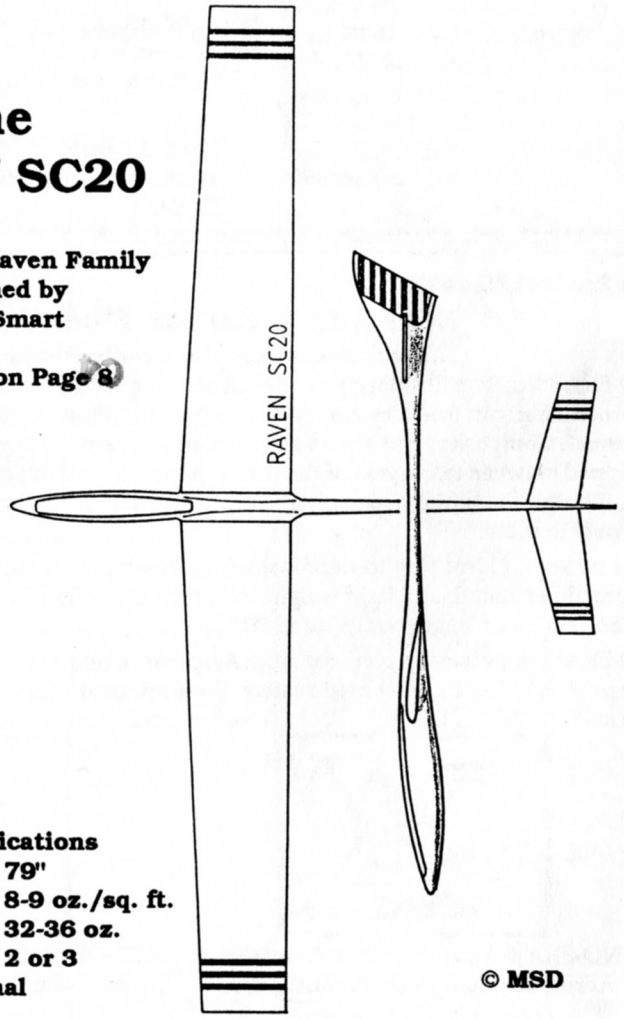
R/C Soaring DIGEST

Vol. 7 No. 8 August, 1990

The RAVEN SC20

One of The Raven Family Designed by Mike Smart

Featured on Page 8



Specifications

Wing Span	**79"**
Wing Loading	**8-9 oz./sq. ft.**
Weight	**32-36 oz.**
Functions	**2 or 3**
Slope or Thermal	

R/C SOARING DIGEST
P.O. BOX 6680
CONCORD, CA 94524

ADDRESS CORRECTION REQUESTED
FORWARDING POSTAGE GUARANTEED

DATED MATERIAL

FIRST CLASS MAIL

Schedule of Special Events

Date	Event	Location	Contact
Sept. 1-3	F3B Finals	Denver, CO	Byron Blakeslee (303) 688-9572
Sept. 1-3	Torrey Pines Scale Slope Fun Fly	La Jolla, CA	Jerry Miller (619) 450-1483 Charlie Morey (213) 494-3712
Sept. 8-9	Unlimited: FAI Limits	Taft, CA	Eric Hendrickson (805) 493-4210
Sept. 8-9	2 Meter & Open	Richardson, TX	Chuck Fisher (214) 270-2634 Jack Hamilton (214) 348-4669
Sept. 8-9	8th Annual Thermal/LSF	Gaithersburg, MD	Don Barker (301) 384-4811 Al White (717) 762-4046
Oct. 5-9	F3F Viking Race 1990	Buxton, North West Derbyshire England	Nic Wright 0352 720516

New Product News Release

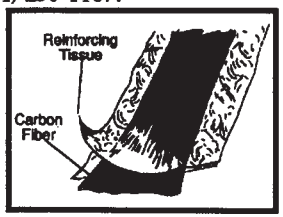
NO-FRAY © Carbon Fiber Tape

...from Aerospace Composite Products

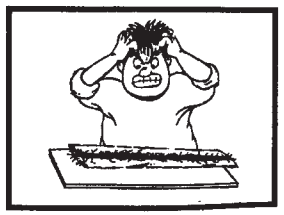
"NO-FRAY© carbon fiber tape provides all of the light weight and high strength qualities of carbon fiber, but in a very easy to use, mess and hassle free form. NO-FRAY©, from Aerospace Composite Products, is a loose filament, carbon fiber reinforcing tape, which is trapped between two layers of thin tissue paper. Epoxy or polyester resins will easily soak through the tissue paper layers, saturating the carbon fiber, and bond the entire assembly in place."

"This makes an ideal way to reinforce wings, fuselages, or any other structures which require high strength and light weight. NO-FRAY© carbon fiber tape is packaged in 1" widths. A 12 foot length retails for $9.00."

"NO-FRAY©tape is available direct from Aerospace Composite Products, P.O. Box 16621, Irvine, CA 92714, or from selected dealers. For additional information please write, or call ACP at (714) 250-1107."



NO-FRAY © Carbon Fiber Tape from **Aerospace Composite Products, Inc.**
Loose carbon fiber filaments trapped between tissue paper cover strips



NO-FRAY © Carbon Fiber Tape from **Aerospace Composite Products, Inc.**
Ends the hassles and frazzled nerves of working with loose carbon fiber

The Soaring Site

Bruce Abell of Australia has suggested that we shift the emphasis on kit reviews from a "review of the kit, itself" to a "Flight Evaluation" assessment. We think that it is an excellent idea, and some of the questions that come to mind are:

- **How do planes fly under different conditions?**
- **What limitations were observed?**
- **What modifications were done that improved aerodynamic performance? How?**

Although this list is far from complete, we hope that it generates a new approach to kit reviews. Please give us a call or drop us a line if you're doing a kit review for *RCSD*.

Read & Enjoy, Jerry & Judy

Happy Birthday, T.W.I.T.T.!

(The Wing Is The Thing)

Capital Area Soaring Association

8TH Annual Contest

Sept. 8th & 9th
Including
LSF 'Nationals' (Optional)
Contest Site: National Geographic Society
Gaithersburg, Maryland
Thermal Soaring Task T1 with L4 Landing Task
Thermal Soaring Modified T4 with Landing Task
C.D.: Don Barker
(301) 454-8858 Work
(301) 384-4811 Home
or
C.D.: Al White
(717) 762-4906 Work
(717) 762-4046 Home

About RCSD...

RCSD is a reader written-publication. The articles & letters are freely contributed to *RCSD* in order to provide:

"The widest possible dissemination of information vital to R/C soaring to enthusiasts all over the world."

It is the policy of *RCSD* to provide accurate information, but if we print a factual error, we want to make it right. Please let us know of any error in *RCSD* that significantly affects the meaning of a story. The opinions expressed are not necessarily those of *RCSD*. Please see the back cover for subscription costs and additional information.

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A Simple Way To Achieve Aileron Differential

...by Jeremy Teo

As most glider guiders know, aileron equiped planes need some aileron differential to help keep banks level, without the ill effects of adverse yaw (coupling the ailerons with the rudder also helps a lot). Here is a simple way of achieving mechanical differential. It involves changing the position of the servo wheel when the servo is at neutral. The effect of this change, added to other mechanical adjustments can help achieve the typical 2:1 (up:down) aileron deflection.

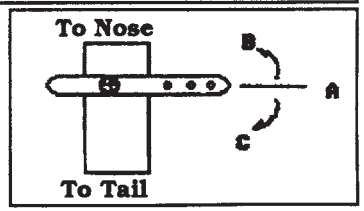
When a typical servo is centered (at neutral), the servo wheel is position A (refer to diagram). By adjusting the neutral position of the wheel to positions B or C, the desired differential is accomplished. Be careful that the servo wheel does not jam on the pushrod, stalling the servo, during its motion. Stalling servos are the quickest way to drain flight batteries and crash gliders!

Here is a simple chart to determine the correct direction to move the servo wheel.

Wing position:	Servo location:	Direction to move servo wheel:
Shoulder wing	top of wing	C
Shoulder wing	bottom of wing	B
Low wing	top of wing	C
Low wing	bottom of wing	B

Jeremy Teo
2997 Anderson Ave.
Port Alberni, BC
Canada V9Y 2V3

When the servo is on top of the wing, move the wheel towards the trailing edge so that the servo has more pull then push. The reverse is true for servos mounted on the bottom of the wing; move the wheel towards the leading edge for more push then pull. This tip will work on servos rotating in either direction.



Jer's Workbench

Containers around the house: Baby food jars work well for mixing paint and you can store them in the refrigerator for a period of time in the case of the epoxy paints.

Cat food cans work really well for mixing up large amounts of epoxy resin. Plus, you can mix paint in them, too.

Plastic tops from coffee cans and other smaller plastic lids from a variety of products work great for small amounts of epoxy while you are building.

Stirrers: Next time you go to McDonalds, look at their coffee stirrers; the size and length work out great for epoxy stirrers and they are reusable, too.

Every job requires the right tool. When next you have the misfortune to repair a fiberglass fuselage, epoxy an epoxy brush on a dowel to get the resin down into the fuselage. You can also use a dowel to lay in the glass cloth in the same manner if you cut down the size of the end a little bit. Be sure to pre-wet the cloth prior to applying it.

AQUILA By the Numbers

...by Gordon Jones

Have you ever noticed that with all the new aircraft on the market and all the super looking designs coming from Europe and the F3B that there are an awful lot of "old" designs still hanging around? Well, for a lot of people that may seem a bit strange, but have you also noticed that some of these "antique" designs still win a contest every so often? Don't you wonder why? Does the guy flying that thing have a phobia against new, or just what is his problem?

I switched to flying sailplanes full time about 1978, after a number of years of power/pattern, and a whole lot of bother I didn't need. I was fortunate that there were a bunch of guys that got hooked on the sailplane thing at the same time, and we could all stumble around the air at approximately the same skill level for quite a while. This made the transition more enjoyable and, at the same time, challenging. We all started flying for our LSF levels together and we would gather at lunch time and every other available time to fly contests for our lower LSF levels. This was good because we didn't have to go out of town like so many people do to gain LSF points, and the contests were a bunch of fun, to boot. Those were the days! We were very fortunate that we had a couple of guys that had flown sailplanes for some time to help out, and teach us some of the finer points.

We all started with OLYs, some home designs, and an AQUILA in our group. I started with one of the first OLYs that had been rebuilt a million times, and taught at least eight other guys the basics of sailplane flying (that I know of for sure). I got to be pretty good flying that OLY, and I won my share of our local contests and did my early LSF levels with no problems. But, I had a hard time beating the guy with that AQUILA! It came down to one of those "I had to have one" deals so I could at least get even with the guy. So, in 1979, I bought my first AQUILA. Little did I know that it would be the first of many to follow. I have, since that day, lost track of how many I have built and owned, and the thousands of hours that I have stared into the sun moving one around the air.

I have some friends that have other "antique" designs and enjoy flying them more than the new and improved designs of today, too. These range from the LEGIONNAIR (in the standard configuration and two meter) to a couple of "older OLYs", and all still provide the flyer with all the thrill and enjoyment of flying for the fun of it. We even try to get together once a year to have an "antique" contest. (The aircraft has to be designed prior to 1975.) You would be amazed at the things people pull out of the attic for this event and the fun that we all have telling lies about flights from years gone by. Plus. occasionally, one of our number scores at a regular contest just to wake up folks. That is what this hobby is all about, and what keeps many of our number still involved in our hobby today!

I have four AQUILAS at present and am working on another just for the fun of it. I have one two meter, one standard, one AQUILA GRANDE, and one Goliath scratch-built version with a 12 foot wingspan. I have started changing the airfoil to a Selig 3021 and doing some different things with the basic planform, but why ruin a good thing. I don't want to get too carried away with something that has worked so well for so long. I only wish that Airtronics had continued making them so I could get more fuselages. Yes, I do have other newer designs and enjoy flying them very much, but there is nothing like specking out an AQUILA to get the blood moving!

Gordon Jones
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Garland, Texas 75041

On The Wing
...by B²

New Eppler 230 Data

An important item mentioned by Walter Panknin in his MARCS Symposium presentation dealt with the Eppler 230 airfoil. Frequently used on swept 'wings as the tip airfoil, it is a reflexed section which many builders have relied on to provide stability without requiring large amounts of twist. Walter's experience and research, however, showed that the E 230 may not be capable of that large stabilizing effect after all, and that the actual pitching moment is roughly half of the published value: +0.025. This is of great importance to those who are designing and constructing swept 'wings, and individuals with computer programs using E 230 data files should update their information to reflect this more accurate value.

New Airfoils

In an effort to extract increases in performance from tailless sailplanes, the Swiss Logo Team has been experimenting with some new airfoils. We have now used one of these new airfoils and can report excellent performance along with good stability. The sections have very low positive pitching moments and are well suited to foam/fiberglass/vacuum bag construction. We'll publish a full report, complete with coordinates, soon!

The Icarosaur Flying Wing

In a recent telephone conversation with Gene Dees, he reports that he sold the rights to the Icarosaur to a manufacturer of RPVs (Remotely Piloted Vehicles... That's military talk for RC reconnaissance aircraft), effectively eliminating any possibility of full sized plans being available. Gene is, however, working on an article for *Flying Models* magazine which will describe the Icarosaur in such detail that anyone interested in constructing one can do so. Watch for it! Herk Stokely, soaring columnist for *Flying Models*, has been featuring tailless aircraft in the last few issues!

Tailless Bibliography Available

We recently acquired a very well written "Tailless Bibliography" authored by Serge Krauss. Although dealing primarily with full sized aircraft, the bibliography has many references of use to modelers. Citation dates range from well before 1900 to the present. We thoroughly enjoyed Serge's comments in the introduction regarding various tailless designs and their designers! Although complete as it stands, Serge has plans to expand the work and is looking for contributions. Copies may be obtained directly from Serge Krauss, 3114 Edgehill Rd., Cleveland Heights, OH 44118. Cost is $20.00.

Project PENUMBRA

Our own long term project, an F3B/Thermal Duration swept 'wing, has undergone considerable progress lately. After nearly five years of sketches, improvements, and procrastination we can at last report a qualified success! We'd delayed construction because it seemed that we always acquired a piece of information which changed a major component each time we were ready to start. We finally decided that if we ever hoped to get something in the air we would have to start constructing something. We are convinced that the resulting aerodynamic design is fairly optimized, but structurally we still have a way to go. Watch for updates!

Bill & Bunny Kuhlman
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Olalla, WA
98359-0975

How to Build A Light Wheel
...by Gene Cope

When it comes to building sailplanes light, scale is no different and nothing should be overlooked. In this process, the weight of wheels rolled around. A standard low bounce 3 1/4" diameter wheel weighs approximately 3 1/2 oz., so I looked for an alternative and found it in "Dave Brown" foam wheels. Tail wheels are another problem, in that weight to the tail means more weight up front. How about a 1 3/4" tail wheel that weighs a whopping 92 grains?

The first step is to get one 5" diameter and one 3 1/4" diameter "Dave Brown" wheels. Carefully pry the hubs apart on both wheels, taking care not to mar the foam. Take the 5" hub and cut the large diameter center to use as a spacer for the 3 1/4" hub and for the turning process. Find two washers the approximate size of the 3 1/4" hub diameter and, with a bolt, sandwich the 5" foam wheel between them and tighten to snug against the spacer. Then, chuck this in a drill press or lathe. Using a flat piece of wood, glue on some 36 grit sandpaper. (This reduces the diameter fast.) Now, reduce the outside diameter to the appropriate size. A second person, holding a vacuum at the point of contact, will greatly reduce the mess. Now, make a template of 1/4" thick wood to the shape of the profile and, using 1/2 of it, glue on 60 grit paper. Now turn the profile and reduce the width, if necessary, to achieve the desired effect on one side, and repeat on the other. Lightly sand with finer paper to smooth the contour, and remove from bolt and washers. Split the large spacer on one side to make it easy for the 3 1/4" hub to slide in. Check the fit and then, using PVC primer and adhesive, glue the hub centers and hold in place with a bolt and nut. The end result is a scale-looking wheel that is light.

The tail wheel is similar in construction, but requires a little more work. Start with a 2" or a 1 3/4" wheel. Chuck this up with the bolt and nut system. With a razor saw or sharp knife, carefully reduce the wheel width to the approximate size down to the hub. Now, carefully pry the hub apart. Reduce the hub width by cutting the center portions on both sides to obtain a size slightly smaller than the desired width. Reinstall the hub on the wheel and chuck it up, and turn the contour, as described previously.

The reason that I used a 5" wheel for a 3 1/4" is that the foam is denser, wider, and was available at the time. A smaller wheel might work for you, but the outcome was a light wheel.

Gene Cope
109 N. 42nd Ave.
Yakima, WA 98902

Flatland Fun Contests Continued
...by Don Anthony

Don Anthony
7562 Langmuir Ct.
Dublin, Ca. 94568

Roll the Dice Contest

A real easy contest that injects a double dose of luck. (You roll the dice and still have to find a thermal.)

RULES: A single die (one of a pair of dice) is placed in a covered clear plastic cup or jar. The pilot, on his turn, shakes the die to see what his flight time will be. (1 to 6 minutes)

One minute flights can get exciting, especially if a full tow is required.

Bold CDs will use a pair of dice to roll 2 to 12 minutes.

All flight times must be equalized to 1000 points.

May be combined with any type of landing scheme.

The Casio 376

...by Lee Murray

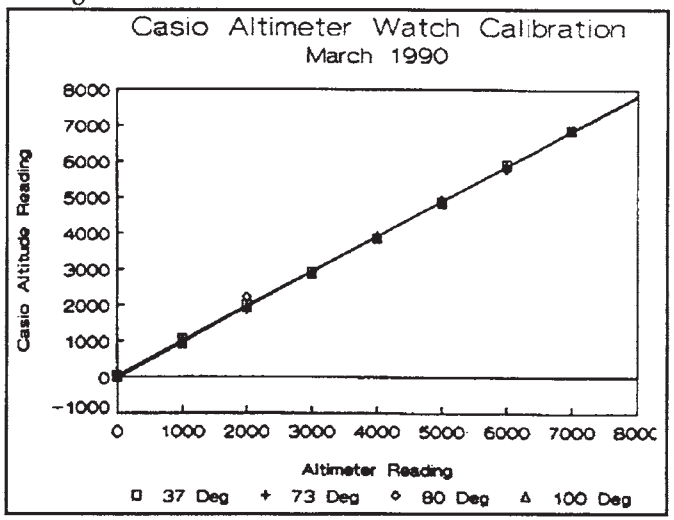
For months I had been working with Al Scidmore on the development of an altimeter which would fit inside a model and which would be accurate and be able to report the readings with some type of output device. I find that several others had been going along the same path trying to get that information for which there was no credible answer..."How high is that model?"

I could hardly believe it when I saw the solution on the wrist of Joe Wurts at the MARCS Soaring Symposium. It was a device, in the form of a wrist watch, which had the ability to measure altitude and retain the maximum reading.

Rather than take you through a long explanation about where I have been with this project and where I'm continuing to go, I want to pass on to the modeling community what I have learned about the Casio Model 376 Digital Altimeter Watch. The main features of the watch are:

- Displays: Analog time (dial with hands), Digital Time, Depth under water in ft., Barometric Pressure in mb and, of course, ALTITUDE in ft. or meters. (not all at one time)
- Time Functions: Seconds, Minutes, Hours, Day, Month, Stopwatch (display to .01 Sec.), Count Down Timer, Alarm.
- Special Functions: Altitude Alarm, Maximum Altitude, Depth Alarm.

Using a borrowed altimeter from a friend and former pilot, Bob Huelsbeck, I checked the calibration of the Casio watch using a vacuum chamber and environmental chambers that I use at work. (I make good use of my lunch hour.) I will not tell you that this altimeter is absolutely accurate or that I can read the device to any closer than 20 feet, but you should bear in mind that it would be nearly impossible to measure accuracy any closer than the accuracy of the device which is the primary reference. It would be like trying to measure engine bearings with a ruler. Despite these limitations, I can say that it will report the altitude within 170 feet, 95 percent of the time, up to 7000 feet. A drop in temperature from 73 to 38 deg will increase the reading by over 200 feet. One can minimize this error by insulating the watch. The graph labeled Casio Calibration shows the consistency of the watch readings taken at temperatures ranging from 38 to 100 degrees F when the temperatures remained constant during the test.



Perhaps the most important thing you should know is that the watch takes readings every 9 seconds up to five minutes and then every minute thereafter. I suspect the readings after 5 minutes are made near the end of the period. So, your watch is not likely to overestimate your maximum altitude by more than the tolerance that I quoted. By chance it may not be taking data when your model is at the maximum due to its reduced rate of data taking after 5 minutes. In the plot you can see how the watch responded to a constant bleed of air into the vacuum chamber during a test.

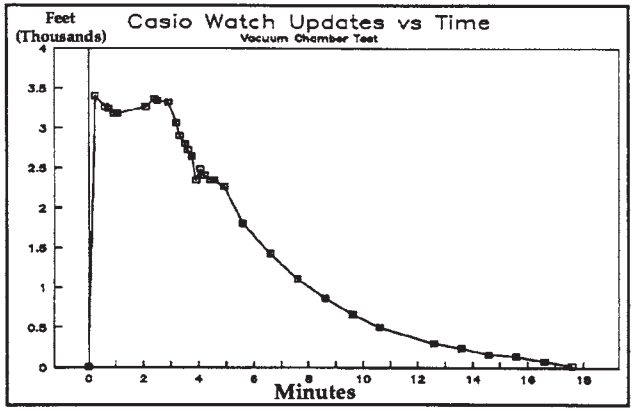
Casio Watch Frequency / Accuracy Study

Reading/ Event		Sec.	Min.
0	(1)	0	0.00
3400	(2)	15	0.25
3260		37	0.62
3240		44	0.73
3180		56	0.93
3180		63	1.05
3260	(3)	125	2.08
3360		143	2.38
3340		150	2.50
3320	(4)	174	2.90
3060		191	3.18
2900		198	3.30
2800		210	3.50
2720		216	3.60
2640		225	3.75
2340		234	3.90
2480		244	4.07
2400		252	4.20
2340		266	4.43
2340		273	4.55
2260		295	4.92
1800		336	5.60
1420		396	6.60
1100		456	7.60
860		516	8.60
660		576	9.60
500		636	10.60
300		756	12.60
240		816	13.60
160		876	14.60
140		936	15.60
80		996	16.60
20	(5)	1056	17.60

(1) Calibrate
(2) Apply Vacuum
(3) Change Vacuum
(4) Begin Bleed
(5) No Vacuum

In using this watch you will want to reset the ground level setting between flights and from time to time as the atmospheric pressure varies from day to day, and even from hour to hour or when it has changed temperature. When resetting the ground level altitude, you also reset the maximum altitude memory. Resetting is done by holding the reset button in until the display starts flashing. When that occurs the setpoint must be changed from the last setting. For example, if you have the altimeter set for 0 feet, you must go to another value such as 20 feet before the altimeter will go through another resetting. I haven't found out how to remove the very stiff plastic band as yet, but I plan to do that for inserting the altimeter into tight spots inside several of my models.

I purchased the Casio Watch from DAK Industries, and it is also sold by Best Products of Richmond, VA.



♣ ♣ ♣

After placing the watch in my models (Prodigy and Cumic+) and seeing the numbers, I recognize that the temperature swings are a problem. When the model is on the ground for a few minutes, while one gets set for the next flight, the watch heats up. The watch is reset when it is hot right before the next flight (taking advantage of the high sampling rate for the first five minutes). However, when the model is flown the temperature drops considerably especially when you get a few thousand feet up. I have seen the bias in the ground level reading as high as 300 feet from before launch to after landing. I hope to use some insulation in the model and a cooler for the watch on the ground control the bias.

The wrist band can be removed like every other wrist band. This is accomplished with a small jewelers screw driver from the back side. Simply compress the spring loaded pin which runs through the end of the band. I reinstalled the pins and added a yellow ribbon in order to help find the black cased watch in case of an accident.

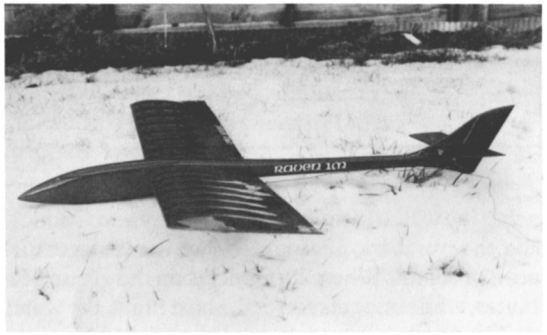
Lee Murray
1300 Bay Ridge Rd.
Appleton, WI 54915

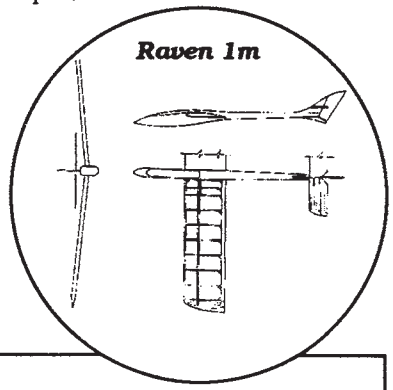
The Story Behind The Raven Family

...by Mike Smart

I have been an aeromodeller since the age of eight, when my father built me a rubber powered Luscombe Silvaire from a Keil Kraft kit. It never did fly particularly well, but it did spark the interest which has lasted ever since.

There followed this, a whole succession of the Keil Kraft rubber flying scale series, which also never flew too well, but provided fuel for the interest in scale models and gradually, an understanding of all the techniques of building flying models. I suppose the turning point came when I managed to buy myself a Cox .020 motor when I was about 13, and I soon discovered that the remains of the Keil Kraft models flew a whole lot better with the fronts sawn off and the motor screwed in place. From this several "hybrids" appeared, made from parts of other damaged models, and then I started building free flight power designs from Aeromodeller plans, and started dabbling with Control Line models, which were very successful, and by the age of 14, I had designed my own powered glider and control line Fokker DV11. By the time I was 15, I managed to get hold of a Macgregor Terrytone receiver and transmitter, and one of the earlier free flight designs got converted to radio control, which did great service and had many successful flights, despite having to tune the receiver every outing! Also, at this time, I got taken by chance to Ivinghoe Beacon, and saw some of the early single channel gliders performing, and this started my interest in gliding. I built a "Wizard of Oz" design from plans, and with single channel, rudder only, had some very successful slope soaring, although it was a bit of a bind, having to land to wind up the rubber escapement! I also had a lot of success with a Cox 049 powered "Sharkface", which was a mere 22" span, but nonetheless aerobatic on rudder only control, and I had mastered this to the stage where I could virtually land it at my feet! I was about 17 by now, and girls, A levels, cars and finding a job, rather took the place of modelling, until I was 21, when I bought my first proportional set of radio gear.





Raven 1m

Span: 39", Wing Loading from 6 oz./sq. ft., 2 or 3 Function Micro R/C

Designed to be completely portable, the Raven 1m is an economical lightweight model for "micro" R/C sets, which has "plug-in" wings and tailplanes. Available in 3 versions, the Standard version is of all built-up structure, and is the lightest, enabling it to be used as a hand launch glider, using 2 function R/C on rudder and elevator controls. The Foam Wing version is identical to the standard, but has foam wings, thus making it more suitable for slope use, whilst the AKRO version has no dihedral and symmetrical foam wings with ailerons, for slope aerobatics, and requires a micro servo in each wing. The kit contains all parts pre-cut, linkages and fittings, full size plan and instruction book.

Raven 1m Standard kit (Ref K3) — £16 + £1 P&P; Raven 1m Foam Wing Kit (Ref K4) — £18 + £1-50p P&P; Raven 1m AKRO kit (Ref K5) — £19 + £1-50p P&P; Raven 1m Standard Plan, only (Ref G7) — £2-50p + 40p P&P

Here again was a milestone! You could actually have full control over the model and even trim it in the air! — what a revelation. This set of radio found its way into a glider, a Slingsby T53 at first, but thankfully I realised that this was not the model to re-learn ones flying skills with, and I built a slope soaring trainer called "Soarcy", with which after a bit of help, I became proficient, and subsequently built an aileron winged version. There followed a whole progression of kit and plan models and one or two own designs, and I made a lot of friends at Ivinghoe Beacon, got interested in thermal soarers for those days without wind, and eventually built a Viking "Cumulist", which was a modified version of the Graupner Cumulus, with a GRP fuselage, and built-up flying surfaces. Some of my friends from Ivinghoe got a little more ambitious, and suggested entering a few thermal competitions. I agreed to join in with this, and in April 1975, several of us entered our first competition, which we came out of reasonably respectably, being in the first 30 out of 72! Nonetheless we were encouraged, and gradually started to get better places, until August 1975, when I actually managed to win the North Berks thermal competition with the Cumulist. This was a real milestone I thought, and was spurred on even further, and started designing my own sailplanes. However, after a couple of years of competitions, usually placing within the top ten, the novelty wore off, and myself and friends started dabbling with power models, again going through a whole string of kits and plans, until we got the chance to fly for Horizon R/C Systems at the Sywell Expo. From this we went on to fly for Macgregor Radio Control at shows, performing aerotowing with aerobatic models.

I had always been friendly with Bill Longley of Viking Models, and being a draughtsman originally, by profession, I started drawing his plans for him. I also marketed my first glider plan through him, namely the Raven 76m. However, word gets around, and I ended up working for several kit manufacturers, which is where I started to gain experience on designing models for production, which is of course, different to designing models for personal taste — money, or rather saving it, is the order of the day!

Helicopters were just about taking off at this stage, and thinking that I would like a challenge, I bought a second hand Schluter Helibaby. About two months later, having consumed about eight pairs of rotor blades, a main shaft, an engine, various other fittings and countless gallons of fuel, I could fly it. I then traded this in for a Schluter Heliboy, with collective pitch, and this consumed most of my modelling time, *...continued on page 10*

Raven 2m

Span: 79", Wing Loading from 8 oz./sq. ft., 2 or 3 Function R/C

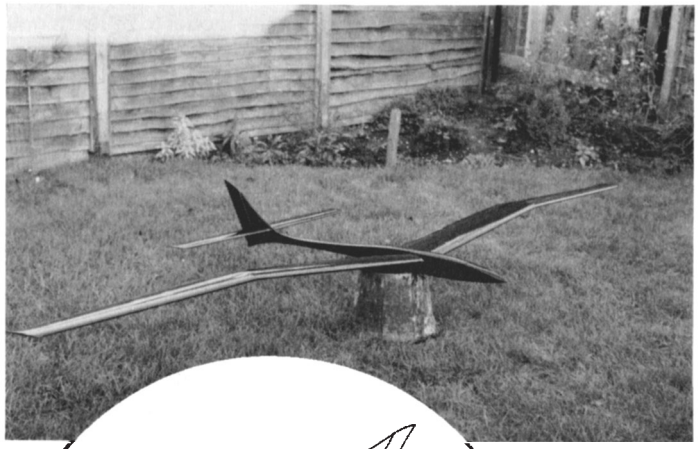
The Raven 2m features a strong 1/32" ply and balsa fuselage, with "plug-in" wings and tailplanes for easy transport, which will accommodate conventional R/C equipment in the fuselage. The E193 wing section and slim lines give speed if you want it, or equally, slow docile flight characteristics. The plan shows sheeted wing with an optional installation of up to 2 lbs. of ballast, and similarly ballast may be installed in the foam wing of the Plan Pack version. In its standard form, rudder and elevator controls are used in conjunction with dihedral on the wings, but you may adopt an aileron option, with no dihedral and a micro servo in each wing, which makes a respectable pylon racer or light weather aerobatic model. Easy to fly with a competitive performance, the Raven 2m is a good all around model for the slope or flat field.

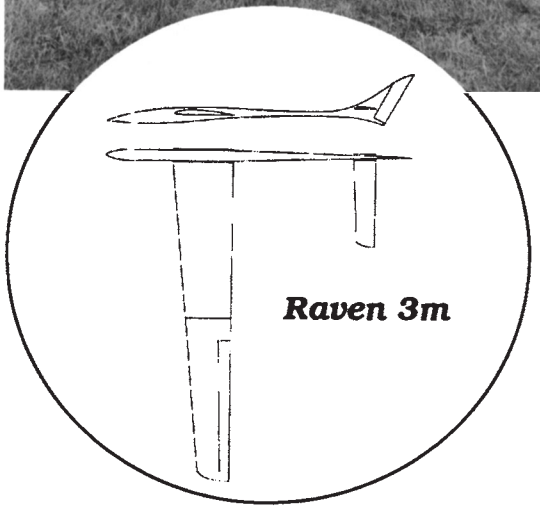
Plan (Ref G8) — £4 + 70p P&P

Plan Pack (foam wings and plan) (Ref PP3) — £15 + £3 P&P

The Raven Family ...continued

although I did manage to design a glider named "Zeus", the design of which was sold to Radio Modeller, and an aerobatic glider called "Warlock", the design of which was sold to a kit manufacturer. About this time I decided to get married, and modelling took a bit of a rest for a while. It was at this stage that I realised that if I wanted to buy a house and carry on modelling, I would have to find an additional source of income, and hence Mike Smart Designs was born in 1978, by offering my Raven 76m plans, and a new electric glider called Poltergeist.





When I lived with my parents, I had always built my models in the kitchen of all places, and I'm sure you can imagine my mothers relief, when she knew that she was going to get her kitchen back, and my relief when I realised that buying a house wasn't so bad after all, as there was a loft, a spare bedroom and a shed that I could fill up with models, not to mention a large lounge that I could put them together in!

So, by 1979, Mike Smart Designs had premises, and I was basically selling plans of my own design gliders. This was OK, but I didn't have a very high turnover, so with what knowledge I had gained by observing other manufacturers, and advice from the same, I carved my first "plug" of a glider fuselage, namely a Speed Astir, and I started to produce a fuselage to go with my design. This went down relatively well, but I realised that there was a large market out there that I hadn't tapped yet, namely power models. It was obviously impossible to design and build a whole range of power models overnight, so I started to import American scale plans, in particular "quarter scale" models, which I had had some involvement with via Bill Longley. This went down well until the exchange rate changed drastically, and eventually I was forced to stop importing. However, during this time I had come across Jerry Slates, and started trading with him also. In 1981, I produced my first full kit, namely Triad, *...continued on page 12*

Raven 3m

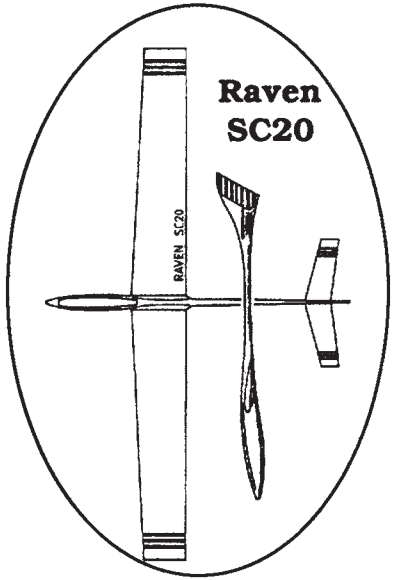
Span: 119", Wing Loading: 9 oz./sq. ft., 2 or 3 Function R/C

A distinctly different Open Class soarer with the same pedigree as the 1m & 2m, featuring a "gull wing" for style and stability. The model has a strong 1/16" ply and balsa fuselage, with "plug-in" wings and tail for easy transport. The fuselage will easily accommodate standard R/C equipment, but we recommend a micro servo in each wing for aileron control. The model may be flown rudder and elevator using normal vee dihedral or polyhedral, or the wings may be constructed with no dihedral, if ailerons are used. The Raven 3m has a very flat glide and smooth competitive performance, making an ideal Cross Country model. It is straight-forward to build and fly, and should present no problems to the average builder-pilot.

Plan (Ref G9) — £5-25p + 70p P&P

Plan Pack (foam 4 panel wings, foam tailplanes, plan and instructions) (Ref PP4) — £31 + £3 P&P

Hannah Smart with the Raven SC20.



Raven SC20

2 Metre Span: 79", AUW 32-36 oz., Wing Loading: 8-9 oz./sq. ft., 2/3 Function R/C

Deluxe kit comprising of a GRP fuselage and hatch, obechi veneered foam wings with leading and trailing edges fitted, shaped and veneered over, pre-cut parts, linkages and fittings, plan and instruction book. The Raven SC20 may be built as two function, with rudder and elevator controls, and dihedraled wings, or three function with rudder, elevator and aileron controls and no dihedral. Servo boxes and cable routes are already cut in the wings to suit a micro servo for aileron control. Due to the slim, low drag fuselage, either a 225MaH or 500MaH "flat pack" nicad are necessary, but the fuselage will accommodate standard R/C equipment in all other respects. The model is suitable for either slope or thermal use and complies with 2 metre competition rules. Wings and tailplanes are "plug-in" to facilitate easy transport.

Kit (Ref K1) — £52 + £3 P&P

(Readers: The P&P prices are different for countries other than England. If you are interested in any of the Raven family, be sure to write to Mike to find out what the actual shipping costs will be! Jerry)

The Raven Family ...continued

and I designed the Raven 2m glider, which, although I didn't know it at the time, was to establish the basis of a range of successful soarers.

I started to design some of my own large scale power models, and found that I seemed to end up more and more at the Aylesbury & District Model Flying Club, flying power, probably because time was becoming limited, due to the amount of GRP cowls, kits and Plan Packs I was producing, and it was nearby. I then managed to land the job of Secretary at the Club, and the 'patter of tiny feet' came along, I lost my spare bedroom, and yet another shed got built. I realised that what was initially a hobby, had got out of hand! Up till now I had produced everything except foam wings personally, and from this point I started 'farming the work out', which of course, meant that profits fell and I had to turnover more to meet my growing overheads.

In 1984, I designed the Raven lm for micro R/C, and in kit form, this suddenly took off commercially, indeed it remains a popular model to this day! The Raven 2m was still doing very well in Plan Pack form, and after producing a GRP fuselage for this and trying a few 2.5m variants, the Raven 3m was born in 1986. The latter part of 1986 also gave birth to a detailed scale power design of the Hornet Moth, for Chris Hodgson, who won the coveted Shuttleworth Trophy with it in 1987.

1987 also proved to be the time when the hobby/business outgrew the available space, and the "shop" got uprooted and moved to a group of dilapidated sheds/barn, which have over the ensuing period, been refurbished to what amounts to a large workshop, with integral print room. The "office" is in the house in the study, and houses the computer, drawing board, photocopier, library and telephones. The "stock room" is the loft and a spare bedroom, and anywhere else I can find to put it! Unfortunately, the change of "premises", resulted in a lot of hard work in providing better facilities, at the expense of the business, and hence there are several new projects which have not yet appeared, although we did manage to launch the Raven SC20, which has proved very successful.

As you will have gathered, Mike Smart Designs is a part-time business, or Cottage Industry. I am a partner in a practice of Consulting Structural Engineers, and hence my time is limited. Despite this, the business continues to flourish, although all GRP work, canopy mouldings, foam wings, and some wood cutting, is done by others. I basically bring together all the components and box them, market the products, and of course, design the models. Due to the growing overheads, I find that Mike Smart Designs is moving primarily towards kit production, as it is no longer economical to simply produce plans for sale, as the market is too limited. Our business is probably divided fairly equally between gliders and power models, the family of Raven gliders accounting for a large proportion of the former, and the large scale power plans and their accessories, accounting primarily for the latter. Unfortunately, time no longer permits serious national competition soaring, and my models are generally proven at Club Competitions, the Raven SC20 holding both Open and 100" class trophies, in 1989. Despite a strong commitment to scale power models, I always find myself drawn back to Ivinghoe Beacon, or the flat field, for a spot of gliding.

As to the future, we have some interesting scale power models, designed specifically with four stroke engines in mind, and further additions to the Raven family, to whet your appetite!

♣ ♣ ♣

(Readers: The P&P prices are different for countries other than England. If you are interested in any of the Raven family, be sure to write to Mike to find out what the actual shipping costs will be! Jerry)

Mike Smart
85, Quainton Road, Waddesdon
Aylesbury, Bucks
HP18 0LP

News Release ...from Scale Model Research

World's largest collection of Full-Color aircraft Documentation Foto-Paaks and Koku-Fan 3-views expands inventory AGAIN with over 175 NEW additions. They now have almost 3000 different Foto-Paaks with more than 70,000 photos in inventory. All are full-color 3 1/2" X 5" photos taken with the modeler in mind, to show details like landing gear, instruments, hinges, flaps, paint schemes and markings. The pictures are sold on a satisfaction guaranteed basis and because of the large inventory, orders are normally mailed within 24 hours.

Bowlus BABY ALBATROSS — Brown with linen surfaces, natural wood & white trim. N4627V. Only flying example left. Extensive gear, surface detail, interior & instruments. Just restored. 2751/25 ***(Readers: Model Builder, Sept. 1975, Plan #9751 for the BABY ALABATROSS. Jerry)***

MINIMOA — Call Bob for more info. ***(Readers: R.C. Modeler, July 1980, Plan #804 for the Hirth MINIMOA. Jerry)***

Bob Banka, the owner/photographer lists the following examples of the FOTO-PAAKS (studies) in his collection: 4 different Ultimate Bipes, 10 different Jennys, 6 different Extras, 42 different P-51's, 4 different Sukhoi 26M, 21 different J-3 Cubs, The New F-117 Stealth Fighter.

In addition, you'll find FOTO-PAAKS of over: 150 - Pre-1920's, 625 - Jets, 150 - Sailplanes, 550 - WWII Fighters, 185 - Helicopters, 300 - Multi-engines, 100 - Sea Planes, 1300 - Civilian, & 55 - Aircraft Engines.

Most Foto-Paaks have 3-views available that enable the modeler to have complete documentation for their project. The 3-views are either Koku-Fan drawings, or photo copies of drawings gleaned from modeling and/or full size aircraft magazines and other sources. Scale Model Research is the world's exclusive dealer for Koku-Fan 3-views with over 900 subjects and more than 5,000 drawings in stock. The Koku-Fan drawings are considered by many modelers to be the world's standard in accuracy and detail. Bob has recently added a complete listing of all of the Schneider Cup Racers.

Modelers can get the Scale Model Research catalog by sending $3.00 (foreign add $2.50 for A/O postage) to: Bob Banka, Scale Model Research, 2334 Ticonderoga, Costa Mesa, CA 92626; (714) 979-8058. (Scale Model Research has agents in Germany, Japan, Australia, Italy and England.)

Scale Thermals

...by Martin Simons

(Readers, the series on Understanding Thermal Soaring Sailplanes will continue next month.)

The Southern Soaring League, based in Adelaide, held a highly successful competition for radio controlled scale model sailplanes at Waikerie Aerodrome on Saturday and Sunday 21st - 22nd April, 1990.

Champion, Class 1 (Vintage)
Martin Simons' PWS 101

Champion, Class 2 (Modern)
John Gottschalk's Elfe S-4

Foka 4 by Rob Goldman with Moazagotl by Frank Smith (background)

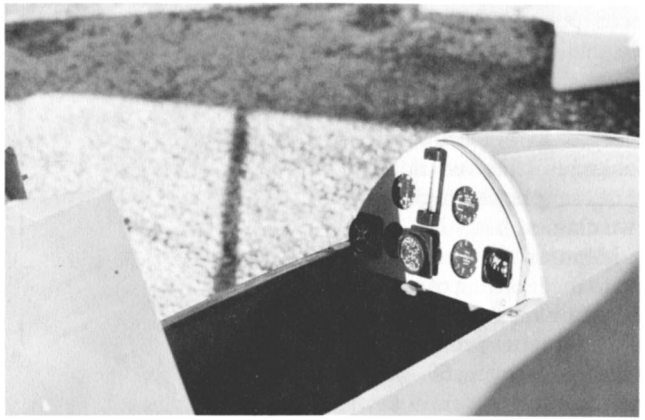
This was the awful weekend when a deep low pressure system moved through the eastern states of Australia, sucking in moist air from the Coral Sea and drenching the land with heavy rain. Disastrous floods submerged about a third of Queensland, destroying whole townships, rivers burst banks in New South Wales, gales and driving rain swept Victoria, with more floods there. The driest state, South Australia, did not escape entirely, many roads in the thinly populated north of the state being washed out. Conditions at Waikerie on Friday and Saturday morning were most unpromising with a strong and cool southerly wind bringing frequent rain showers under a heavily overcast sky. Fortunately, things improved enough to permit flying on the Saturday afternoon after the static judging, and on Sunday Waikerie returned almost to its normal condition, with a clear sky in the morning and thermals producing cumulus clouds by mid-morning.

In welcoming the contestants, Mal Pring, the SSL's highly energetic and efficient Contest Director, said that the competition was the realisation of a dream of mine. I don't remember the dream but I did have a bit of a nightmare after seeing the rules for scale sailplane competitions which were adopted by the Model Aeronautical Association of Australia early in 1989. These rules made no mention anywhere of soaring. They could even be interpreted as rules for an aerobatic pattern flying contest and if they are not changed I fear that is what the MAAA National Scale Gliding Championships may become.

It seems to me that contests for scale sailplanes should require the model to emulate its full-sized counterpart in flight. Sailplanes are designed to search for and use aerial upcurrents. I remain convinced that a scale sailplane competition must emphasise soaring. So the move towards an alternative set of rules was made. With support from the SSL a mailing list was developed and a date for the contest fixed with the Waikerie Gliding Club as willing hosts for the weekend. Periodic newsletters were sent out to those who indicated interest.

The original draft rules were discussed *...continued on page 16*

Superb Minimoa by Barry Dundas



Golden Eagle 2 cockpit detail by Colin Collyer.

Golden Eagle 2, 1/3 scale by Colin Collyer, Grunau Baby 2B by Ron Kent (behind)

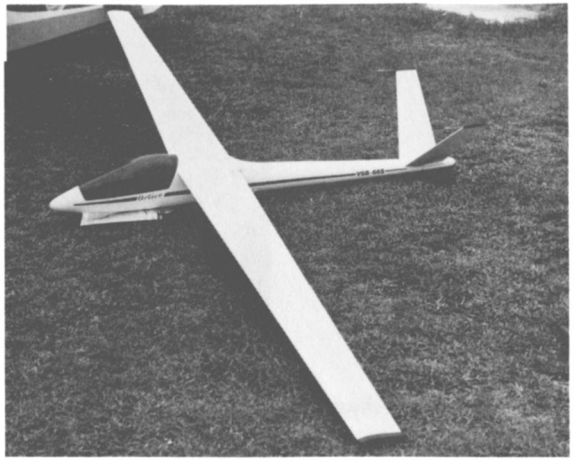
Scale Thermals ...continued

and altered several times until something that seemed satisfactory and workable appeared. The one thing that I felt I must insist on was the requirement for the models to attempt to soar. There was, however, nothing to prevent someone from entering the static part of the competition without flying. Several took advantage of this option.

Enthusiasm

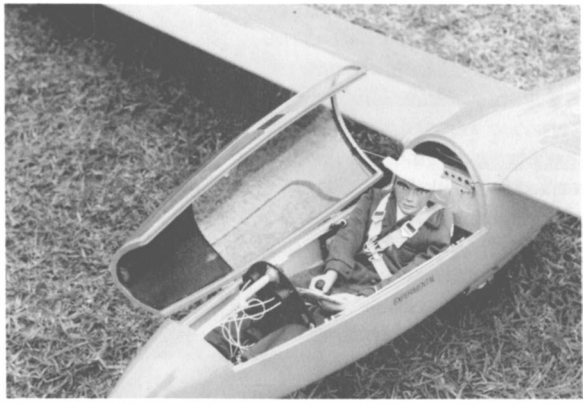
The SSL expected about twenty models to appear and would have been pleased with a couple of dozen. A month prior to the event there were eighteen paid up entrants but several of these entered two or more models, so it looked as if there would be about thirty sailplanes altogether in the two classes.

In the last few weeks and right up to the morning of the competition, more entries came in and the final count produced 35 persons with over 50 sailplanes listed. There were a few late withdrawals so the total number of models finally presenting for static judging was 46. The meeting thus became one of the largest scale aircraft competitions of any kind so far held in Australia. Larger numbers of scale and near-scale sailplanes have been flown at the Camperdown slope soaring weekends in Victoria. The Waikerie competition was, so far as we know, unique because it was on a flat site with all contest launches by winch or hand tow. What was evident from the start was the great friendliness and general enthusiasm of all the pilots, their families and friends.



Orlice by Wayne Jones — Casualty of a winch launching mishap.

The L-Spatz — Another excellent model by Wayne Jones.



Elfe S-4 -- Cockpit detail by John Cottschalk.

Ka 6E by Col Collyer

Minimoa by Barry Dundas — Did not fly.

ASW 17 by Noel Roediger — Scratch built. Won static, flew well (Modern Class).

It was especially pleasing to meet the large contingent from Victoria, who hired a bus to bring them and their models to Waikerie, while Hans Julius Schmidt and his mother travelled all the way from southern Tasmania.

In terms of numbers of interested people, pilots, helpers, spectators and friends, the total is not known but 80 or more people were present in the Waikerie Gliding Clubrooms for the evening meal on Saturday and there must have been a good many more than this coming and going at the flying field on Sunday when the weather improved. Among the spectators were a number of regular Waikerie Gliding Club members and of course several of the model fliers are also pilots of full-sized sailplanes.

Outline of the rules

Classes

Using as cut off point the date of flight of the world's first glass-reinforced-plastic sailplane, 27th November 1957, the sailplanes were divided into two classes, Class 1, vintage, Class 2, modern. This was meant to separate plastic sailplanes from the older types but had the effect also of excluding from Class 1 quite a lot of wood-fabric aircraft that might otherwise have been counted as 'vintage'.

Static judging

The static judging was intended to be of the 'stand off scale' type to encourage entries from less expert modellers. Simple documentation (three-view drawing and photographs with notes) was called for. Weighting factors 'M' and 'K' were applied to the raw scores after the basic judging was completed. (In view of the final 'static' results, it has to be mentioned that these factors were about the only things taken without alteration from the MAAA rules.) The highest 'M' factor was allocated to *...continued on page 18*

Scale Thermals ...continued

accuracy of outline, the next highest to finish, colour and markings, and the lowest to details and scale structure. The 'K' factor weighted the scale scores of 'own design' scratch built models higher than those for aircraft built following a published plan, and these in turn were 'K factored' higher than models built from kits, and these higher than 'almost ready to fly' and 'ready to fly' purchased models. The 'K' factor is obviously very important and can be decisive.

After some discussion about judging, it was decided to adopt a democratic system. Each competitor was asked to mark five or six of the other people's models so that every sailplane was judged independently by several persons. The final scores were then totalled with the M and K factors applied by computer, to produce the final results, standardised and scaled to 1000 points for the winner in each class. This method had two important advantages. First, no individual or small group of judges could be subjected to personal criticisms or accused of bias. Secondly, the models were judged by people all of whom had direct experience of building at least one scale model sailplane, so they could all appreciate the amount of work and care that had gone into the model being scored.

Disadvantages were, perhaps, that individual scorers were often inexperienced and might have been either too lenient or too severe. Some very good models might have been penalised if the luck of the draw gave them two or three severe markers while others may have benefited by having more than their share of lenient judges. It was hoped that such variations would balance out on average to produce a fair outcome. To require everyone to score everything would doubtless have been better but with about fifty models to be considered would have taken far too many hours. Some further comments about judging appear below.

The weather conditions on Saturday morning were barely fit for anything but the rain held off long enough to allow the models to be assembled on the lawns on the lee-side of the clubhouse. There was not enough room here for the four metre stand-off rule to be enforced. Unforeseen organisational difficulties, arising only partly from the bad weather, forced the three-dozen judges to wander around a good deal among the models during the morning, so that they frequently, or always, got much closer to the models they were scoring than the rules stipulated. They could not fail to notice, for instance, the absolutely meticulous accuracy and superb quality of workmanship in the Elfe S4 cockpit produced by John Gottschalk and the highly professional finish, colouring and markings of this splendid model in Class 2. The only thing against it was the 0.8 K factor. Other models, including the author's own, look quite good from four metres away but stand up less well to close inspection. The 1.0 K factor, however, worked in their favour, as it did for Noel Roediger's ASW 17, one of the very few models in Class 2 that were wholly designed and built from scratch. The others were Col Collyer's nearly perfect Ka 6E and Jo Rufenacht's ASW 17, but the latter was not very accurate.

Noel's winning ASW 17 was accurate in outline and had the highest aspect ratio and narrowest chords of any model present. It flew extremely well, which must prove some aerodynamic thing or other. Both the Kirby Kite and the PWS 101 had unmodified aerofoil sections and, contrary to some people's expectations, lost little or nothing in flight. This too proves some aerodynamic other or thing. Barry Dundas's excellent Minimoa in Class 1, in my view, was badly undervalued in the judging. A number of other models deservedly lost marks because of inadequate documentation.

A considerable problem was that of entering the raw static scoring data into the computer. A quick reckoning shows that for the static scoring alone over 500 separate numbers had to be entered. Our thanks are owed to David Leigh and Ian Moreland, who, unaided, carried out this task and also worked out the computer program itself, together with designing and producing the various scoring forms for both the flying and the static parts of the competition. This took many hours. The available computer was not capable of taking one of the bigger spreadsheet programs that would have saved a good deal of work and worry, but even with a spreadsheet there is no short cut round the data entering problem.

Soaring

For the flying, launches were by winch or hand tow with the line lengths extended to 250 metres (500 m for winches) to allow the larger and heavier models to get to a reasonable working altitude. Lines longer still might have been even better but some existing winch drums cannot take more than 500 metres of heavyweight monofilament.

Flight scoring was based on a ten minute duration within a fifteen minute working time. No penalties were incurred for flights over ten minutes. We did not want to see fine models being damaged in frantic efforts to get down at a rigid deadline. A large landing area, 150 metres in diameter, was specified, with a small bonus for landings anywhere within this circle. Again, we did not wish to see models broken by pilots trying to get into a small target or hit a spot for the sake of a few extra points. This, too, is in keeping with full-sized practice, where it is far more important to make a safe landing within a safe area, than to arrive heavily on some exact point.

In Class 2, the very simple and light model BG 135 belonging to Robert Tuncks, launched to the full height permitted by hand towline, soared to even greater heights and surpassed all others to win this part of the contest. Two of Rob's four flights achieved the ten minute maximum. (The BG 135 is a little-known type. It was produced in Britain in the early seventies, as a small, cheap, all metal sailplane with a rectangular wing and V tail. Several were built but the venture was not commercially successful.) Rob Goldman's Foka achieved the second best flying score in Class 2. In this class, a total of eleven 'maxes' were scored, all but two in the fourth round.

In Class 1, contrary to the hasty announcement at the closing ceremony, Robert Goldman's Olympia 2b achieved the best flying score. My 4.75 metre span PWS 101 showed itself capable of soaring in a weak thermal to score a maximum, despite its mass of about 6.5 kg, placing a fairly close second to the Olympia. We both achieved a ten minute maximum in the fourth round, the only two 'maxes' scored in Class 1.

Class 2 Champion, combining flying and static scores, was John Gottschalk's superb Elfe S4, a well deserved win for a beautiful model which also was flown with great skill. Second came Colin Collyer's fine Ka 6E. In Class 1 my PWS 1O1 came out top, with Robert Goldman's Olympia 2B second.

Lessons learned

One thing learned by a good many of the pilots was that building a respectable scale model sailplane takes much longer than it does to produce an ordinary thermal or slope soarer. To this must also be added time for learning to launch and fly the model. A good many of the sailplanes made their first winch launches only a few days before the contest and some, it may be, had never flown before at all. There were remarkably few serious accidents, despite this.

The weekend was entirely free from radio interference problems. Frequency discipline was excellent at all times.

Many other lessons were learned. Most of the winch-launched models took off from the ground, the wing tips supported by simple rails or, in one case, merely by a couple of bricks under each tip. This normally gives a trouble-free take off and a gentle initial climb as the winch gets into its stride. Once the airspeed has built up *...continued on page 20*

Scale Thermals ...continued

sufficiently, the climb can be steepened. Some models used twin towhooks with a Y shaped bridle on the towline, to ensure directional stability at the very beginning of the launch. Further experience may prove this to be unnecessary. One model was crashed very early on by being allowed to rear up too sharply at the start, so that it stalled, rolled over and dived to the ground instantly.

A couple of accidents also resulted when, leaving the ground with a slight sideways drift, the wing tip of the sailplane slipped underneath the returning winch line which, under tension, had lifted off the ground a little way. The result was a disaster as the model attempted to climb with one wing trapped under the line. Wayne Jones's attractive Orlice and Richard Tapp's DG 200 suffered in this way. I did not hear of any others. The same kind of thing can happen if there is an idle winch too close to the model on one side, so that a wing can slide under the line. When models are launched by hand the wings are well clear of such dangers.

A few people had problems caused by the damp weather. Damp wood swells and may warp as it dries. Some airbrakes and spoilers jammed open or closed at awkward moments. John Gottschalk's Elfe was affected but saved by some quick thinking. Noel Roediger's ASW 17 went out of control on the landing approach from this cause, one brake jamming open. Noel at first blamed radio interference but apologised subsequently when the real cause of his trouble was discovered. The ASW 17 was little damaged and flew again soon afterwards. Hans Julius Schmidt withdrew from the flying because he suspected that water had affected his radio, and there may have been other 'glitches' now and then for this reason. My winch ran wild without being switched on, rain evidently getting into the electrics and causing a short circuit. Fortunately, although the line broke and tangled, there was no permanent damage.

One model was seriously damaged when it apparently shed a complete wing in flight, and Colin Collyer, in a rash moment, damaged his 1/3rd scale Golden Eagle in an attempted flight back to the hangar. He spent much of Saturday night repairing it to compete again on Sunday, which it did with distinction.

The organisers too learned a great deal. It seems very likely that there will be another scale sailplane soaring meeting at Waikerie in 1991, probably somewhat earlier in the year to increase the chances of good weather, with somewhat longer hours of daylight too. If a suitable long weekend can be found, it will be used. (Easter, unfortunately, is not feasible for the Waikerie Gliding Club.) Dates in early March are currently being looked at.

Liaison with the caterers could have been improved. They responded extremely well to the unanticipated demand for dinner on Saturday evening, but should have had more warning. We did not know, ourselves, that there would be so many people looking for a meal. The scorers need a good deal more time too. It proved more difficult to develop a scoring program for this rather complicated competition than anyone had imagined, and entering the data as the figures came in presented some headaches. Rather odd anomalies cropped up, late in the day. The cut off date for entries should have been made more definite and enforced more rigidly, to give time for the catering to be planned and for the scoring program to be run through a few more times.

The static scale judging rules need revision and clarification and the data entry system will have to be streamlined and tidied up. We are working on this. In the scale judging, models will require clearer labelling and identification and everyone must provide adequate documentation.

The two class structure may be re-arranged in some way, but the basic concept seems right. The problem is that some wooden sailplanes built before 1957 would, in model form, be every bit as good as the glass ships, while many wooden and metal aircraft built since 1957 seem out of their class against the ASW 17 or Discus.

Since there should be extra time it is probable that the flying part of the meeting will be extended, not by adding more contest rounds, but by devoting time to relaxed sport and demonstration flights. I personally, however, shall be much disappointed if soaring does not remain the essence of the flying competition.

Results

The final table of results gives some precise figures. Complete details of all the static and flying scores have not been 'saved' by the computer, unfortunately, so a thorough analysis is not feasible. What can be said with confidence is that thermal soaring contests for scale model sailplanes have been proved entirely feasible, and they can be a lot of fun.

Aerotowing by VARMS

Highly efficient, indeed spectacular, aerotowing of model sailplanes was demonstrated at Waikerie on every possible occasion, and even on some occasions when the weather looked impossible, by members of the Victorian Association of Radio Model Soarers (VARMS). Those who have not seen model aero towing before were greatly impressed, especially by the extraordinarily rapid rates of climb achieved with heavy sailplanes in tow. Given a powerful motor and an experienced tug pilot, the method seems not only more effective but also safer than winch launching and it is probably going to become more common. It will almost certainly be expected in future that all scale sailplanes will be fitted with aero tow releases, so that they can be towed up when a tug is available. Many thanks to the VARMS experts for their excellent work in developing the system and staging the very convincing demonstrations.

Just how it will be possible to incorporate aero towing in future scale sailplane soaring competitions, is not yet clear. To cope with a field of fifty, if we can expect such numbers in future, more than two tugs (with suitably experienced and competent pilots) will be needed. There may be problems with clashing radio frequencies since each launch needs two clear channels. If all the sailplanes are to be released at similar heights to ensure a fairer competition, some sort of altimetric control of release will be needed. These are not insuperable difficulties. For instance, electronic altimeters are now readily available and could be used to operate automatic releases. Nonetheless, a good deal of thought is needed before satisfactory procedures can be developed.

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Soaring Tidbits for Flat Landers

...by Ray Reiffer

I always read every article that I can find on R/C soaring because I am interested in hearing the other guy's account of how he does it. Unfortunately, I am usually disappointed in the technical account or in the brief explanation on how to soar. So much of the good stuff is left out for those that want to hear about how to do it. So, with this in mind, I will tell you about how to find lift over flat land with, hopefully, enough detail on the things you want to hear. I have learned these things over the past ten years of soaring full scale and R/C ships.

I believe that it was between 1978 and 1980 that the University of Toronto in Canada sent papers of notice to all registered sailplane pilots in the U.S.A. and Canada. They wanted to round up volunteers to participate in an observation program on the migration route of the Monarch butterfly. I participated in this program for about 3 years. My ground level observations are the basis for much of what is to follow, and this study has lead me to other observations while flying in full scale sailplanes.

The Monarch butterfly is not only an excellent soaring machine but, along with the dragonfly, is one of the only known insects to soar. The value in watching the Monarch is seeing that lift at low levels (less than 600-800 feet above ground level) actually is different than lift at a higher altitude. Conditions will change this figure all over the map, but my point is that thermals organize into more concerted forms, strengths, and activities as altitude is reached. Of course, we are on the bottom of the "air ocean" trying to get up there. So, let's talk of lift over flat land, and where to find it.

Where To Look

Lift is everywhere. But, it is not always where you are. I have found that any location where there is water, wet ground, ponds or any dampness up wind is not a good place to be. We need dry, dark, uneven ground like that of a plowed field. The furrows present a lot more surface area per acre to the sun, thus producing a hot spot. A cut corn field is good because the stubble protects the ground from the wind and allows it to heat up. Parking lots and buildings are also good thermic sources. Gravel pits are great places to find a constant reliable source of lift.

Once, while flying an 1-26, I found myself far away from mother (the airport) and much too low. The last thing I wanted to do was to land. This is not only embarrassing, but there are logistical problems, as well. The sky had cleared and I was at 1000-1500 feet above the ground. In an 1-26, this is not good. So, I glided over to the best looking spot I could find within range. I parked the 1-26 at minimum sink over a large dry plowed field. I waited. The air was like thousands of tiny bubbles coming up under the ship. Although this was not enough to maintain altitude, it delayed the sink. This told me that there was a thermal about to kick off. Still sinking and unable to wait much longer, I heard a screen door slam shut. The farmer had just come out of the house. He proceeded to his tractor and, moments later, things started to happen. I had soon climbed to 4500 feet. The sky was showing a few clouds, and I was on my way, again. My point in this story is that air is sticky. It holds to the ground until it cannot contain itself. The release mechanism in this example is the farmer starting his tractor which caused the sound waves to do the trick.

If you are having trouble finding lift, you should return to the hot spots you know, and wait. If you have altitude, you can afford such a maneuver. If not, return to the launch site. To keep this simple, lift is where you find it. If you found it there once, it will be back. It is just a matter time. So, pay attention to your watch and, in doing so, you will know when to expect another thermal.

When To Find Lift

Lift goes through a cycle every day. It is a very noticeable thing if you watch for it. Some days, due to weather conditions, it may not happen as you think it should. Generally, there are two cycles and, sometimes, there are three cycles. To be able to stay up during the off side may require a lot of altitude. Of course, few pilots are trying to stay up for hours at a time.

"Streets", the clouds that are lined up one after another in long rows, are a good example of a short cycle that continues over and over. If the cloud base is low enough for you to reach with your R/C ship, then you can have some fun for a long time. The thermal activity is the target, of course.

"When" is usually restricted to how soon in the day you can fly. The spring of the year is the best time to fly, as the air is so cold that very little ground heating is required to kick off good thermals. It is my favorite time to fly. Although I have poor luck in the winter, I go for it on occasion. The summer is no doubt the most heavily flown, but I wonder how many first timers have been disappointed because the ground and air temperature were so close together that nothing happened until late in the afternoon. So, a very pretty day is not necessarily good for soaring.

Regardless of the time of year, the late afternoon often produces great flying at gravel pits as they release their stored heat from the rocks. A stand of pine trees is also very good because they are so dark and dense. The trees have trapped a lot of warm air. As the day cools off, these reserve thermic sources start giving up to the atmosphere and beautiful sunset flights are possible. I enjoy seeing the orange light reflecting off the bottom of the wings against the dark sky.

Types of Lift

To me, each type of lift encountered is as interesting to watch as it is to fly in it. For those who have never noticed the types of lift, I can only guess that they fly all lift the same and, they have, no doubt, lost a thermal or two because of it. Or, perhaps, they just did not stay up even though they were in lift. The thing I like about this sport is that, although this is a science, it is still practiced as an art. Some guys are great artists at extracting lift, while the rest of us settle to the ground.

The lift that I encounter at my local flying site is usually of the text book type, or vortex with a core lift, about 30% of the time. I mention this because I often hear pilots remark that they will try to core the thermal. However, the lift they are flying in may not have a core, or it may have several. Although it is very hard to tell exactly what is going on up there, it is usually clear to some degree.

There is indeed a difference in all of the types of lift. A lot of them can be seen directly, with patience, and a trip to your local muck farm. There are plenty of these farms here in Michigan, but I think you'd be hard pressed to find one in Arizona. I drive right into a big one every day so, sooner or later, I catch the conditions just right. I can actually see the thermal activity in a clearly visible manner. As the moisture rises up from these hot soil beds, I can see the outline of the activity. Although bubbles and columns are the most frequently seen, occasionally the dark soil allows me to see a vortex clearly. In order to see the actual movement, you must adjust your eyes to detect the silver like forms against the bright sky. After a time, you'll be able to spot them easily. A lot of R/C pilots know of them, and this is how they fly to the exact area of lift.

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Readers: This article by Ray will be continued next month, where he will explain the different types of lift. Jerry

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