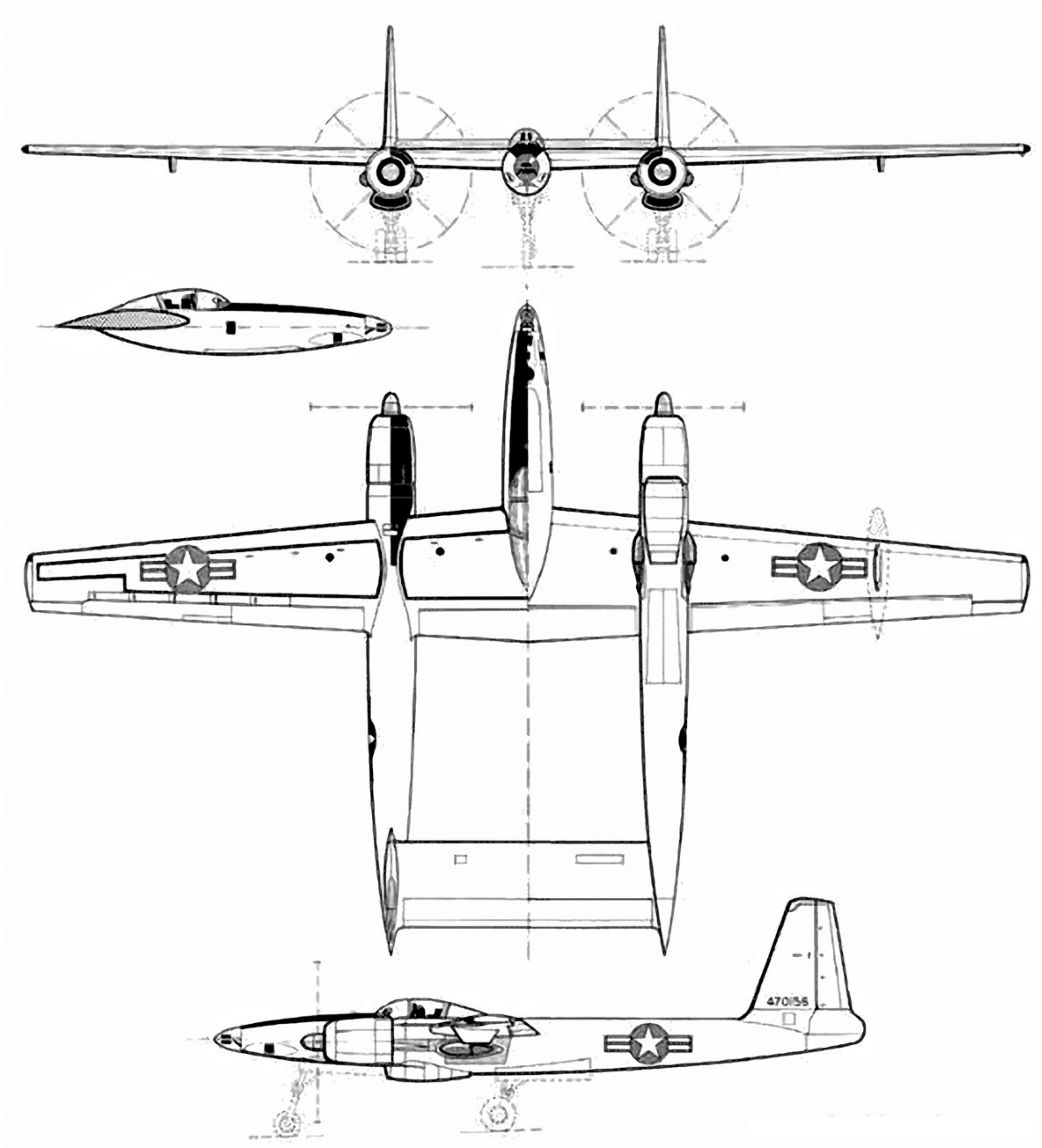
http://d.library.unlv.edu/cdm/ref/collection/hughes/id/20



http://www.airailimages.com/uploads/1/0/1/9/10199931/__7893263_orig.jpg

https://latimesphoto.files.wordpress.com/2013/06/fa_308_47xf11_970.jpg



https://www.the-blueprints.com/blueprints/modernplanes/modern-h/20134/view/hughes_xf_11/

Technical Specifications
XF-11 Reconnaissance Aircraft

Length:	65 feet 5 inches
Wingspan:	101 feet 4 inches
Height:	23 feet 2 inches
Wing area:	983 square feet
Max. speed:	450 mph
Accommodation:	Pilot and navigator/ photographer

Resources:

Wikipedia: <https://en.wikipedia.org/wiki/Hughes_XF-11>

Boeing: <http://www.boeing.com/history/products/xf-11-reconnaissance-aircraft.page>

Welcome home, Howard: <http://d.library.unlv.edu/cdm/landing-page/collection/hughes>

Video of second prototype in flight: <https://www.youtube.com/watch?v=NtZDfdpbnws>

Park Scale Models 1:12 scale e-power model: <http://www.parkscalemodels.com/shop/item.aspx?itemid=81>

Rol Helfox, camber2reflex@yahoo.ca, posted this photo to the Montreal Area Thermal Soarers MATSCLUB Yahoo! Group with the comment: "Is this a sign from above or just a leaky window? Possibly a new 'secret' airfoil message from God? I think it means time to go fly."