Newsletter

September 2020

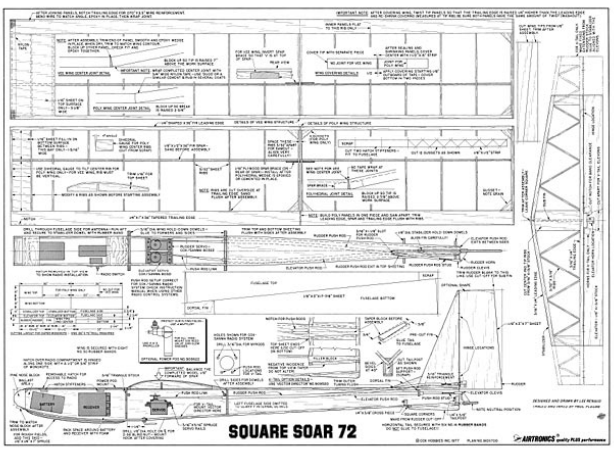
Memories

During my enforced stay in hospital, I had time to muse over so many varied things – some pleasant, some not so pleasant. Memories are wonderful, you can sort of dip into them at will and regain pleasure you had experienced many years before. I kept coming back to one model which gave me hours and hours of pleasure and to be honest it was about as ugly as a model could get. This was the Square Soar.

Quote: 'The Square Soar is an easy to build R/C sailplane designed for the novice. The straight forward construction is similar to many free flight models and provides a rugged crash-resistant structure so important for surviving the first few flights. The constant chord wing and simple box fuselage make building and covering the model a simple task, even for the first-time modeler.'

Now I am aware that a model does not have to be pretty to fly – the Square Soar could never be accused of being even the tiniest bit 'pretty'. I think utilitarian would be a much more apt description.

It wasn't so big that it wouldn't fit in a normal family car – 72" wingspan – just about ideal. It didn't have a clever wing section but really was robust. This kit was purchased and built by my friend Shozo when we used to fly together out in the Quatari dessert along the road from Doha to Dukhan. We would meet up early on our Friday rest days, motor on and on until we found the giant dunes which steadily march



along with the winds. Here, we would pull off the main road and set up our models. Then that long hot climb up the slope till we finally hit the ridge. We always seem to have a breeze at the top, perhaps 10MPH - ideal for gentle slope soaring. I was flying a 100" model which I had brought out in kit form from the UK.

Now, Shozo had never slope soared and was amazed to see my model gently gaining height as I worked the slope, and then as I had height, I could then start enjoying mild aerobatics. I landed after around 30 minutes. Shozo launched his Square Soar but within the next nano second had dumped it unceremoniously lower down the slope. A quick check proved that nothing had been damaged externally, the servos sounded good so all was well. Shozo offered the model for me to test fly for him. Maybe the heavens smiled at that moment but as I launched, that little glider astonished me - it was so responsive – if you look the rudder is large but the elevator, small. Whoever had designed that funny looking model had got it spot on. His model took lift better than mine and when I had got it to height, would loop straight as a die whilst making gorgeous whistling sound from the airfoil section. It was an absolute delight and having handed him back control, he soon became used to the gentle touch that it required.

So, it was with this model that Shozo learned to fly not only gliders but it also tremendously improved his power flying.

The story does not end there. Shozo came to the end of his Quatar contract and went back to Japan. He left me with no less than 26 models including his Square Soar which I shipped back to UK. I can't tell you how many happy hours that glider gave me but I can tell you how it finally ended it's days.

I was flying from the top field on Long Mountain just above Welshpool. I was tooling around with one of those Cambrian Pioneer models when I suddenly found a powerful thermal – I quickly landed and picked up the Square Soar. First launch and I missed the thermal but hit a tree. Swiftly I recovered the model and relaunched except this time, I hit that thermal and up it went like a high speed lift. Shortly after that it became a very hard to see spec – too high and I realized I had problems. I put the nose down hoping to break the thermal. Break was exactly the right word because one wing folded and it was spinning down. It seemed to take ages before hitting the trees to my right. I recovered all the bits

and having removed the radio gear, burned what was left. That Square Soar may have been a very basic design but boy, did that thing fly. Happy memories!

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A VIEW FROM THE HEDGE. (By Will Sparrow) 

Once upon a time you modellers had to clean squashed flies from your model's wing leading edges, cowl fronts and propellers. Similarly, your car windscreens were forever spattered with crushed flies during the warmer months of the year. Not any more, it would seem. It appears that, as a result of global warming, the insects are migrating northward; some estimates (the WOO says) put the northward trend at up to 5 metres per day. The south of England has become devoid of some species. The trend is not confined to insects, either. When did you last hear the call of a cuckoo round here? Apparently, cuckoos now choose to migrate to Scotland, forsaking the southern parts of this country. One can't blame them for leaving the south… but going to Scotland? What with all the native midges and all, Scotland should be really buzzing in the summer months, drowning out the calls of the cuckoos! Are modellers similarly affected by this biological urge to head north, I wonder? Please don't go – for my mental well-being I need my regular aviation fix from the viewing twig.

One beautiful Monday in mid-September saw a good number of your members keen to get some air under their models' wings. That lovely (to my eye, anyway) large, twin electric-powered scale model had also sneaked out for an outing. I love scale models, so it was with happy expectation that I settled myself on my twig. The first take-off had the model's huge canopy come adrift, so a quick landing circuit had to be flown, and the model returned to earth safely. The problem was soon fixed and the model lined up for another take-off. The model lifted off into a smooth and straight climb-out, turned left onto the downwind leg into a level cruise. When abeam the pilot's position, the port aileron/flap suddenly started flapping violently in the breeze – the model quickly changed from a thing of airborne poetry to something resembling a poorly-shot pheasant. The outcome was never in doubt: the model totally destroyed itself in the outfield. It always amazes me how philosophical you model flyers can be after a disaster – I raise a wing to you all.

A View from the Hedge

Later on, in the same week, I almost witnessed a strange occurrence (I had just popped out of the hedge, so the tale was relayed to me by my mate, Jim Sparrow). A member was flying an electric delta when it vanished as he turned to land. I've never heard anything like this before. The model was nowhere to be seen. The outfield is just bare earth after the recent crop sowing, so the model was not hiding in any vegetation; where on earth was it? A search, and subsequent searches, have, so far, failed to find the model. A couple of us had a good fly over the surrounding area and we could see no sign of the elusive model. The mystery remains: is the model laughing at us from its place in another dimension…?

Sunday, 20th September was the day put aside for a BMFA Flying scale competition. There were some lovely models present and folk seemed to have turned up from the far corners of the realm (by all accounts, many needed completion points in order to be considered for the British team to compete at the next world scale championships, to be held in Norway – heady stuff!). I particularly was interested to see a large, and beautiful biplane strut its stuff. Unfortunately the engine would not play ball and the model, like me, was just a spectator. Much nice, scale flying took place and the visitors were all very appreciative of your facilities and the warm welcome they received from your club. Only one of your members took part in the flying and he had motor issues and had to abort both his flights. These events are nice to watch, but are a bit on the slow side ("akin to watching a berry ripen" – JS). I flew over to the car park, as the event was drawing to its close, and was amazed at how that large biplane I so admired, was fitted in to the modeller's estate car – every bit of interior space was full of model. I didn't see the driver get in, but I suppose that he must have.

Are you a "glass half full" or a "glass half empty" type? In these times of plague you should be happy to have a glass at all! Enjoy what flying can be enjoyed and look forward to times when your glass may be ever-full. Shut the gate when you leave and mind how you go…

WS

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Modelling Matters

By Brian Holdsworth

It is often claimed that big models fly better than smaller examples, but what

is the reality?

An aircraft in flight is affected by turbulence in the air through which it is flying. This turbulence is generated by the disturbance from the air movements caused by wind and thermal activity produced by temperature variations, passing over ground surface irregularities ranging from small lumps and bumps, plants, shrubs and trees, ridges and gullies to hills and mountains. Man-made elements such as hedges, fences, walls and buildings, masts, pylons and bridges etc. also have considerable disturbing effects. The restriction from the obstruction increases the local wind strength as the air is diverted around it, magnifying the effects. Light winds generally produce smooth variations becoming more violent for higher wind strengths up to the destructive effects of gales, hurricanes and tornadoes.

Some of these effects can be useful with the rising air over hills being exploited by gliders in the form of slope soarers to maintain unpowered flight. Similarly, thermal soarers exploit the rising air generated by thermal activity from the warming effect of sunshine on the ground where the turbulence from ground irregularities often triggers the separation of the thermal from the ground to produce a rising bubble of warmer air. However, most effects are unwelcome due to the disruption of smooth flight.

The disturbances extend downwind of the obstruction spreading out in three dimensions, reducing in intensity with distance until becoming insignificant. Mountain ranges have effects over considerable heights and distances. There is a range in New Zealand, famous under some conditions for its sequence of high altitude wave cloud formations downwind, at right angles to the wind, marking the peaks and troughs of the disturbed air over a hundred miles or so. These are popular with sailplane pilots aiming to utilise the considerable rising wind effects to reach record altitudes, though several have paid the ultimate price when their aircraft disintegrated in the turbulence. Many powered aircraft, including airliners, have come to grief when flying though valleys, when the downdraughts in the lee of hills and mountains have pushed them into the ground. Fairly recently, micro-burst effects have been identified where localised strong downdraughts under thunderstorm clouds have pushed landing airliners into the ground, killing all on board.

For those on board an aircraft, the effects of turbulence are difficult to identify other than the rough ride. The model flyer, being an observer on a fixed surface (the ground), can see the relative movement of the model against the background of sky or distant ground surface.

For example, the effect of a turbulence event may be to cause the model to be displaced vertically by a distance. The turbulence would generate a vertical force proportional to its magnitude and the wing area over which it acts, producing an acceleration. This results in a vertical movement proportional to the acceleration magnitude and duration, divided by the model mass. Note that mass is the scientific term used since weight varies with acceleration and its use is likely to cause confusion; under steady state conditions, weight equals mass. Assuming the magnitude and duration of the turbulence are fixed, the effects of changes to the model parameters may be assesed in a comparative fashion

without requiring detailed calculations of the model performance which would be very complex due to the difficulty in determining the required parameters.

Increasing the wing area alone would increase the distance moved. Similarly, increasing the mass alone would reduce the distance moved. The ratio between mass and wing area is generally referred to as the wing loading, being defined as mass divided by wing area (eg 16 ounces per square foot). This means that the distance moved is inversely proportional to the wing loading. Doubling the size doubles each dimension so that the wing area would increase by a factor of four and the volume by a factor of eight, increasing the wing loading accordingly.

The movement of the model is perceived by observing the angular visual change in its relative position against the background. If the depth of the model fuselage is increased, the relative movement is perceived to be reduced, so that a shallow fuselage appears to move more than a deeper example. As this is a visual effect, it is not linear and colour can have effects, especially with patterns - blocks of different colours can be confusing, which was exploited in World War 1 with dazzle camouflage. A larger model will have a proportionally deeper fuselage than its smaller-scale version.

The angular visual change is inversely proportional to the distance from the observer. Larger models will generally be flown farther away reducing the perceived vertical effect of the disturbance.

Increasing the model ground speed increases the horizontal angular change rate as the model flies past the observer; this also has the visual effect of reducing the perceived vertical effect of the disturbance. Due to their higher wing loading, large model speeds are generally higher. A head wind reduces the ground speed magnifying the effects; similarly, a tail wind increases ground speed reducing the effects. The effect of wind is proportional to its ratio to airspeed so has a greater influence on a slow-flying model.

Thus, a lightly-loaded, slow-flying thermal soarer would be affected more than a heavy, fast-flying jet, even if considerably larger.

There are other effects of increasing size in the form of generally-improved aerodynamic performance. Reynolds Number is used in aerodynamic calculations in an attempt to compensate for scale effects. It is proportional to the

airspeed squared and the chord of the flying surfaces, wing, tailplane and fin, together with control surfaces such as ailerons, elevator, rudder, flaps etc. It is somewhat inexact, with limitations at smaller sizes, particularly for chords below about two feet which covers most models. Specialised airfoil sections can extend performance into smaller sizes, but for chords below about eight inches, performance deteriorates rapidly.

Much of the reduced performance at smaller sizes comes from the edge effects at the wing root and tip since these effects tend to act over a fixed distance rather than a proportion of the surface size.

Increasing size helps other items such as propeller efficiency where increasing diameter helps, though with upper limits since the resultant rotational tip speeds can cause problems with compressibility effects over about 250 mph and particularly as supersonic values are approached (about 760 mph at sea level). Tip speed can be reduced by using lower rotational speeds for larger diameters, with the pitch increased accordingly to maintain adequate pitch speed. Typically, these adverse effects become significant over about 14 inches diameter.

Engine efficiency also increases with size towards a limit, with multi-cylinder configurations extending the useful size. There are upper practical limits, though these are beyond normal model applications.

There are several disadvantages with larger models. The greater stresses from the increased leverage of aerodynamic forces require consideration of structural integrity. Larger engines generally produce more vibration which increases the stresses on the structure, radio, servos, linkages etc. Servos draw higher currents with consequential difficulties in providing adequate power supplies. Building/purchase costs are higher for the model and associated equipment such as engines, servos etc. Storage, transport and other handling become more difficult. Flying strip requirements become more onerous with greater consequences in the event of landing off the strip. Flight costs are higher due to the greater fuel usage etc.

Electric power in larger sizes has limitations, since heat dissipation becomes problematic for currents over about 50 amps. Battery voltages over 50 volts would require increasingly rigorous safety precautions, since electric shocks

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from high voltages can be lethal. Speed controllers for such voltages are expensive, since their design and implementation are difficult, with any failures more likely to result in a fire with consequential loss of the model together with potential for damage/injury to property/personnel.

Some legal operational restrictions apply to a model over 7kg. Over 20kg is regarded as a full-size aircraft, due to the potentially increased consequences in the event of incidents. Considerable formal inspections etc. of the model and flyer abilities are required to obtain and maintain CAA exemptions to permit flight under additional restrictions.

Thermal soarers present operational limitations at higher wing loadings, since the model is less likely to produce significant vertical movements when areas of lift or sink are encountered. Varios etc. may be installed to improve feedback by reporting small vertical velocity changes via telemetry, There is, inevitably, a reduced ability to exploit patches of weak lift. Any improvements in efficiency with increased size can increase "still-air" performance, reducing the need to exploit lift to extend flight duration.

As ever, the various advantages and disadvantages need assessment to select an acceptable compromise!

Club Instructors

Jason Reid, Mark Conlin, John Higgins, Brian Holdsworth, Chris Vernon, Andy Harrison, Jim Sheldon, Paul Cusworth, Justin Goldstone, John Prothero and Kevin Watson.

In Conclusion

For this monthI have at last started to use a much more powerful programme. I bought this maybe a year ago and found it to be so way out complex that I gave up on it.

I've had lots of time to fill recently so I started to watch the tutorials and realised that it was worth investing whatever time necessary to finally shake hands with it. So this is the very first time I have used it in anger - the more I use it, the easier it will get.

So it is time to rake through my pictures to again look back on so much happier times.

The North American Sabre at Elvington LMA