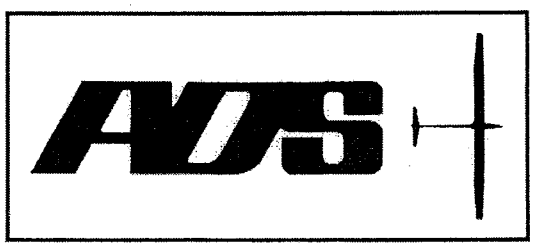


Committee - George Whelan 208617, Derek Robertson 821368, Neil Davidson 712458

NEWSLETTER OCTOBER 2000

Another thermal flying season draws to a close, this year will not be remembered for its good weather being mostly cold and damp. Our Tuesday flying got off to a slow start with no takers for the Tuesday evening slope flying, after an EGM we reverted back to Calder with improved results.

I have attached a model of a new constitution for your perusal for the AGM. The main thrust is to incorporate a higher safety profile, a must in this day and age. Nothing in this document is cast in stone and hopefully at the AGM any issues will be resolved and the new constitution adopted.

Attached is a copy of last years AGM minutes, bring them along to the AGM as copies will not be provided on the night.

This months model is yet another from Mark Drela, this time a small chucky, Mark has included some concept notes as to how it became this size and shape. I have shown the wooden version which should be within the competence of most of the club members. Further info on this range of models can be seen on the Charles River internet site.

This issue has an article about trimming full house models, it does however give a good insite into basic trimming in general AND the reasons why the model flight is changed. The article is equally suited to RE models for basic set up and trimming. It also includes some good question and answer material on trouble shooting.

Guy Taylor owner of Soarhigh models in Turriff will give members of ADS a 10% discount on any purchases from his shop. Guy has an excellent range of glider orientated gear, is competativly priced, and if the item is not in stock he can usually get it pretty quickly. My own experience of dealing with Guy is very positive and I would recommend a visit to his shop.

On a final note this is the last issue of the newsletter I will be producing, after 2 years, 13 issues and some 200 pages I have exhausted my journalistic drive for the time being.

FORTHCOMMING EVENTS

10TH OCTOBER AT COVE BAY HOTEL - BRING AND BUY.

7TH NOVEMBER AT COVE BAY HOTEL - AGM - AGENDA ITEMS TO NEIL DAVIDSON.

Is the Apogee the Right HLG for me?

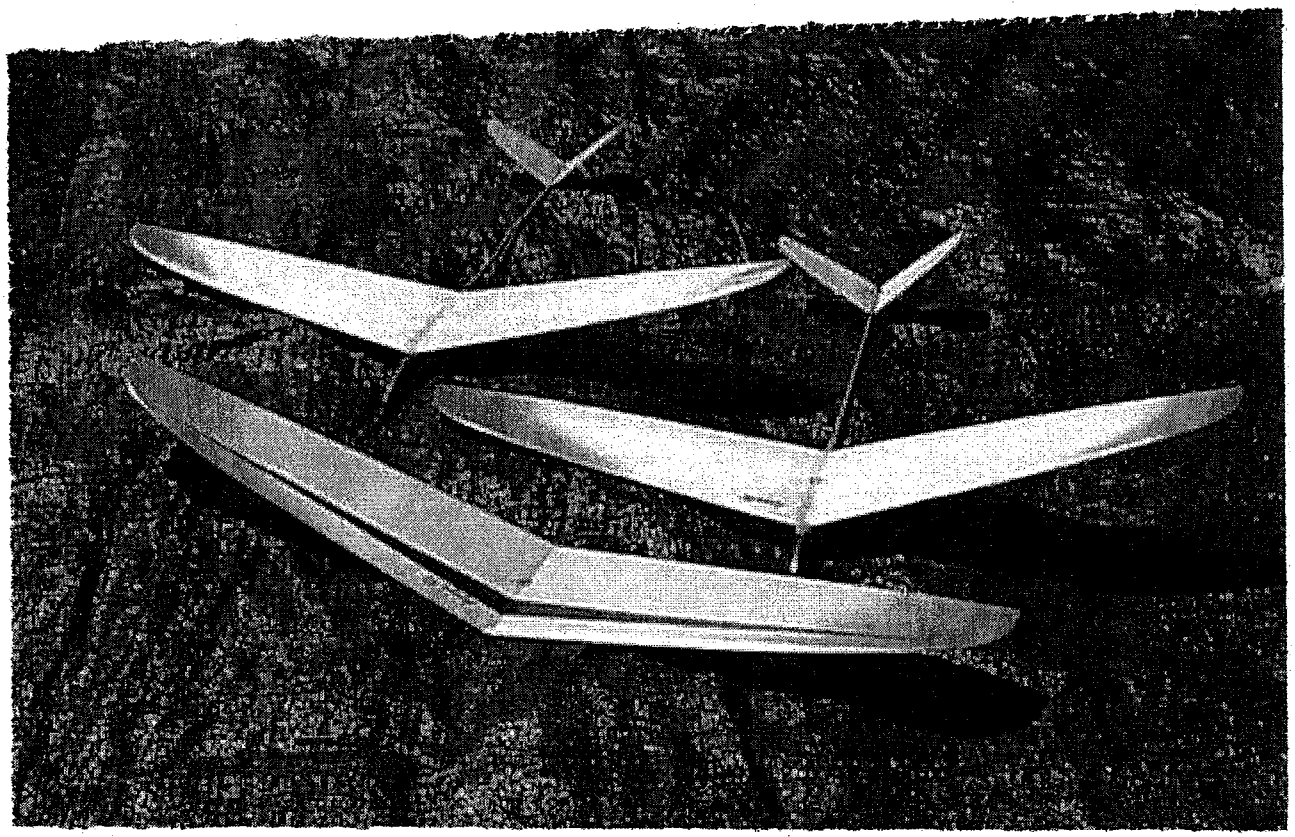
The Terminator, which was our first web-published design (designed by Bill Grenoble and Denny Maize), was an effort to bring composite construction and HLG's to first-time builders. As such, the Terminator HLG site includes numerous construction details and a design that is fairly insensitive to design changes and construction "oopses".

Unlike the Terminator, which was designed for the first time HLG builder, the Apogee is a (very) high performance design. Obtaining the Apogee's potential requires careful construction and a constant (obsessive?) attention to weight and construction details. In return for this effort, if built from properly chosen materials, constructed carefully and accurately, the Apogee will surprise you with its capabilities.

If you have experience building light wood or composite airframes, have a gram scale and are used to using it while building, like building from scratch and want to build a world class HLG, *the Apogee is for you*!

Introduction

For some of you, Mark Drela needs no introduction... For the others, Mark has held indoor HLG records and innovated in many aspects of HLG design for the indoor crowd. He is a well known aerodynamicist at the Massachusetts Institute of Technology, and as some of you have read on the Soaring Exchange, Mark is also working to see if he can get his XFoil airfoil design code released to the public domain by MIT.



Understanding the Apogee HLG Series

The Apogee HLG series is the outcome of his RC HLG design analysis this year. Comments on the Apogee, from those who have seen it fly, range from "wow" to "very surprised" to "how did he do that?" There are several flying and in construction in the club, and we expect that once you build one, the number will multiply at a "pretty fast rate".

The Apogee HLG is the result of some careful thinking about the nature of the flight requirements of a high performance hand launched sailplane.

One of Mark's early observations was that in hand launch, launch altitude is one of the most important parameters of a successful design. You can do some things to influence sink rate (the "hang time") of a design, but if you can get 20% or more *launch height advantage*, this will swamp any minor hang time advantages.

A perhaps even more important consideration is *manoeuvrability*. This is where the small span of the Apogee really has a considerable advantage over "full-size" HLG's - even aileron "full-house" designs. The Apogee's

fast roll rate, tight circling radius, and docile stall behaviour allow very small or spotty thermals to be worked very close to the ground with confidence. The fast control also allows safe flying in high turbulence which grounds most 2-channel 1.5m gliders.
The Apogee hand launch glider obtains thermaling performance primarily via high launch and tight circling capability. Its key design features are:

small size -- 36-40 in. span, 165-190 in^2 wing area
light weight -- 3.6-4.2 oz. weight, 3.1 oz/ft^2 loading
very light extremities and fast rudder roll response
thin airfoils with 100% attached laminar flow at higher speeds

The all-laminar airfoils give good launches and surprising penetration. In a typical contest it is quite competitive with full size 1.5 meter HLGs. In spotty or choppy lift, the Apogee's manoeuvrability is strikingly good. An unexpected bonus is that the manoeuvrability makes the Apogee always extremely fun to fly!
What's better: 36" or 40" span? The 40" version is newer, and experience with it is somewhat limited. But mainly there's a minor trade-off between manoeuvrability and L/D as expected. If you want a "fun" glider, or fly in turbulence near buildings, then the 36" span is probably a better choice. For contest work the 40" span is suggested. One side advantage of the 40" span is that it's easier to build to a sufficiently light wing loading, and allows use of 120mAh batteries for longer flying time.
What are the differences between the wood and composite Apogees? The 36" wood Apogee was the prototype to check everything out before the CNC metal moulds were cut.
The main difference is in the airfoils. The AG03 on the wood Apogee seems to favour the glide at some expense of launch height. The AG04 on the composite Apogee is a bit more of a "high-speed" section, and its flight behaviour bears this out. These differences are quite minor however. The computed AG04 polars are a bit better, but the AG03 can be constructed and maintained more accurately in balsa so it may be better in reality. The AG03 is recommended for the wood Apogee versions.

Apogee Airfoils

Mark designed a new set of airfoils for the Apogee, specifically oriented to the RC HLG flight tasks. A basic goal of the airfoil design was to minimise the launch-mode drag of the system, while not trading off cruise performance to the extent that "big glider" airfoils do in this application.
Many current HLG's use "big glider" airfoils like the SA7035, MH32, etc. On small gliders these have large draggy separation bubbles. Thinning such airfoils, or using "fast" slope glider airfoils like the S6063, only partially alleviates this problem.
The AGxx airfoils were designed for very low Reynolds numbers from the outset. At thermalling speeds, they have quite small separation bubbles for good minimum sink and a docile stall. At higher speeds they exhibit 100% attached laminar flow, resulting in very low launch drag and exceptional penetration. Computed polars indicate very significant overall improvements over the S6063 and other adapted airfoils. The Apogee's performance and behaviour matches these expectations.
There are two sets of airfoils, one set for use with moulded construction, and another that are designed to be "buildable" with wood wing construction.

Drawings and Construction Notes

The Apogee has been designed in two sizes, 36" and 40". In addition, each design can be built either with a shaped wood (balsa) wing or a composite wing.
After building a prototype, Mark built fiberglass moulded Apogees using a CNC-machined mould. Not all of us have access to this technology, and there is good news here. The performance of the wood version is almost identical to the CNC-moulded version IF you are accurate in your rendering of the airfoil and choose the right density balsa (*light!*). If you choose to build the wood version please also refer to Mark's tech note on airfoil shaping in the wood sections below.
NOTE: Please pay particular attention to the completion weights and construction notes on these plans. Each gram counts...

Wood Wing Apogee Construction

Wood Wing Construction Notes:

1. See the "Shaping Data" links below in the Related Construction Notes section for printable tangents for the ag airfoils used in the wood version of the Apogee wing.

2. The wood wing Apogee also has no separate spar. The wing is shaped from solid balsa, and the balsa provides enough strength to support the air loads.

3. The 40" wood Apogee can be built with a solid wing IF 4.0 lb balsa is available (*weighed 4.0 lb balsa... not "this is pretty light" 4.0 lb balsa :-*). This is more durable and will give better airfoil accuracy. Use *diagonal splices near tip* if using 36" wood sheets. Otherwise it is probably a better deal to stick with the built-up aft section of the wing as shown in the plans.

4. The AG03 airfoil is used over most of the span, and gradually blends into the AG11 *in the last 2 inches at the tip.*

5. ***The shape of the upswept leading edge (the smooth curve on the front bottom of the airfoil) is especially critical for launch and penetration performance. Please shape it very carefully. "Just sorta rounding it off on the bottom" like someone might do to a Gentle Lady leading edge strip won't cut it on the Apogee. It has to be accurately shaped for this airfoil to work correctly.***

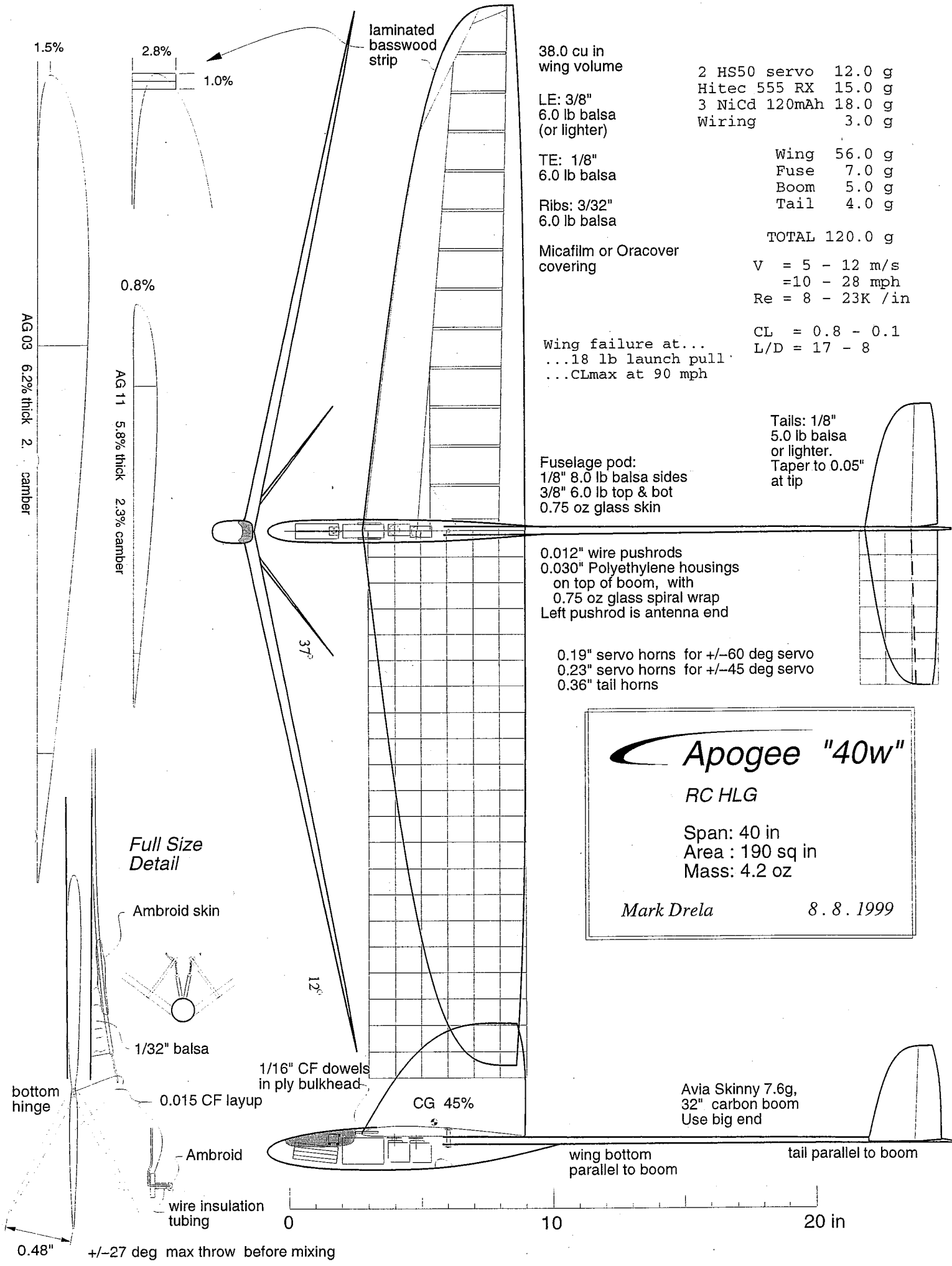
6. If 4.0 lb balsa is not available, one can thin the airfoil 10% or even 15% to compensate for slightly heavier wood. Airfoil computations indicate that the thinner airfoil will penetrate even better, but the float and handling may degrade a bit. Difficult to say for sure without trying it.

A quick note on the airfoil transitions for the wood version...

The AG03 airfoil is used over most of the span, and gradually blends into the AG11 in the last 2 inches at the tip.

Radio Gear Recommendations

As shown on the fuselage plan, the Apogee is specifically designed for the Hitec 555 RX, HS-50 servos, and a 3-cell 120 mAh AAAA battery. This will give bullet-proof reception and a safe flying time of 70-75 minutes. Smaller receivers such as the Berg and smaller 50 mAh 1/3AAA cells can of course be used for a significant weight reduction, provided the tail is kept light so that noseweight is not required with the lighter gear. However, the single-conversion RX will compromise reliability and the smaller batteries will limit flying time to 35-40 minutes. There is little reason to reduce the wing loading below 3 oz/ft^2, so that the lighter gear may be unnecessary if the airframe weight is kept down, especially on the 40" version.
The weight savings of the lighter gear may be more important on the 36" version.
Any radio capable of elevon mixing can be used.



38.0 cu in
wing volume

LE: 3/8"
6.0 lb balsa
(or lighter)

TE: 1/8"
6.0 lb balsa

Ribs: 3/32"
6.0 lb balsa

Micafilm or Oracover
covering

```
2 HS50 servo   12.0 g
Hitec 555 RX   15.0 g
3 NiCd 120mAh  18.0 g
Wiring          3.0 g

        Wing   56.0 g
        Fuse    7.0 g
        Boom    5.0 g
        Tail    4.0 g

      TOTAL 120.0 g

V  = 5 - 12 m/s
   =10 - 28 mph
Re = 8 - 23K /in

CL  = 0.8 - 0.1
L/D = 17 - 8
```

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Wing failure at...
...18 lb launch pull
...CLmax at 90 mph
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Fuselage pod:
1/8" 8.0 lb balsa sides
3/8" 6.0 lb top & bot
0.75 oz glass skin

Tails: 1/8"
5.0 lb balsa
or lighter.
Taper to 0.05"
at tip

0.012" wire pushrods
0.030" Polyethylene housings
on top of boom, with
0.75 oz glass spiral wrap
Left pushrod is antenna end

0.19" servo horns for +/–60 deg servo
0.23" servo horns for +/–45 deg servo
0.36" tail horns

Apogee "40w"

RC HLG

Span: 40 in
Area : 190 sq in
Mass: 4.2 oz

Mark Drela *8 . 8 . 1999*

Mixing Full House Sailplanes

Introduction By Rick Eckel Copyright 1995

Let's admit it. The simple two-channel 'floater' types Sailplane are the most relaxing and enjoyable planes to fly. They look graceful in the sky, practically fly themselves, and land so slowly you can walk beside them. On a beautiful, calm, sunny, summer Sunday there is no better way to spend time than guiding a floater beneath billowy clouds suspended in a deep blue sky. But...

There are some of us who can't leave a good thing alone. We must have speed... Or "performance"... Or a thousand little switches sticking out of our transmitters. We want launches to the moon, thermal searches that cover at least three states and landings on the head of a nail every time. For us there's no fun like the good adrenaline rush of a high-speed pass low across the field!

So we opt for the full house Sailplane. Fibreglass, carbon fibre, kevlar, foam, obeche, and servos in every nook and cranny. Beasts that are inherently unstable, fast as the dickens and prone to landing like lawn darts. And then we are faced with trimming the dang things, getting them to fly in a civilised (or at least somewhat controlled) manner, and landing 'em without cutting off our own legs. The key to all this is a computer radio and that most dreaded of all procedures: mixing.

Many newcomers to our wonderful sport have approached me and asked about computer radios, how to choose one and what it is that you really do with one when you have it. Nosy and full of questions as they are, they are seldom satisfied with "mixing" as an answer. So here is the low-down on what 'real' Sailplane pilots do with a computer radio.

Let the mixing begin

Setting up, or 'mixing', a full house Sailplane with a computer radio can be a pretty intimidating task for the uninitiated. There seem to be so many possibilities, so many control surfaces, so many switches and so many terms and nomenclatures. Actually... there really are too many. But they're manageable if we first understand the basics of what we need to accomplish. Then we must translate that into the terminology and control functions provided by our particular computer radio manufacturer.

Sailplanes have three distinct flight requirements: launching, landing and the flight task. Mixing is used to enhance the flight characteristics of the plane for each of these requirements. In launching we want to obtain the highest possible altitude. For landing we require slow speed with the most control possible in order to land very precisely. The flight task requirements vary with the task (I'm most familiar with the thermal duration task but there can also be speed and distance tasks),

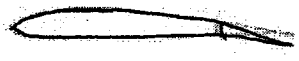
As the full house Sailplane and computer radios have become more common, basic ways of enhancing each of these flight requirements have become more or less standard. They are enabled by mixing two or more control functions (for instance: flaps and elevator or aileron and rudder) together so that the flight characteristics of the plane are optimised for a particular flight requirement. The interesting part is that each aeroplane design will have its own reaction to the typical mixes and must be optimised individually for top performance.

A Few Definitions

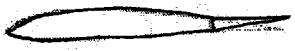
Camber, reflex, crow and butterfly are terms tossed about by those baptised in the use of computer radios as if their meaning were obvious. From my experience they are only obvious if you already know them. (Or is that obvious?) Anyway, a brief review won't hurt.

Camber and reflex are kind of equal but opposite terms. They refer to the position of the wing's flaps and/or ailerons. Camber means that the flap or ailerons is deflected a little downward effectively adding undercamber to the normal wing airfoil. Adding undercamber means that the bottom surface of the wing becomes more concave. Reflex, on the other hand, is the deflection of the flaps or ailerons upward. Moving the flap or ailerons up removes camber in the airfoil making the bottom more flat or even giving the wing a 'reflexed' trailing edge.

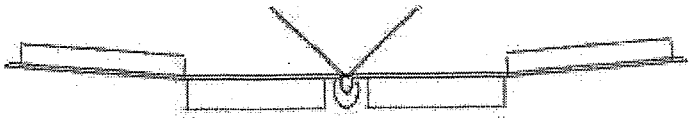
Cambered Airfoil



Reflexed Airfoil



Butterfly and crow are different terms for the same thing. A Sailplane in the crow or butterfly configuration has its flaps lowered and both ailerons reflexed (raised). The ailerons stick up and the flaps hang down making the plane look reminiscent of a crow or butterfly as they approach a landing.
Crow (Butterfly) Configuration



The flaps, ailerons or the full trailing edge (both flaps and ailerons) can be referred to as cambered or reflexed. Camber and reflex are used in a variety of circumstances. Crow (or butterfly) is only used for landing or perhaps for diving out of a thermal.

Launch Mixing

A Sailplane will launch from a winch or high start perfectly well without any trim adjustments - assuming that the tow hook is well positioned. However the launch may be enhanced by several adjustments. The first is to camber flaps a bit to generate more lift during the launch. A little up or down elevator compensation is frequently of benefit when flaps are used during launch.
Flaps only cover perhaps 1/2 of the length of the trailing edge of the wing. Some flier's find that additional lift can be generated and a steeper launch attained if the ailerons are also cambered to match the flaps, or a little less, when launching. As a beginning point of reference, we are talking about a cambering of flaps and ailerons of perhaps 1/4".
At the end of the launch some additional altitude can be gained by "zooming" off of the winch line. This zooming can be enhanced by reducing airfoil drag by reflexing the trailing edge. That is, reflexing both the flaps and ailerons slightly above their normal positions. Again, as a point of reference, we are talking about maybe a 1/16" reflex of flaps and ailerons.
All of these things can often be controlled using the 3-position flaps switch as the master channel for the flaps and slaving the other channels that require adjustment (elevator and ailerons) to them. This means that a lot of flexibility for mixing to flaps is necessary for the launching task. That makes it one of the key things to look for if you are choosing a radio for a full house Sailplane.

Landing Mixing

For landing a Sailplane the flaps are again important. They are useful for obtaining the slow speeds while retaining good control that make spot landings easier. Most aeroplanes exhibit a nose up pitching motion (or "ballooning") when flaps are deployed. So a mix of elevator to the flaps is employed to counteract the pitching. The elevator mix used in the launch may or may not work (or be available) for the landing flaps deployment. So a different elevator mix may be needed. Most pilots also prefer to have landing flaps fully proportional and controlled by the throttle stick on the transmitter so that they can vary the flaps depending on their landing approach.
Another enhancement to the landing function is the use of ailerons as spoilers. When both ailerons are reflexed and the flaps are lowered the plane is said to be in the "crow" or "butterfly" configuration. A little reflex of the ailerons just dumps (spoils) the lift of the wing and steepens the glide slope. A large degree of reflex adds drag as well.
So this landing mix is a lot like the launch mix except that the ailerons have a different motion, the elevator to flaps mix is different and the flaps are proportionally controlled by the throttle stick rather than having pre-set positions via the 3-position switch. Only the more advanced programmable radios and/or those specialised for Sailplane will have the ability to provide both launching and landing mix set-ups.

Flight Task Mixes

Perhaps the most widely used flight task mix is rudder to ailerons. The purpose of this mix is to allow co-ordinated turns to be accomplished using only the right stick on the transmitter. This mix also eases the transition from a two channel (rudder-elevator) Sailplane to an aileron equipped model. (Just don't forget that the ratchet trim for the rudder is now under the left stick!)

There are also a variety of other mixes for the flight task requirements for Sailplane. Pilots tend to vary in their preferences for these mixes. Part of the preference is personal and part is because different planes respond differently.

Some pilots like to have the trailing edge of the wing camber, either just flaps or flaps and ailerons, with the application of up elevator. This gives an apparent increase in the effectiveness of the elevator. Conversely they sometimes want the trailing edge to reflex with the application of down elevator. This makes the plane accelerate more quickly. Pilots like to be able to switch this mix in and out depending on whether they're in a thermal or not. So they turn it on and off with a switch on the transmitter.

In addition to or in place of the above some pilots like to be able to 'dial in' some camber on the wing while they are working a thermal. With more camber some airfoils can fly slower, develop more lift, and get more altitude out of a given thermal. Once a thermal expires or is lost pilots want to 'flee the sink'. The ability to reflex the trailing edge can be very effective when you need to get away from a particular piece of sky quickly. These controls are often handled by a pot (potentiometer) on the transmitter or, as an alternate by the throttle stick so that they are proportionally variable.

In slope racing it is very important to make good 'bank and yank' turns. I understand that some pilots like to use an inverse aileron differential mix in order to put some adverse yaw in the plane as they bank up for the turn just prior to the 'yank'.

The Mix is the Secret!

There are many other mixes and variations on mixes that different pilots use for different flight requirements. I think that some of them must be closely guarded secrets! Secret mixes that provide a competitive edge that pilots develop and hand down only with greatest ceremony to select co-conspirators! I think that's why I can't fly as well as Brian Agnew or Joe Wurts (or a lot of other pilots for that matter) - I don't have any secret mixes! (Aren't conspiracy theories wonderful excuses!)?

After the Basics ....

These are just some simple explanations. A properly "co-ordinated" plane is a balance of all these factors combined. Though these factors apply to most planes, we are talking about a full house thermal ship and not slope planes here.

After you have set your plane to specs, you can follow a few basic steps to check out the set-up.

The CG (centre of gravity)

(1) Once your plane is set to fly straight and level (elevator trim adjusted), try a simple dive test. (Best to try this in calm conditions).

A: Point the nose down about 45 degrees and let go of the stick.

a: If the plane stays where you point it, it is considered neutral incidence (we are referring to the entire plane and not the wing or tail placement). This means you will be flying the plane pretty much all the time and will have to undo what inputs you give it. If you tell it down, you have tell it to fly back level or up based on what you want to accomplish. Many experts prefer this and consider it the max. performance.

b: If the plane comes back up, you have positive incidence. The plane may be just a bit easier to fly this way, but it is really a matter of preference. Too much of anything is not a good thing, so if it comes back up quickly, you should adjust the CG by reducing the nose weight until it "feels" comfortable. The majority of flyers seem to prefer a small amount of positive incidence.

c: If the plane "tucks" (speeds up and noses down), it is has negative incidence. A plane with this set-up will be difficult to fly and may be too sensitive to fly properly. Add some nose weight until correct to your liking. Few if any pilots fly with negative incidence.

Aileron deflection (how fast the wings go up or down)
(1) After the dive test and you have the CG to your liking, try this test for aileron deflection.
A: Again fly straight and level. Turn off rudder mixing if possible. Move the stick to the right and left. The wings will rise and fall (roll) as you do this.
a: If it does this too fast for your comfort, reduce the amount of aileron deflection. (E.g. : If the aileron has 3/4" up deflection reduce it by 1/16" - 1/8" etc.).
b: If it is too slow for you, increase the amount of deflection. Every plane reacts differently based on design and size of ailerons (surface area). As always, it is a matter of personal preference. Designers recommend set-ups based on their particular flying style.

Aileron Differential (this affects the speed of the wings in comparison to each other, and where the nose points side to side) Note: There Is No Simple Solution to Adjusting the Differential for "co-ordinated turns". Rudder and flying style play an important role. The plane's speed is also a factor.
(1) With the ailerons set for your speed comfort and the rudder mixing turned off (rudder also affects yaw), observe what the nose of the plane is doing. If the nose moves to the right or left when you move the ailerons, you have YAW (that's "yes" in Southern). This is where you adjust the amount of up deflection in the aileron of one wing compared to the down deflection of the aileron on the other wing. In simple terms, yaw is caused by the forward speed of one wing over the other. You need it to make the plane turn. Too much is called "Adverse Yaw. To adjust this you will be setting the amount of down deflection on the left aileron when the right aileron is fully raised - and vice versa.
a: If the nose moves too much to the right when you move the stick to the right (and vice versa) - decrease differential (which means increase the amount of aileron down travel)
b: If the nose mover too much to the left when you move the stick to the right (and vice versa) - increase the amount of differential (which means lessen the amount of aileron down travel)

Rudder mixing (how much rudder movement combined with aileron throw) note: This combines with aileron differential to create a "co-ordinated turn". You are looking for a balance here. Many pilots set their differential to make the plane turn and use very little rudder or use the left stick. Others set up two trim settings and pretty much stay with them.
(1) Set up your radio with two rudder settings -- one at max and one at 30%+-. Try turning the aircraft in a fairly tight circle at a comfortable speed. With the rudder on the low setting, observe the nose of the plane.
a: If the plane tends to nose into or out of the turn, or does not stay in the turn, move the left stick to add or reduce the rudder throw.
b: If you have to add rudder, switch to high setting and try it. If this works, then you can adjust it for your comfort at that speed.
c: If you have to reduce rudder, then reset your throws to 50% and 20% and try again.
(2) At this point try flying very fast and very slow and see how the plane reacts to the different rudder throws

What If .....????

John asked:
> The G. Esteem has a 7080 airfoil, which I've never flown but 3 times and I kept falling into thermal turns- I guess from flying too slow? Will reflex do any good, or camber in thermal turns?

Doug Barry's reply: (10/22/98)
The following is the SHORT version of a real LONG process. There are three possible reasons the plane falls into a turn: CG location, aileron differential and rudder coupling. Each of these has to be tested separately and resolved before moving on to the next item. Correct sequence is:
1) Set CG to correct position. The safest way to do this (since CG location is a personal preference issue) is to find the MAC and set the initial CG at 30%-33% of that cord. MAC (Mean Aerodynamic Cord) is the

cord line that is located at THE GEOMETRIC CENTER OF THE WING ... -NOT- the root cord and -NOT- the average cord!!!!!!!! This is an IMPORTANT- definition and one that a large number of modelers do not understand! Later the CG can be moved around (a little bit) to get the plane set-up exactly as you like.
2)Now with the CG close to correct we want to adjust the aileron differential. This is done by flying a straight and level course away from us, with the rudder coupling -TURNED OFF-, apply full aileron control till the plane rolls 45 degrees then reverse aileron control till the plane rolls to 45 degrees opposite, repeat process, then roll back level. If the aileron differential is correct the plane will roll along the fuselage axis -AND- maintain original heading. Paying attention to how the fuselage wags its nose this will tell you if you have too much or too little differential. Adjust accordingly. A small problem here is that every plane takes a different amount, I have planes that use 3X going up compared to going down and planes that are very close to 1:1! This process takes time and a bunch of trimming flights to get close, the closer you can get it to being "right" the easier thermaling is going to be later so you really need to hang tough on this.
3) Once the aileron differential is set, now we come back and adjust the rudder coupling. This is done by flying thermal turns, if after a little bit the nose drops into the turn you have too much rudder coupling; if it starts to skid around with the nose high, you have too little rudder coupling. Adjust accordingly, work slowly here. A difficulty is that rudder coupling is -VERY- speed sensitive, if going faster less coupling is required, if going slower more coupling is required. So -TRY- very hard to get the thermal turns settled at the same airspeed before deciding which adjustment to make. This different speed issue is why the better flyers are using the rudder stick in flight!
4) Once you have succeeded to get the first three steps done correctly, we are going to go back and readjust the CG. This is a very sensitive step and the CG adjustments are done in -VERY- small steps (like 1/16 ounce movements). Flying in a thermal turn, set-up the turn so it looks good (be critical), then allow sticks to return to centre (gently) and watch what the plane does. If the turn tightens in to the circle and starts to dive you are slightly nose heavy, remove some lead: if the plane opens the turn up and flys out you are nose light, add some lead. The "ideal" response is that the plane should continue 360-540 degrees then start to "slowly" open the turn up. Again this is a -VERY- sensitive adjustment and should be done VERY SLOWLY. If for any reason you start to add/remove more then 1/4 ounce one of the earlier factors is not right and you need to go back to square one and restart.
This process takes a BUNCH of time and flights to get right, but once you are there it makes the plane a pleasure to fly. It is part of the reason I can roll into thermals at 20 feet and only be slightly nervous.

"My plane keeps porpoising, even when I don't touch the stick. It's a two meter Spirit and I put a lot of weight in the nose, but it doesn't seem to help.
>What's wrong?"
>Jimmy

I can think of two reasons why this might happen.
1. This guy has sticky control runs that mean that the elevator never gets to neutral. Thus he puts in a little down to kill the zoom. This stays in even upon returning the stick to centre and the model proceeds to dive and keep diving. He touches up this stays in the model zooms and maybe or maybe not stalls the touches down and off we go again.
2. And my first choice guess is that reading between the lines of the question. The CG is at this time very far forward of the correct position. This will cause the model to go down hill pretty quick. To overcome the forward CG the Decalage of the model is all screwed up i.e. lots of up elevator or positive incidence on the wing. Now because the CG makes the model dive the wrong angle setting will become even more effective with a rise in speed and the model will zoom. This will slow the model the wrong angular setting now has less effect the nose goes down the model speeds up and off we jolly well go again.
The fix: - Check all the rigging angles to the plan not the die cutting.
Set all the controls to zero and ensure free movement.
Set the CG as per plan.
Test glide or better still get a good flyer to do a check out.
A word of caution.

The designers of models place the CG at a given position for good aerodynamic reasons and also because the model will fly well at this setting. Any deviation from this point will be due to some other problem not a bad drawing. Keep the CG static and trim the model aerodynamically at least until experience allows you to adjust things to your preference with some knowledge of the consequences.

Bill Kuhl recently wrote:
> The control movements that you use, often are more than needed. Sometimes I think maybe I am using so much throw, that the drag is slowing the plane down too much for the control input to be effective.
Bill,

The basic outline you propose makes a TON of sense to me, especially since, as RC pilots, we rely almost entirely on visual feedback from the plane to judge, correct, and modify our control inputs. You don't get to sit in a seat that lets you feel the results of your overcontrol in the pit of your stomach and your inner ear! Better RC pilots, familiar with their planes are SO much less likely to overcontrol, because they're confident that they'll get what they want from a given (small) input, and don't have to receive a massive visual cue from the glider to confirm that the input was effective. No question that huge inputs equal huge drag, and that the rate of introduction of an input (and the rate of its release!) can make a difference in conservation of a gliders given energy level. A 'smoother' flying style will almost always be a lower drag flying style as well. There is also an issue with frequency of control inputs (and of course I mean how frequent the inputs are, not anything to do with radio frequency). When I am teaching, I always reach a certain stage with a student (after they have basic control more or less figured out) in which I tell them that they need to challenge themselves to stay off the stick entirely for as much of a given flight as they can possibly stand to do. They are often amazed at how little input they need compared to previous flights in which they are operating under the assumption that they have to constantly make control changes in order to be effectively flying the glider. You'll always know more about how a glider flies (and how it is trimmed and balanced) if you spend some time letting IT do the flying.
Lift,
Scobie in Seattle

FROM GRAHAM IRVINE

Directions to "Meigle Carrou" (South-West facing hill slope)

Head for "Stonehaven".
At "Commodore Hotel" at roundabout-keep straight on into "Stonehaven".
At end of playing fields-turn first right up hill (that also swings into left bend), follow road (slug road to "Banchory").
4 miles along this road you come to bend in road with post box in wall-there's a little opening on right-turn right here.
30yards further on-turn left.
Continue along this road for about 3 or 4 miles till you reach a big farm on right.
Turn right about 200 yards beyond it, then look for large standing stone.
PARK CAR – off the road to allow farmer access.
WALKING - cross sleeper- type bridge, then through gate, then 150 yards further on you will see a ruin.
Cross ruin, head diagonally left, climb and across fence. Then walk up hill to slope.

ABERDEEN & DISTRICT SOARERS CONSTITUTION

1. Name

The Club shall be known as Aberdeen & District Soarers, hereinafter referred to as ADS.

2. Objectives

The objectives of ADS shall be to;

a) provide facilitate the sport of model aircraft construction and flying

b) assist members to improve their standard of building and flying, and to ensure strict observance of all rules in the interests of safety

c) encourage club activities including visits and outings

d) to promote the policies and rules of the national body to which the club is associated.

3. Membership

(a) Membership of ADS shall be open to any person of any age with an interest in any aspect of radio controlled soaring flight. The committee shall have the right to accept, reject or expel members. All members shall have the right to attend, take part in and vote at all general meetings of ADS, to make nomination or be nominated for election to the committee, and draw up motions to change any aspect of the ADS organisation for consideration at Annual or Extraordinary General Meetings.

(b) It is a condition of participating in any club meeting or competitions that members of ADS maintain a valid third-party insurance policy covering accidents arising from the flying of model gliders, to a minimum of £5,000,000 and to ensure the continuing validity of the insurance, members must at all times comply with the ADS Safety Code.

(c) All members of the ADS must be members of an agreed national body as decided by the club members from time to time.

(d) In the event of it being necessary to limit the number of members admitted to the club (for site consideration or any other reason), the membership lists shall be decided by a majority vote of those attending.

(e) All members must abide by the club "Safety Code" whilst operating on any temporary or permanent site officially recognised by the ADS for club flying

(f) Any behaviour by a club member which is prejudicial to the continued use of the club_s facilities or damaging to the club_s reputation will be considered by the committee and may result of the withdrawal of the offender_s membership of the Club. A pro-rata refund of the club fee will be made.

(g) It is a condition of membership of the Club that all new members are treated as novices with regards to their flying ability until such time as they prove otherwise.

4. Register of Members

The current register of ADS members shall remain in the custody of the Secretary of ADS.

5. The Committee

(a) The committee shall consist of the Chairperson, Secretary / Treasurer, Events Organiser and Safety Officer.

(b) In the absence of the Chairman at any meeting, a Vice Chairperson shall be elected by those present to conduct the meeting and who shall have the full powers of the Chairperson for the duration of that meeting.

(c) The Committee shall be responsible for the organisation and administration of ADS.

(d) All members of the Committee shall hold office for one year and then be eligible for re-election.

(e) the Committee shall meet at not less than two monthly intervals.

(f) The Secretary shall maintain a record of all proceedings of ADS.

(g) The Treasurer shall be responsible for the finances of ADS and shall present an audited statement of the funds to each Annual General Meeting.

(h) An account shall be opened in the name of ADS at an established bank or building society. All cheques shall be signed by the Secretary.

(i) The Committee as a body are empowered to act on behalf of the club in any relevant matters and to enter into whatever agreements, leases, licences or other arrangements which they deem necessary.

6. Election of the Committee

(a) The officers and members of the committee shall be elected at the Annual General Meeting of ADS. Any two members may nominate an eligible member for election. Nominations may be verbal and raised at the time of the Annual General Meeting. The nominee must state that he is prepared to stand for nomination.

(b) Voting shall be by a show of hands. In the event of insufficient nominations being received, the Committee shall have the power to elect any eligible member.

7. Annual General Meeting

(a) The Annual General Meeting shall be held in November of each year and at a time and place as may be decided by the Committee.

(b) Notice of the Annual General Meeting shall be notified to members in the newsletter prior to the Annual General Meeting.

(c) The business to be transacted at the Annual General Meeting shall be;

a) Minutes of the Previous Annual General Meeting.

b) Matters arising.

c) To receive a Annual Report from each member of the Committee.

d) To review an audited statement of the funds of ADS.

e) To hold elections.

f) To set the annual subscriptions for the ensuing year.

g) To vote on any motions brought up at the Annual General Meeting.

h) In the event of a Committee Motion, the Chairperson may amend a motion but any amendment will be subject to a vote from the whole meeting. Any amendment by the Committee should not substantially change the spirit of the original motion.

8. Extraordinary General Meetings

(a) By resolution of the Committee or upon request in writing by no fewer than five members of ADS, the Secretary shall convene an Extraordinary General Meeting. Such meeting shall be held within one month of the passing of such resolution or receipt of such request. The notice shall state the business for which the meeting has been called, and only that business shall be discussed.

(b) Amendments proposed to motions during the course of a meeting must be seconded if they are to be put to the vote.

9. Quorum

(a) No business shall be transacted at any general meeting of ADS unless there be present no fewer that five members, or 10%, whichever is the lesser who are entitled to vote. In the absence of a quorum:

(a) the Annual General Meeting shall stand adjourned for seven days to a place and time appointed by the Chairman when business shall proceed without further notice, with or without a quorum, and;

(b) an Extraordinary General Meeting shall be dissolved.

10. Voting

Only such members of ADS as are present at a meeting, including the Committee but excluding the Chairman, shall be entitled to vote. At all meetings a simple majority will be sufficient to carry a motion. In the event of a tie, the Chairman shall have the casting vote.

11. Subscriptions

(a) There shall be four levels of membership;

Senior Citizen

Senior

Junior (Under the age of 18 at the date of application for membership)

Honorary

(b) The amount of the annual subscriptions shall be fixed from time to time by resolution passed at the Annual General Meeting or Extraordinary General meeting.

(c) Subscriptions shall be due in November. The membership year shall be from 1 January to 31 December each year.

(d) Subscriptions remaining unpaid by 1 March each year shall indicate that defaulting members have ceased membership of ADS.

12. Membership Card

Each member of ADS shall be issued with an annual membership card. Membership cards shall constitute evidence of current membership of ADS. In addition to this, each member must hold proof of insurance to the minimum standard laid down in paragraph 3(b).

13. The ADS newsletter.

Shall be sent to every member of ADS providing that he/she has no objection to the retention of his/her name and address on the computerised mailing master list.

14. Dissolution of ADS

In the event of ADS ceasing to exist, any monies remaining shall be donated to any such organisation involved in model aircraft activities as shall be nominated by the Committee.

Committee - George Whelan 208617, Derek Robertson 821368, Neil Davidson 712458

MINUTES FOR THE 1999 AGM

The venue for this year's AGM was the Cove bay Hotel, thanks to all of those who attended.

Apologies for absence were received from Norrie Kerr.

The minutes of the 1998 AGM was read by George Whelan, accepted by Tom Bartlet and seconded by Graham Donaldson.

The Treasurers Report was read by Neil Masson. The overall situation is that the loss of £363.58 was recorded for the year, this was due to extraordinary items of expenditure such as £320 for a new winch and line, £148 for club equipment and £32 for Davie Davidson's flowers.

The Competition Report was read by Brian Ord. This report explained that the competition program had not been a success due to poor weather and attendance's. The report was accepted by Bill Stark and seconded by Jim Ruxton.

Club Fees. Neil Masson put forward two proposals with regards to the club fees. The first was that a joining fee should be payable when first joining or re-joining after letting fees lapse. The second was that the fees should be increased to create a fund if the situation arose that the club was forced to have to pay or buy new premises. Neither of these proposals was seconded.
George Whelan put forward the proposal that the fees should remain static for the next year, seconded by Jim Ruxton. After a vote, George Whelan's proposal was accepted.

To summarise, the fees for the year to 2000 are as follows;

Adult	£10.00	
Junior up to 16	£5.00	
Over 65	Free	(SAA fees will still be due)

Winter Programme. A winter program of slope flying on the last Saturday in January to March 2000 was proposed by Graham Donaldson and seconded by George Whelan.

SAA Business. Brian Ord explained that he had written to the SAA in the hope of obtaining some assistance in dealing with the problems regarding the continuing use of Calder Park, he was most disappointed in the lack of response which did not offer any assistance.

Committee Resigns. The Committee resigned with only George Whelan offering himself for re-election.

Nominations & Election of the New Committee. These were as follows;

Chairman: George Whelan was proposed by Tom Bartlet and seconded by Allan Stewart.

Events Organiser: Derek Robertson was proposed by Graham Donaldson and seconded by Tom Bartlet.

Secretary & Treasurer: Neil Davidson was proposed by Neil Masson and seconded by George Whelan.

AOB.

1) It was proposed by Allan Stewart that the committee get sight of the SAA insurance policy. Neil Davidson to pursue.

2) Some members expressed interest in joining BARCS, a information flyer will be issued in due course.

3) Due to problems with falling membership of clubs in general, Neil Davidson suggested that contact should be made with other clubs in the area with a view to holding joint meetings and competitions. This is to be pursued by George Whelan.

4) Tuesday night flying for the year 2000 will revert to the slope and thermal flying at Calder Park will be held on Saturdays.

The meeting was concluded at 21:45 with a vote of thanks for the outgoing committee.