by Phillip Kent

Avro 625 Avian Monoplane

An ideal first large-scale model project, Phillip Kent's 1/4-scale version of this early air-racer is easy to build and fly

The drawing for this quarter-scale model of the radial-engined Avro Avian was done in 1999. Some model air racing was planned for the millennium and I offered to make the drawings available to anyone who would like to build the model, provided they let me know how it went together and how it flew. The offer was taken up but, after a few photos of a part-built model, nothing else was heard of the project.

A couple of years later I managed to persuaded Jim Dobson of the Skelmersdale Club to build a smaller scale version and then Fred Keegan from Pontefract offered to build the quarter-scale version. The model featured here is the one started by Fred and finished by myself. Due to a car change Fred was unable to fit the Avian into his new pride and joy and an offer for the part-built model was readily accepted. My part in the project has been building the wings, getting the model fitted together and completing the rigging and finishing.

I first became interested in the Avian Monoplane after seeing a fine quarter-scale model built by the late Derrick Brunt at the Woodvale Rally. At that time, quarter-scale models of this size were quite rare although Arthur Searl and John Armstrong, both from the Liverpool club, had quarter-scale versions of the Avro Avian biplane. The model, I remember, was a superb flyer and it oozed character with the quaint undercarriage, the wire rigging and its lime green paintwork.

There were only two full-size aircraft built, one with an upright in-line engine and one with a radial engine. Both aircraft were racing conversions of the famous Avro Avian biplane and both made their racing debut in the 1930 Kings Cup air race. Avian G-AAYV, painted dark red with white lettering, was powered by an Armstrong Siddley Genet Major radial engine, while G-AAYW was finished in a lime green, with white lettering and a 105 h.p. Cirrus Hermes in-line engine fitted in an upright position.

MAIN IMAGE: One of only two full-size Avian Monoplanes built, G-AAYV made its debut at the 1930 Kings Cup air race. After an unsuccessful showing, it was later converted back to a biplane.

INSET: Relatively simple construction and uncomplicated colour scheme and markings make the Avian Monoplane an ideal first large-scale project.

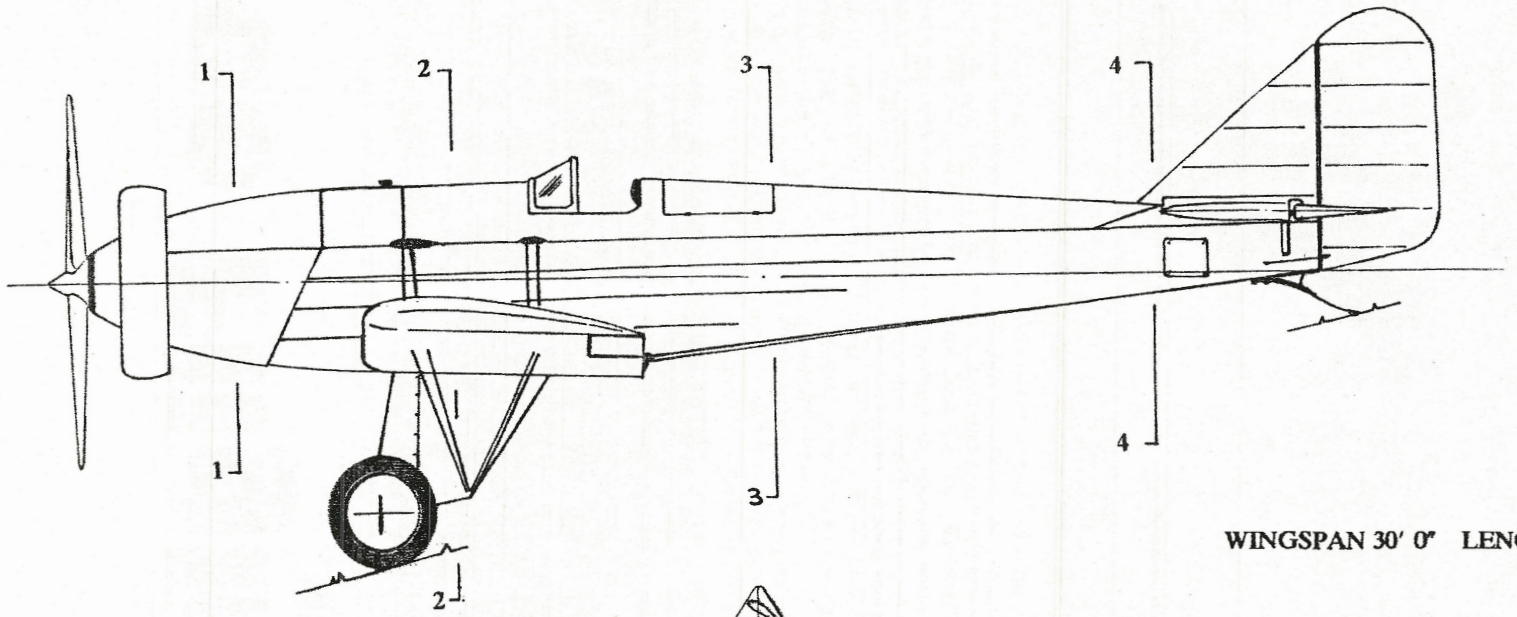
The Genet Major-powered aircraft, G-AAYV, was fitted with a faired undercarriage, fairings at the wing roots and a ring cowl for the 1930 race, but its handicap was too severe and soon afterwards it was converted back into a biplane. G-AAYW placed 48th in the race and it was later sold to Sqn. Ldr. R. Atcherley. The aircraft had various modifications carried out during its flying career. These included fairings around the undercarriage legs, mass balances on the ailerons, sheeting on the wing leading edge and a large landing light fitted under the port wing. The aircraft was eventually scrapped during the Second World War.

Construction

The model uses typical model aircraft construction techniques and materials. The airframe is mostly of balsa, spruce and plywood. The rigging is functional and should not be ignored. The rigging and fittings are available from *Mick Reeves Models*. The prototype model is fitted with a Laser 150 four-stroke engine but other engines could be used.

Fuselage

The fuselage is a simple box structure with spruce longerons and balsa spacers. The sides are built first, directly over the plan on a suitable building board. An old flush-type door makes an ideal building board if you are stuck for something big enough. Cover the plan with thin polythene sheet; the backing from *Solartex* is ideal. Pin the longerons in place and add the plywood parts and the balsa uprights. Because of the size of the fuselage side, it is probably best to build them one at a time. With smaller sides it is possible to build one and then the second over it. Provided you take care and make sure

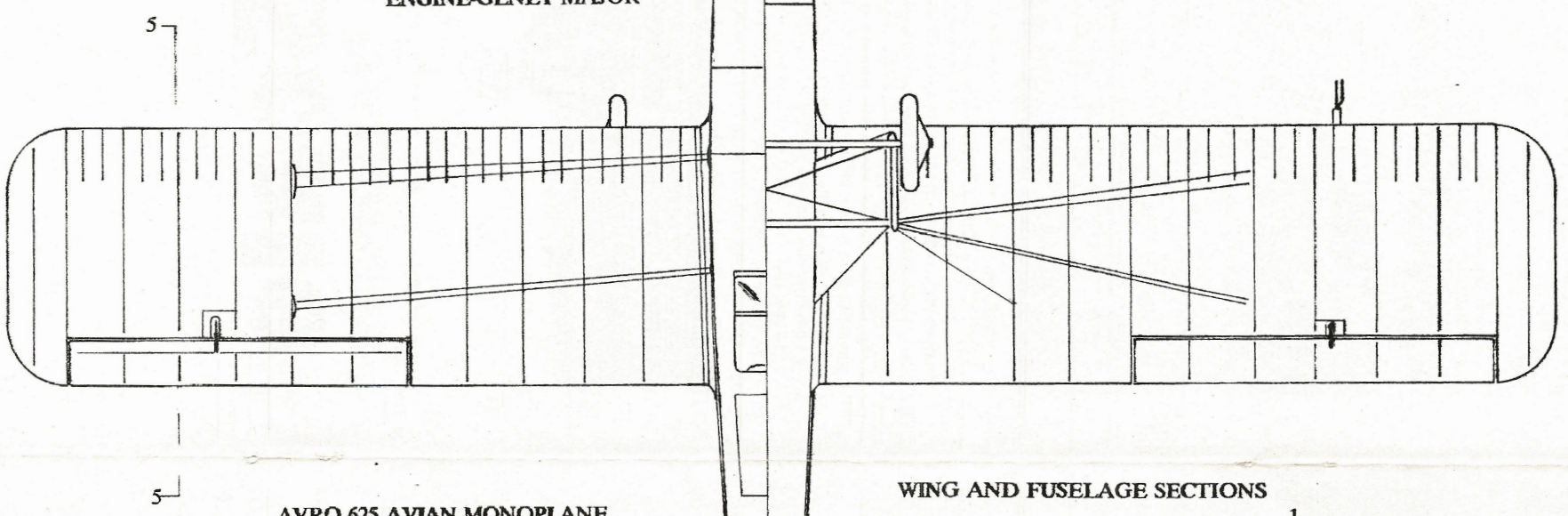


WINGSPAN 30′ 0″ LENGTH 24′ 3″

COLOUR G-AAYV DARK RED

WHITE LETTERS AND RACE NUMBER 84

ENGINE-GENET MAJOR

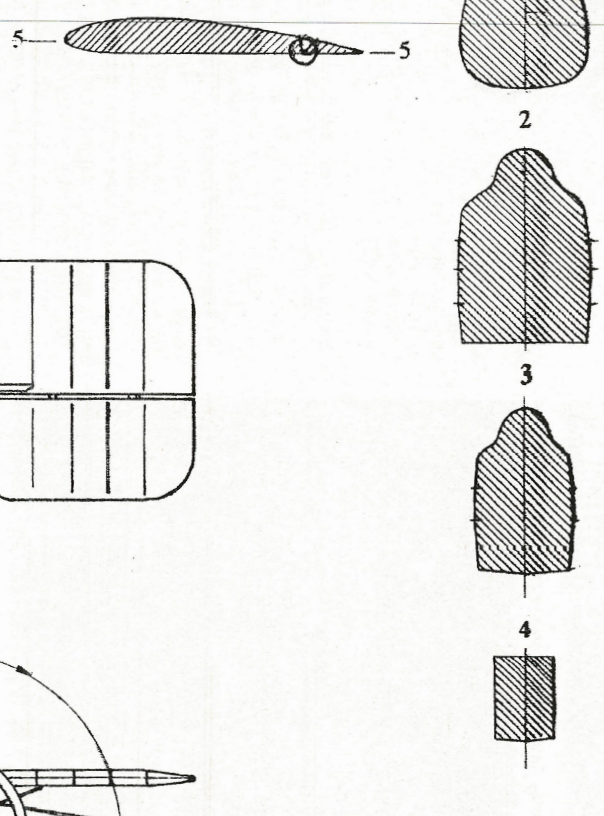


AVRO 625 AVIAN MONOPLANE

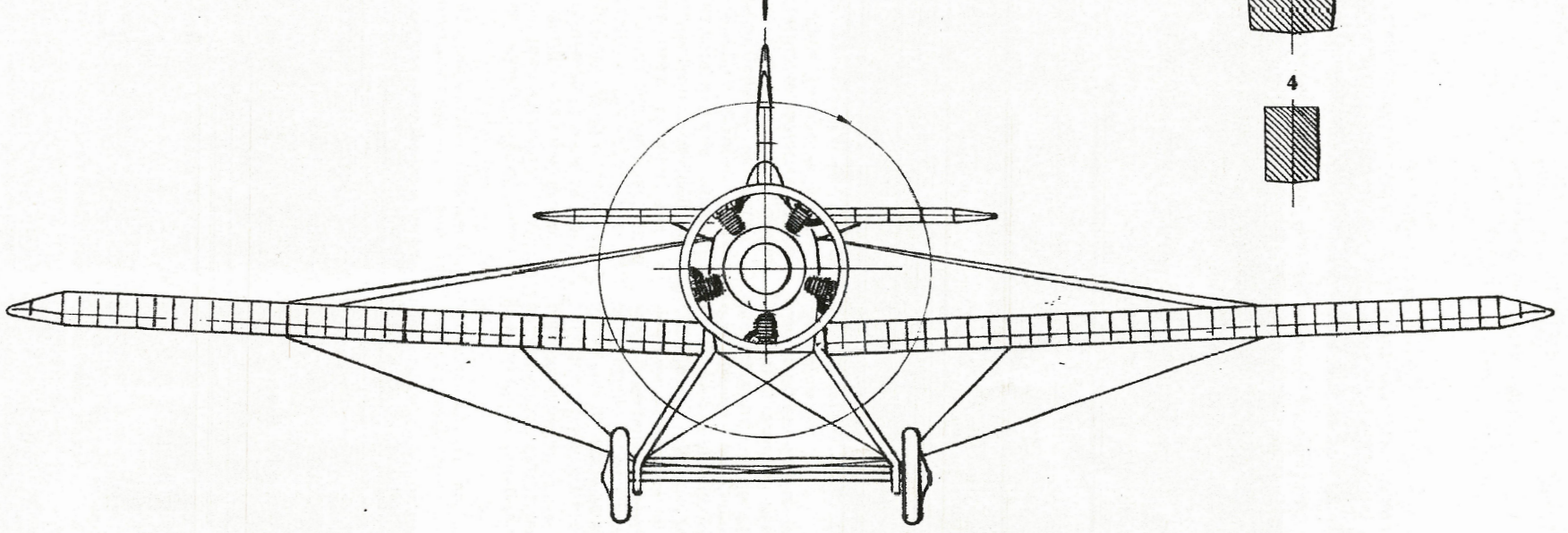
Drawn by Phillip S. Kent 19/2/96 ©

Scale 1:40

WING AND FUSELAGE SECTIONS



For further information see Nexus plan 3068
Avro Avian (Cirrus Hermes) by Dennis Bryant.



Phillip S. Kent

Fig. 10-18. - Flap layouts

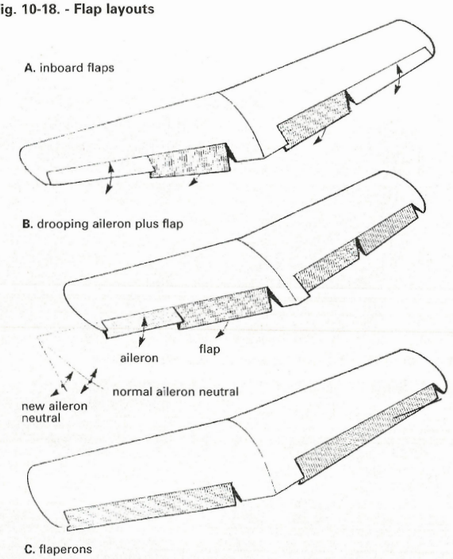


Fig. 10-19. - Flap styles

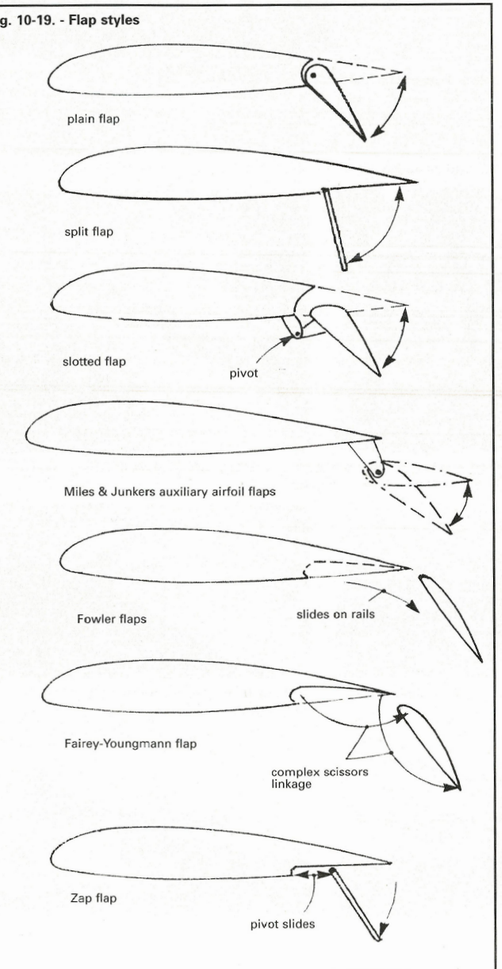
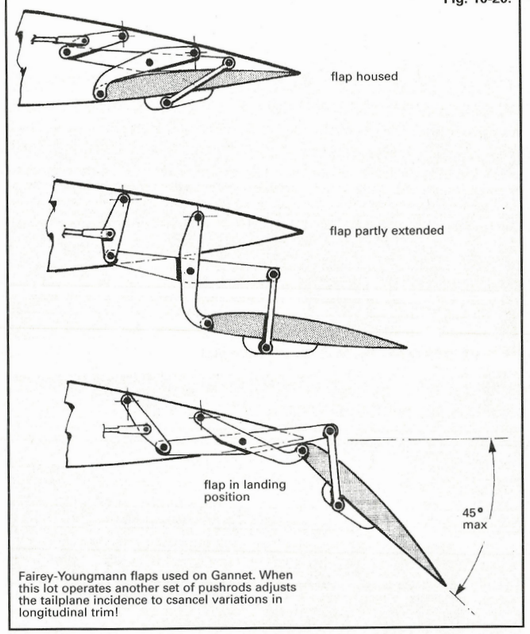
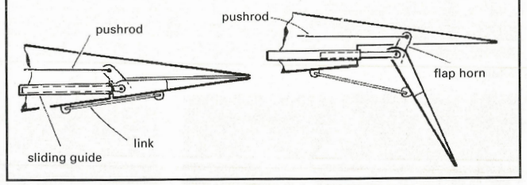


Fig. 10-20.

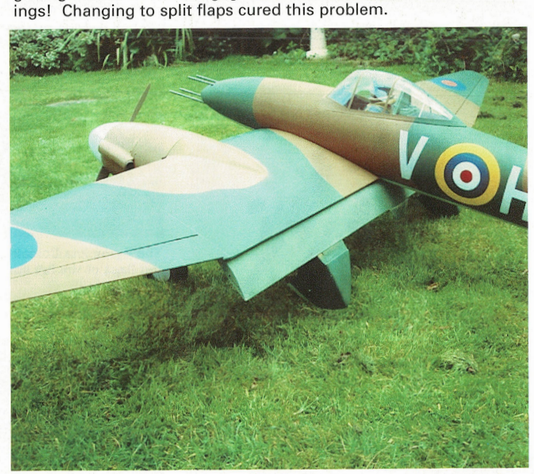


Fairey-Youngmann flaps used on Gannet. When this lot operates another set of pushrods adjusts the tailplane incidence to csancel variations in longitudinal trim!

Fig. 10-21. - Zap flap system used by Brian Taylor on Fairey Fulmar



If one finds the thought of replicating the complex Fowler flap linkage daunting, don't worry - one can simply settle for split or plain flaps, which on a sport scale model will be entirely adequate for enhancing our flying enjoyment. Interestingly, the DH Hornet began life with Fowler flaps, but changed to split flaps before series production began. The reason for the change was excessive nose-down couple when the Fowlers were deployed making it difficult to lower the tail enough for landing - especially vital for getting the tail hook to engage the arrestor wires on carrier landings! Changing to split flaps cured this problem.



Paul Mitchell's Westland Whirlwind sports true-scale Fowler flaps, shown here depressed.

Free Flight Scale
at the Nationals


1


2

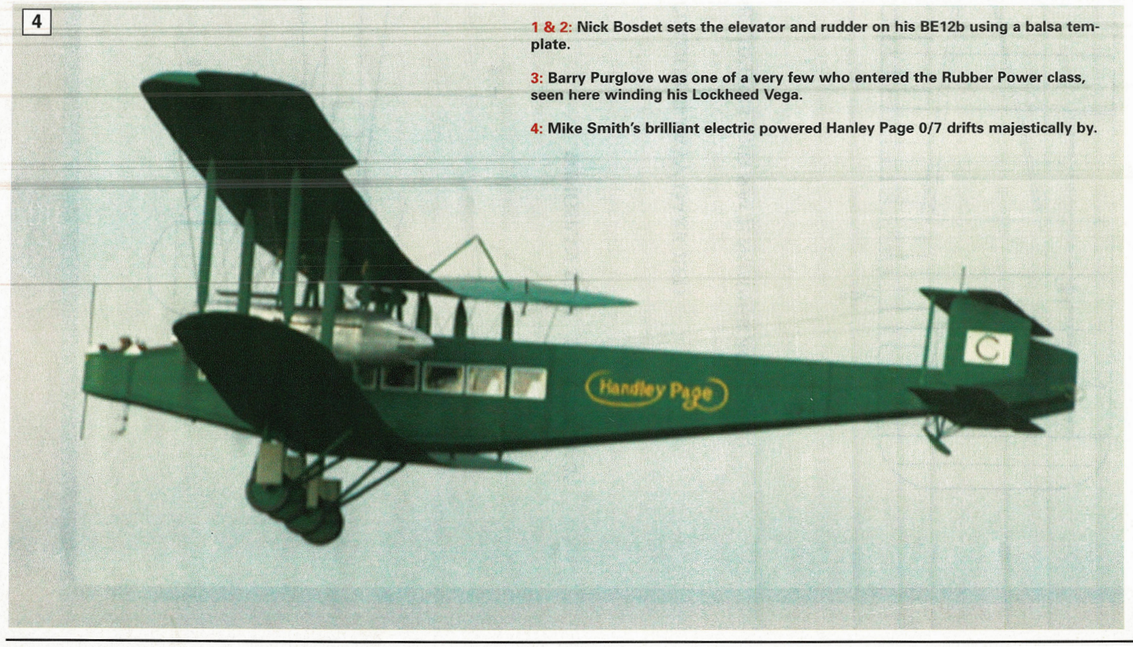

3

Contest free flight scale seems to be 'on the up' - this year's Nationals drew 11 entries in the i.c.power class and a similar number in Co2/Electric. Only the Rubber Power class seems to lack support with only four entries on hand.

Weather prophets had indicated rising wind conditions during the Saturday-to-Monday holiday weekend - and as it turned out, they had it right on the nail, so that planned action to get in as many contest rounds as possible during Saturday evening proved to be correct. Surprising therefore that although conditions were perfect, for that first evening, surprisingly few took full advantage in order to beat the weather.

One of the problems in the CO2/Electric class has bee the lack of true outdoor models - most entries in previous years have previously been indoor models brought along in anticipation of 'minimum-risk' calm evening conditions. This year was a bit different though thanks to the appearance of Mike Smith's electric powered 66" HP0/7. This superb example of free flight scale modelling led static by a wide margin. But then, in addition, Mike went on to post a brilliant flight, commencing with a long, smooth take off, majestic circling cruise and finishing with a straight landing approach. It was a truly impressive performance that won the event. The Power event was, by comparison, more than a bit ragged, with many of the attempted take-offs ending in unceremonious nose-overs in the rough at the edge of the runway. The exception was Bill Dennis's fine Sopwith Triplane which lifted off well to circle overhead without excessive downwind drift

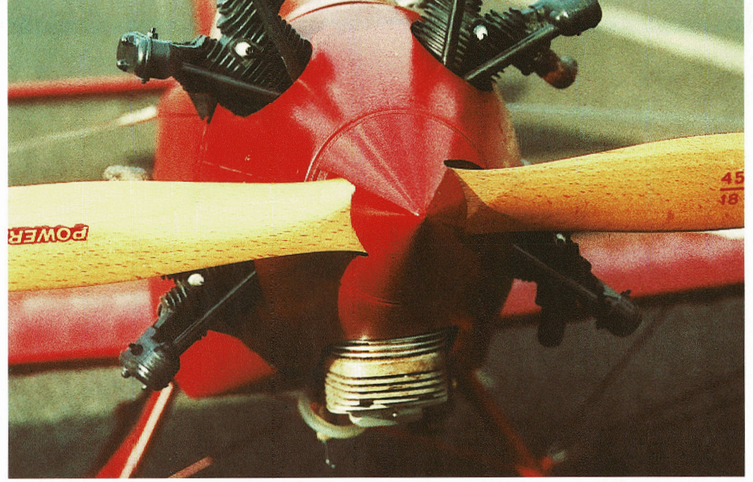
4



1 & 2: Nick Bosdet sets the elevator and rudder on his BE12b using a balsa template.

3: Barry Purglove was one of a very few who entered the Rubber Power class, seen here winding his Lockheed Vega.

4: Mike Smith's brilliant electric powered Handley Page 0/7 drifts majestically by.



ABOVE LEFT: Inverted Laser 150 four-stroke is shrouded effectively by dummy radial. In-line Cirrus-engined version G-AAYW would be an easy alternative, subject to simple modification of the plan. **ABOVE RIGHT:** Simple cockpit has lithoplate windscreen frame and simple four-dial wooden instrument panel.

steel and was bolted in place on the model. The tail struts were made by squashing aluminium tube in grooved hardwood blocks in a vice - quite effective.

The model balanced where I thought it should but I did add some lead to the inside of the cowl, just to be safe.

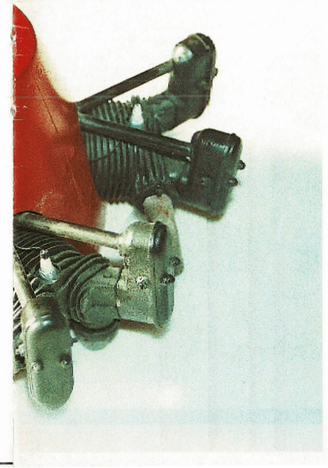
Flying

After waiting some time for decent weather, we finally got a good day. I always do my first flights at the Pontefract D.A.S. flying site on Pontefract racecourse, usually in the morning as this is a quiet time. The model was rigged on a folding table - almost a requirement, I would think, for a model like this. The tank was filled, the controls were checked and checked again and the model was ready to go.

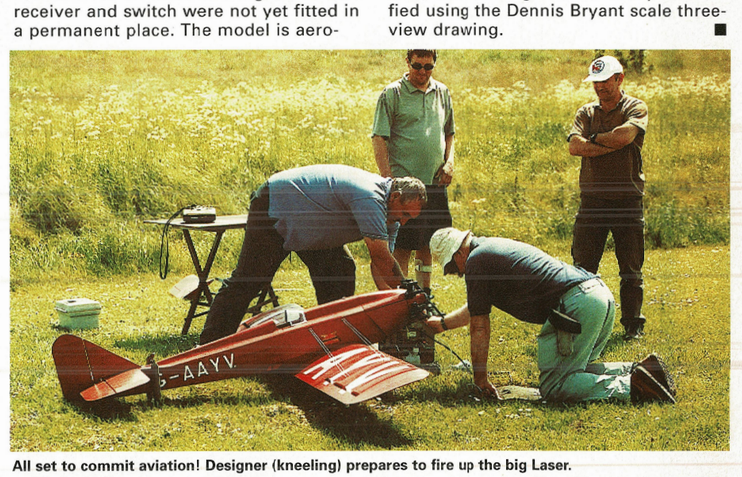
The *Laser 150* stared up straight away, Fred Keegan had the camera and it was time to take off. I opened the throttle and, after a longish take-off run due to the long grass, the model lifted off. The climb out was straight, but I did need a small amount of 'up' trim for straight and level flight. This was fed in, making the model much easier to fly; perhaps I didn't need that lead after all.

The model flew like a trainer rather than a scale model and I am sure that any competent pilot would be able to fly it. It did look good in the air, but after making half a dozen circuits I decided to land and make sure that nothing had worked loose. Everything was fine and the model was soon in the air again for more checks and photographs. I did not put the model through any aerobatic manoeuvres on these two flights, as the receiver and switch were not yet fitted in a permanent place. The model is aerobatic, but I am not sure if the full-size aircraft was. It was, after all, a monoplane conversion of a biplane.

This is a relatively easy model to construct and fly, perhaps an ideal first large-scale model. There is some metalwork to do but no special machinery is required, only a saw, vice, files and a torch for the silver soldering. The model also uses commercially obtainable 6" diameter vintage wheels from Flair. If you want to build the Cirrus-engined version, the drawings can be easily modified using the Dennis Bryant scale three-view drawing. ■



LEFT: Dummy engine uses ubiquitous Williams Bros. plastic cylinders to depict Armstrong Siddley Genet Major radial.

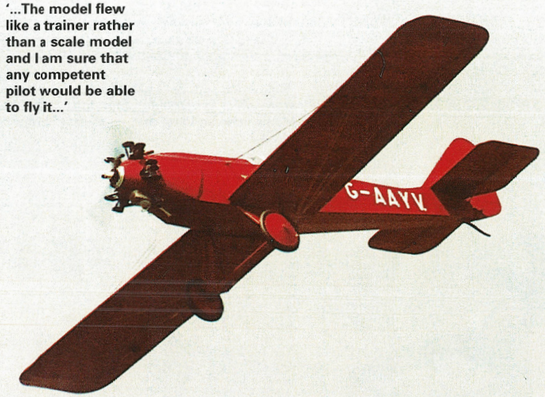


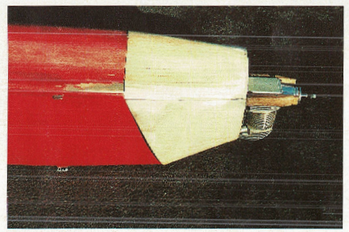
All set to commit aviation! Designer (kneeling) prepares to fire up the big Laser.

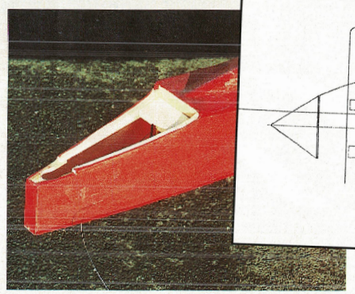
Specification

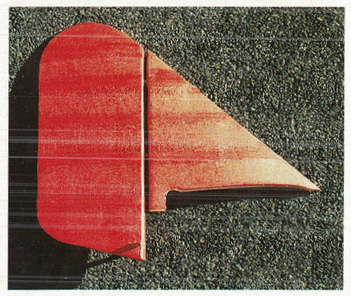
Model:	Avro 625 Avian Monoplane
Type:	R/C Scale
Designer:	Phillip Kent
Scale:	1/4
Wing span:	96" (2438mm)
Engine size:	150 four-stroke or equivalent
Engine used:	Laser 150 four-stroke
No. of channels:	Four - rud./elev./ail./throt.
Construction:	Built-up balsa, spruce, ply
Covering:	Solartex and tissue
Finish:	Sprayed cellulose
Markings:	Humbrol enamel and Solartrim
All-up weight:	13 lbs. (5.91 kg.)

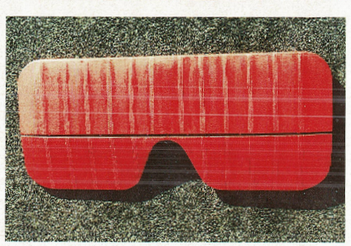
'...The model flew like a trainer rather than a scale model and I am sure that any competent pilot would be able to fly it...'



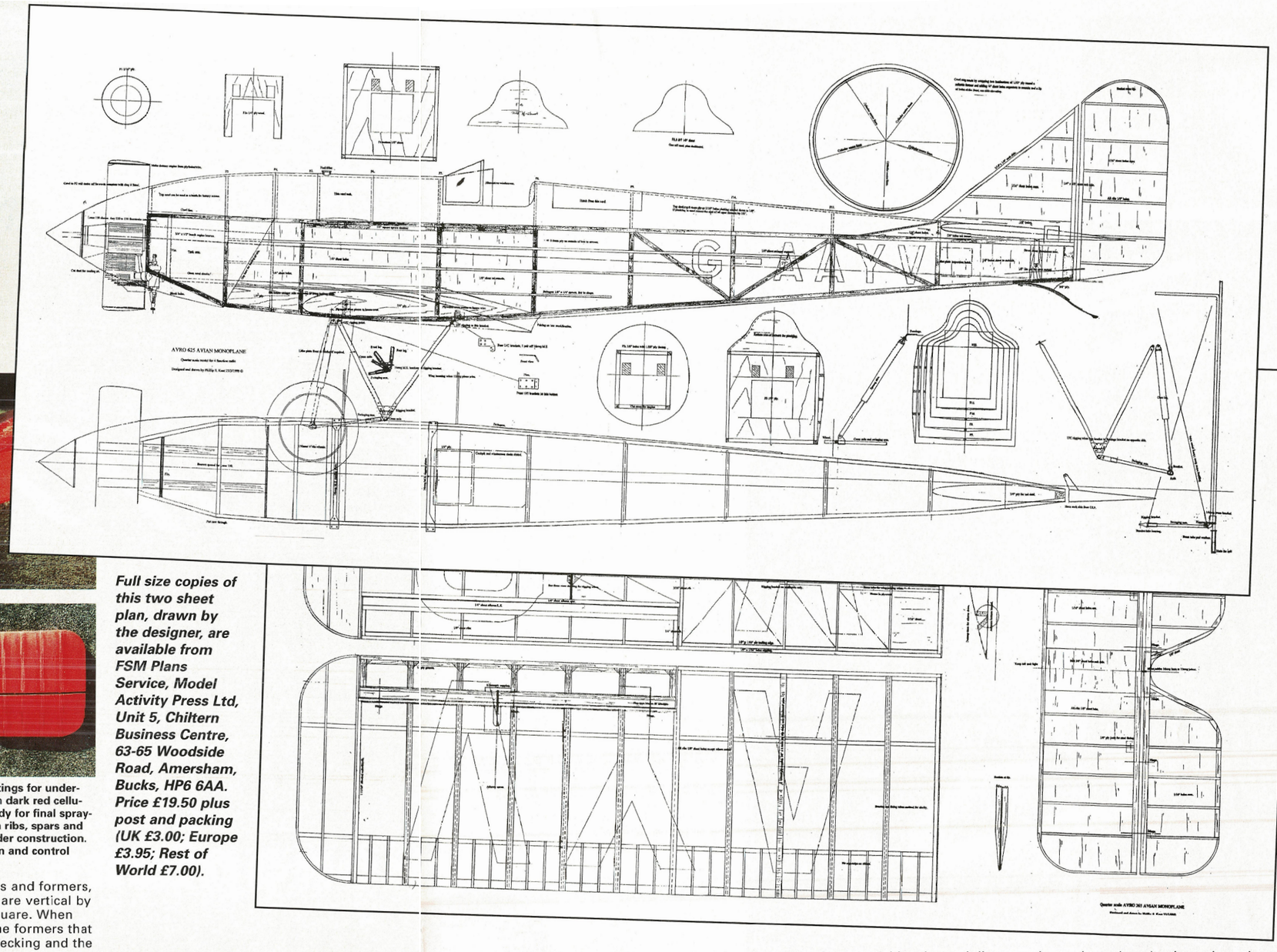








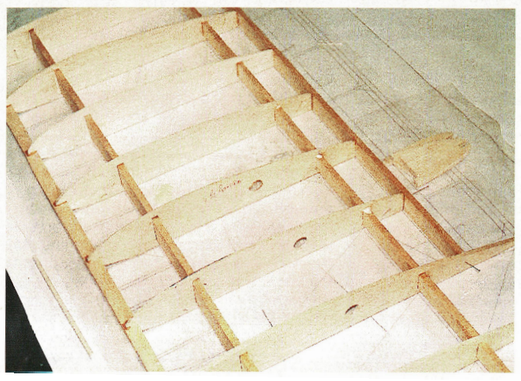
TOP LEFT: Engine in the prototype is a Laser 150 four-stroke; note metal fuselage fittings for undercarriage and wing bracing wires. **TOP RIGHT:** Fuselage tail end prior to spraying with dark red cellulose, showing tailplane seat. **ABOVE LEFT:** Fin and rudder with rib tapes in place ready for final spraying. **ABOVE RIGHT:** Completed tailplane; construction here is a 1/16" balsa core with ribs, spars and leading edges added both sides then sanded to final section. **BELOW LEFT:** Wing under construction. Ailerons are built in with the wing and cut out on completion. **BELOW RIGHT:** Aileron and control horn prior to covering and hinging.

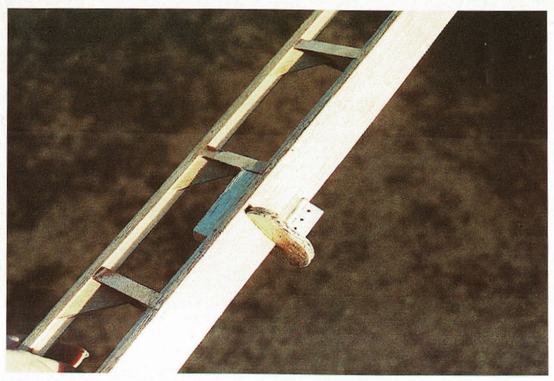


Full size copies of this two sheet plan, drawn by the designer, are available from FSM Plans Service, Model Activity Press Ltd, Unit 5, Chiltern Business Centre, 63-65 Woodside Road, Amersham, Bucks, HP6 6AA. Price £19.50 plus post and packing (UK £3.00; Europe £3.95; Rest of World £7.00).

that they are both the same, you should be all right.

When both sides are finished, give them a light sanding and then pin them over the plan view of the fuselage. Fit and glue in the cross-pieces and formers, making sure that the sides are vertical by using a tri-square or set-square. When the box is complete, add the formers that give the shape to the top decking and the ones outside the box at the nose where it is to a rounded section.





The engine bearers should now be fitted, along with the various plywood cross-pieces for the upper bracing wires the wing wires and vertical ply plates for the tail struts. Next, apply all the metal fittings for the undercarriage and bracing wires. Plank the decking with 3/16" balsa and sand down to 1/8" thick. The nose area is sheeted with 1/8" balsa: note that the rear part of the cowl can be made removable for access to the battery. The three 1/8" x 1/4" spruce stringers can then be fitted to each side and shaped to the correct section (see the former sections); also fit the central bottom stringer. The front cowl is from block balsa and the dummy engine was made from *Williams Bros.* plastic cylinders. As these are presently unavailable, plywood discs and balsa might may be substituted.

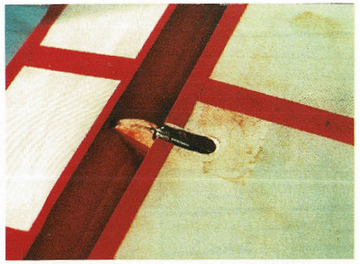
The tail unit

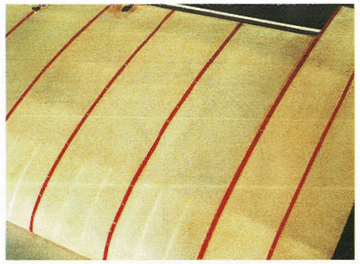
The tailplane and elevator are built on 1/16" sheet balsa cores cut to the outline shape. Add the spars, ribs and the leading edge to one side of the tailplane core. Turn the unit over and complete the second side. Sand to the section shown on the side elevation. The elevator, fin and rudder are constructed in a similar manner and again they are sanded down to the section shown on the drawing. Note the plywood pads that need to be fitted to the underside of the tailplane to accommodate the struts.

Wings

I find it easiest to cut the ribs using a plywood template that is made to the shape of the finished ribs. If two drawing pins are pushed through the template they will stop it moving on the balsa sheet during the cutting operation. Of course it is possible these days to have the ribs cut professionally - check the small ads. in the modelling magazines. The wing structure does need care, as there is no 'D'-box leading edge or sheet covering. It is adequate, however, with the working flat wire rigging.

Pin the plywood trailing edge over the plan; it is a good idea to cover the plan with thin sheet polythene before doing this. Slide the ribs onto the spars before pinning the un-glued structure over the protected plan. Add the leading edge. Build the ailerons in with the wing and cut out and finish later. Note the unusual





FAR LEFT: Aileron covered, hinged and with pushrod connected.
LEFT: Ready for painting. The port wing panel with all rib tapes in place.

Wing registration lettering was hand-painted using card templates to mark position of characters, outlining with drafting pen then infilling by soft brush. Bracing wires are functional and should not be ignored.

shape of the aileron leading edge; this is correct. I used 1/8" diameter basket cane wrapped around the sheet balsa tip profile for the wing tips. This works very well but laminations of 0.4 mm plywood can be substituted.

Do not omit the diagonal bracing and remember to fit the bass wood pads for the wing bracing wires. The servos should be fitted into the wings before covering with hatches if you think that you might need access. I fitted the 14 s.w.g. brass tubes with the wing propped in the correct position to the fuselage. Do both wings at the same time so that the dihedral and incidence can be made the same for each wing. Epoxy the tubes in place and then box in with plywood. These wires and tubes are adequate for the model and they do not need to be made from bigger diameters.

Undercarriage

The undercarriage is made from thick-walled brass or brake pipe tubing and piano wire. Several small mild steel brackets need to be fabricated and the details are provided on the drawing. The fairings were made from balsa and spruce with lithoplate covering on the bungee legs. Silver solder the components together for maximum strength.

Finishing

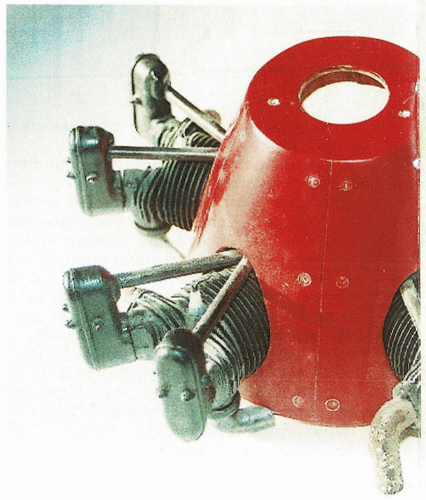
The sheet balsa-covered areas of the fuselage were covered with tissue. The rest of the fuselage was then covered with *Solartex*. The wings and tail unit were again covered with *Solartex* and rib stitching and tapes were added for a more realistic finish. Tapes were also fitted at the joints on the fuselage covering. The tapes were torn from scrap *Solartex* and ironed in place.

Fitting the rigging takes a fair time, but your skills at silver soldering will improve dramatically! You do need plenty of room to do this and it is best to have the model on a table so that you can get to all points. I made a small fixture for holding the wires and fork end fitting in place for the silver soldering operation.

The model was painted with dark red cellulose sprayed on. It is still possible to obtain this paint and it is easy to apply with a spray gun. It does require some form of fuel-proofer if glow engines are used. I decided that the lettering on the wings would need to be hand-painted as there was quite a sag in the covering on the fabric-covered wings. Thin card templates were cut and these were attached in the correct places on the wings. The outline was then drawn in using thinned matt white *Humbrol* enamel in a drafting pen. The letters were then filled in with a good quality soft brush. Three coats were needed to get an acceptable result. The fuselage letters were cut from *Solartrim*.

The windscreen was made from clear plastic sheet with a lithoplate frame. There are two screens shown on the drawing; I fitted the one that was used on the aircraft before it was fitted with the ring engine cowl.

The tailskid was made from spring

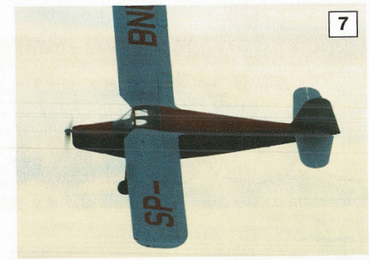


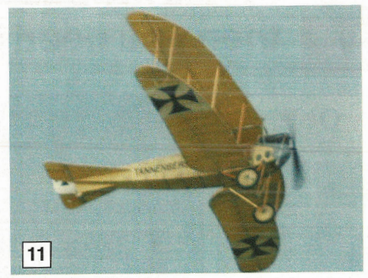
5: Winner in i.c.power with a combination of good scores in both Static and Flying, Bill Dennis's Sopwith Triplane climbs out for a faultless flight. 6: Kevin Wallace runs up the engine of his Sopwith Camel. 7: Charlie Newman's RWD-13 placed 3rd in Co2/Electric. 8: Barry Purglove's rubber powered Lockheed Vega managed a good flight on the first evening of flying. 9: Mike Smith placed 2nd in i.c. power class with his Sopwith Dove. 10: Kate Rimmer runs up her DH Hawk Moth. 11: Pete Illiffe was brave to risk his lovely indoor Co2 DFW B1 in the outdoor conditions, but it brought him 4th place. 12: Derek Knight's Fairchild Argus failed to get airborne.

before dropping into a long floating glide to a touch-down only six inches from its starting point!

On the following Sunday evening the large crowd of spectators once again assembled for the fun, but I the wind was much stronger. Mike Smith and Andrew Hewitt both managed take offs with their models, but the rough wind did not help and Bill Dennis's Triplane was a clear winner in the I.C. power class. ■

13: Terry Manley's veteran Sopwith 1.1/2 Strutter heads for the rough. 14: Nick Bosdet's BE12, unfortunately this time in runway hog mode, on its way to a nose-over in the rough. 15: Kate Rimmer's DH Hawk Moth flew well. 16: Fernando Ramos came over from California again with his Glost Gamecock.





Power – 11 entries

			Static	Flight	Total
1	Bill Dennis	Sopwith Triplane	1664	1610	3274
2	Mike Smith	Sopwith Dove	1758	1477	3235
3	Andrew Hewitt	DH34	1634	1597	3231
4	Terry Manley	Sopwith 1.1/2 Strutter	1396	1687	3083
5	John Rimmer	BE12b	1566	1390	2956
6	Kevin Wallace	Sopwith Camel	1374	1070	2444
7	Katie Rimmer	DH Hawk Moth	1310	1130	2440
8	Billy Henshaw	Corben Super Ace	722	1222	1944
9	Fernando Ramos	Gloster Gamecock	1232	505	1737

CO2/Electric - 11 entries

1	Mike Smith	Handley page 0/7	1678	2000	3678
2	Derek Knight	Bristol M1	1494	1820	3314
3	Charlie Newman	RWD 13	1571	1590	3161
4	Pete Iliffe	DFW B1	1542	1205	2747
5	Kevin Wallace	FK26	1384	1145	2529
6	J Donaldson	Interstate L6	784	1740	2524
7	Steven Glass	Hawker Hunter	1112	1335	2447
8	Louise Rimmer	Piper Cub	1160	1260	2420