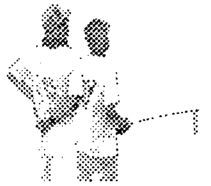

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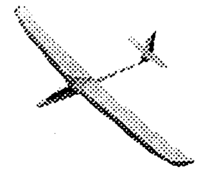

Official Newsletter of the Southern Ontario Glider Group Inc.

Volume 12 Issue 4 August 1996

My apologies for the tardiness of this issue! With the sudden improvement in the weather, there have been too many distractions for your editor and she's been too easily distracted to sit at a computer monitor!

We have another fantastic issue thanks to our scale afficionados: Bill Woodward and Fred Freeman.

Before we get to them, however, I've been asked to remind everyone to USE THE FREQUENCY BOARD at the field! Apparently there was a mishap involving someone who didn't use the board and suffered the consequences!

Also, regarding GNATS' July 28th contest, Bud Wallace reports that "we came; we conquered!". Stan Shaw took second and Bud took third place in the contest. Erik Rash of the Clarence Sailplane Society was first. Congratulations to everyone!

This will be the last issue before our indoor meetings start in October, so don't forget to mark Sunday, October 20, 2:00 p.m. on your calendar. That's the date of our first meeting.

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Airfoils for Scale Sailplanes, Part 2.

by Bill Woodward

Most model airplane flyers have experienced tip stall at one time or another. It typically occurs at the worst time, just as one's model is close to the ground during a landing approach. The aircraft suddenly drops a wing, and before you know it, you have a crumpled outer wing panel. Why then does the model drop a tip? The reason is because the tip airfoil section reaches its stall angle before the inner panel section of the wing, thus lift ceases at the tip and the wing drops on the side of the stalled section.

Tip stall can be attributed to two main causes: a warped wing and/or bad wing design. The warped wing best illustrates how the tip stall occurs, so we will first consider this situation in our discussion.

Suppose you have a model on which the outer panel of the wing has a warp in the trailing edge, starting at the panel joint and gradually warping downwards to the tip. Let us suppose that the warp is quite large say about a centimetre below the proper position of the trailing edge. In technical jargon this condition is known as wash-in. Since the trailing edge at the tip is lower than the trailing edge at the inner panel, the airfoil section at the tip will be presented to the air stream at a higher angle than the inner panel section. The angle of the tip may be close to the stall angle or it may even be at stall angle. If the model has the warp on only one wing, say the right wing, the right wing will go down and the model will start into a turn to the right.If the speed of the model is decreased by raising the nose of the aircraft, lift at the wing tip will drop off further, the wing drops drastically to the right, and the aircraft could go into a spin.

Tip stall can also occur on an aircraft that has no warps in the trailing edge. Generally this is due to bad design. The plan form of a wing is an important factor when designing wings. Wings having a plan form that is strongly tapered are highly susceptible to tip stall. The

Inside This Issue

plan form which best prevents tip stall, is an elliptical shape. However, sailplanes rarely have elliptical shape wings because they are diffcult to design and build with the high aspect ratios that are required for an efficient wing. Thus a compromise is struck, and most sailplanes have mildly tapering wings with wash-out running towards the tips. Wash-out is of course, the opposite to wash-in. That is to say, the trailing edge is twisted upwards as it moves out to the tip. The washed out tip section will present an angle to the airflow which is less than the angle of the inner sections. This will result in the inner section stalling before the tip stalls and will maintain the aircraft in a level wing state.

There is an interesting story on the effects of wash-in/wash-out that Martin Simons tells in his book on vintage sailplanes. It concerns the crashes of a number of Slingsby King Kites due to tip stall at low speed. Here is Martin's account of the problems written with typical British understatement:

"Obviously something was seriously wrong. The cause of the trouble was not discovered until some years later. Fred Slingsby was carrying out an inspection of a King Kite when it occurred to him to check the incidence across the span. This convinced him that the three degrees washout intended by the designers had been reversed in the workshops, the wing having three degrees of washin! This, together with the bad stall of the aerofoil, would have accounted for the dangerous spinning charateristics. The wingtip stalled before the wing root, so a wing drop and spin were almost inevitable at low speeds".[1]

Recall in Part 1 of this article, I wrote about the scale effect. The problem of tip stall in many sailplanes can partly be attributed to the scale effect. Consider a sailplane with a tapered wing. The tip airfoil section has a smaller chord than the root section and therefore must suffer from scale effect. Hence, if the airfoil is the same section along the wing, in order for the tip to produce the same amount of lift as the root, the tip section will have to travel faster than the root.In straight flight, the tip is travelling at the same speed as the root, and it is only in a turn that one of the tips will exceed the speed of the root. In the turn, the tip at the outer point from the turn centre will travel faster than the root. This will produce more lift at the tip and is part of the reason why the fast travelling tip starts to rise, putting the aircraft into a bank.

If we now go back to considering the above sailplane in straight flight with the nose raised to slow the aircraft, the lift will begin to deteriorate at the tips to a smaller and smaller amount. Chances are a tip will drop and put the aircraft into a spin.

To combat this effect, full size designers use higher lift coefficient sections at the tips. The transition from the inner airfoil section to tip airfoil section is accomplished gradually from a point on the inner panel on out to the tip. The point where the transition begins may be dictated by the plan form of the wing and to some extent, depends on the designer's whim. For example, the change could start from the root out to the tip or in the case where the plan form of the wing has a straight inner panel and an outer panel tapering to the tip, the change of section might start at the beginning of the outer panel. Some wash-out is also used along with the change in section.

A typical example of this practice is the section and wash-out used on the King Kite. The root section is a NACA 23021, tapering to a NACA 4415 at the tip. The designed wash-out is three degrees, and I suspect, (although I have no evidence), that the transition starts close to the root. The wash-out will probably start from the same position as the change in section, but this is again conjecture on my part...

The example described above, has two different airfoils which give a smooth shape transition from one to another. It is important that the designer chose similar shaped airfoils. If they are radically different in shape, the wing will not only look weird, but will perform in strange ways. One method of obtaining an airfoil with a greater lift coefficient, is to increase its camber. A designer can start with a specific airfoil and gradually increase its camber as the airfoil transits toward the tip. With modern computer programs, this is an easy thing to do.

There is however, a limit to which the camber can be increased before problems occur with the aerodynamics of the section.Without generating the data for the particular airfoil, it is hard to say where this point begins. At a guess, a moderately cambered airfoil of say 3% camber, can be increased from about one half to one percent without suffering a problem.The main problem with increasing the camber is that the angle of attack at which the airfoil will stall is decreased. Due to this fact, the use of wash-out is imperative.

In contrast to the practice of increasing the camber of the airfoil out to the tip, early designers used an opposite philosophy. They reasoned that because the decreasing of camber on an airfoil increased the angle of attack at which the airfoil stalled, then the obvious thing to do is to decrease the camber as the section ran along the wing. However, although this practice solved the problem of tip stall at low speed, it caused problems at high speed reducing the efficiency of the wing.

Tip Stall Remedies for Scale Models

The above outline for full size sailplane design practice, serves as guide for preventing tip stall on scale models. In most cases, the remedy applied to the full size aircraft can be applied to a smaller scale model of the full size. Minor modification may be necessary because the model will be using a different airfoil. For instance, the wash-out may have to be a little greater than full size.....mainly to give the modeler a greater margin for error when flying the model.

The choice of tip airfoils can be approached from the technical standpoint by studying polar charts of lift and drag coefficients for various sections. From the charts, you can look at the zero lift angle of attack for various airfoils and decide the airfoil that best matches your selected root airfoil. To save you time poring over many charts, the list shown below matches the airfoil sections given in Part 1 of this article. An appropriate tip section is recommended and the amount of wash-out to be used. This is by no means the only combinations possible for the given airfoils.

Eppler 195 to Eppler 193-- at the tip...
  1°- 1.5°-- wash-out
Eppler 197 to Eppler 193-- at the tip...
  0°- 1°-- wash-out
Eppler 207 to Eppler 205-- at the tip...
  2°- 3°-- wash-out
Eppler 209 to Eppler 205-- at the tip...
  2°- 3°-- wash-out
Selig 4233 to Eppler 193-- at the tip...
  2°- 3°-- wash-out
SD 7032 to Clark Y-- at the tip.........
  2°-- wash-out
SD 7062 to Clark Y-- at the tip.........
  2°-- wash-out
SD 7062 to SD 8020-- at the tip ....
  5°-- wash-out... for older vintage models.

Note: Before you make your choice on the amount of wash-out you are going to use, check how much the full size aircraft had. If in doubt, use a little more than the full size. Remember it is better to err on the large side; although too much wash-out may impede the performance of your aircraft a little, it may save you the tragic consequences of a spin in to the ground.

3% Quabeck Section (HQ3/-) for modern sailplanes.

To obtain scale looks, it might be necessary to reduce the section thickness from the root to the tip. For example, if you choose an HQ3/15 for the root, you might have to use the HQ3/12 for the tip to maintain the scale appearance of the wing. If this is the case, then one half of a degree of wash-out is recommended for every percent decrease in thickness. For a root with a HQ3/15 and a tip of HQ3/12, this is a reduction of 3%, (15% -12%) in thickness. Therefore, 1.5 degrees is required for washout. If in doubt, it would be safer to add 0.5 of a degree to the above value and make the wash-out 2 degrees.

If the wing of your proposed design looks scale without having to reduce the thickness, you could possibly use a 3.5% cambered Quabeck section at the tip. The alternative is to modify the 3% to a 3.5% using a computer program.

Gottingen Sections

For the Gottingen sections given in Part 1, the obvious method to prevent tip stall is to use full size practice. That is to say, reduce the camber of the section and apply lots of wash-out. The Slingsby T46 and T21 both used Gottingen sections and on both the tip section is fully symmetrical, (0° camber). The washout on both of these aircraft is eight degrees. My model of the T46 follows full size practice with a symmetrical section at the tip and an equally large amount of wash-out.

As you can see, choosing an airfoil for your next scale project is more of an art than science. I hope my notes and comments will help you in your choice.

Reference: 1. Martin Simons, The World of Vintage Sailplanes, 1908-1945 (Melbourne: Kookaburra Technical Publications, 1986), p.152

Editor's Note: I recently purchased the book that Bill referenced for his article. It is available from Raul Blacksten, archivist for the Vintage Sailplane Association. His mailing address is P.O. Box 307, Maywood, CA 90270 U.S.A. His email address: raulb@earthlink.net

He has two other books available. Both in Italian: "Luigi Teichfuss, Italy's Forgotten Glider Designer" and "L'Aliante Militare". Quoting from the brochure he sent me, the first book "contains a lot of information, B & W pictures and 3-views of Teichfuss and his glider designs which cannot be obtained anywhere else." Of the second book, Raul says: "...chock full of information on the military gliders which were developed for use during WWII: 3-views, B & W pictures, and data."

Look! Up in the sky...
by Ann Tekatch

For most of my adult life, I have been a casual bird watcher (that is, I watch them casually, I don't just watch "casual" birds - oh never mind!) and I was delighted to discover that r/c gliding offers a marvelous opportunity to watch and learn from our feathered friends.

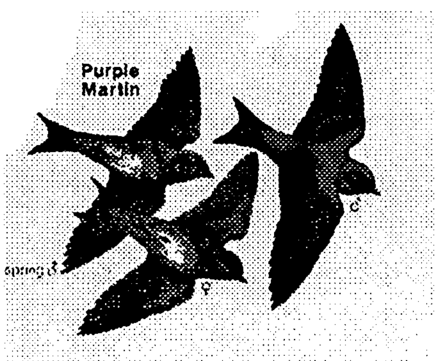
At the field, I've been delighted to spot not only turkey vultures, but hawks, swallows, seagulls and great blue herons. (I've been unable to identify those little birds that nest in the tall grass and charge out at passing gliders, though. If anyone can help me identify them, I'd appreciate it!)

It drives me absolutely nuts when someone at the field says "hey, look at the hawks circling over there" and points to a group of soaring turkey vultures!

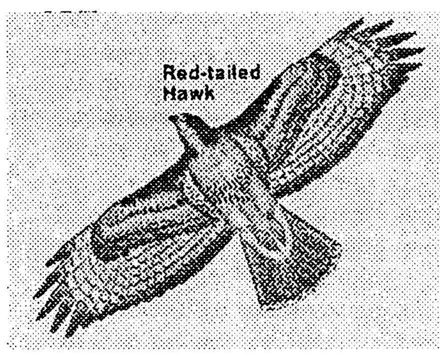
So here's something completely different for all you glider-guiding, bird-challenged pilots:

The R/C Glider Pilot's Guide to Soaring Birds

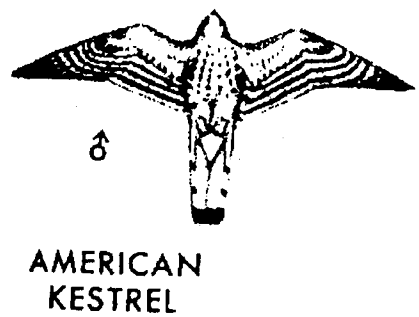
This is our most frequent visitor! Easily distinguished by the dark "Y" or "T" shape. Turkey Vultures are quite large. They have a wingspan of 69" - bigger than a hand-launch glider, smaller than a two metre!



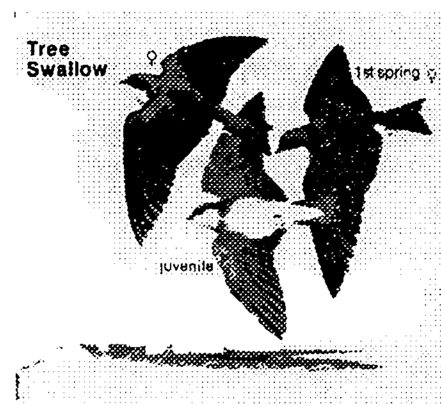
Purple Martins belong to the swallow family. They eat small insects including mosquitoes. Purple Martins are larger than tree swallows and mostly dark underneath. They look much like Starlings but fly like swallows: short glides followed by rapid flaps of their wings.



Red-tailed hawks are the most common hawks in our area. They have a wingspan of only 50" and are easily identified by their lighter markings. Most of the hawks in our area have similar coloration on their undersides.



American Kestrels are beautiful birds, about the size of a Blue Jay. They hover over their prey (insects, reptiles, small birds) and then plunge down on them. I once watched one of these "sparrow hawks" pounce on a sparrow at a backyard bird feeder! Amazing.



These are likely the most common swallows to be found near our field. They're dark on top and light-coloured underneath. Swallows feed on small insects that get sucked up into the air in thermals. If you see a flock of swallows circling, point your glider toward them!

Why Build Scale? - Again!

(More ramblings of a one-track mind!)

by Fred J. Freeman

In these days of RTF's, ARTFS (glad I got that one in the correct order!) and RTC's, etc., it is difficult for many people to even consider the task of scratch-building a scale-soarer; after all, duration's the thing, isn't it? At least, that's the more popular idea, once you've discovered that you are capable of defying gravity for increasingly longer periods - and that's fine with me because, sooner or later they are going to say to themselves "Is this all there is to this game?". When most people get to this stage, they feel that they have a choice - they can say that they've mastered the art, or they can do "something more sophisticated"; well, I ask you, what could be more sophisticated than a scale model of, say, one of those Super Sailplanes you've seen floating majestically over the green fields of Southern Ontario?

Now, I'd be the very first to admit that scale modelling does not appeal to everyone, but, judging by the amount of interest generated whenever a scale model appears at the field, there are quite a few who, with a little encouragement, might be inclined to have a go.

There are a couple of points I'd like to make; first, it might be advantageous to ask around before deciding what to build, and secondly, it must be realised that it's not going to be quite as simple as buildng a 'Gentle Lady' - but the end result can be much more rewarding.
Some of the reasons which are given for not building scale are:

1. They don't fly very well. This statement has been disproven time and time again - ask Bud Wallace: the first flight of his new T53B was timed at 7 minutes!

2. They are too complex - a scale model can be as complicated as the modeller wants to make it; choose a simple type for the first effort.

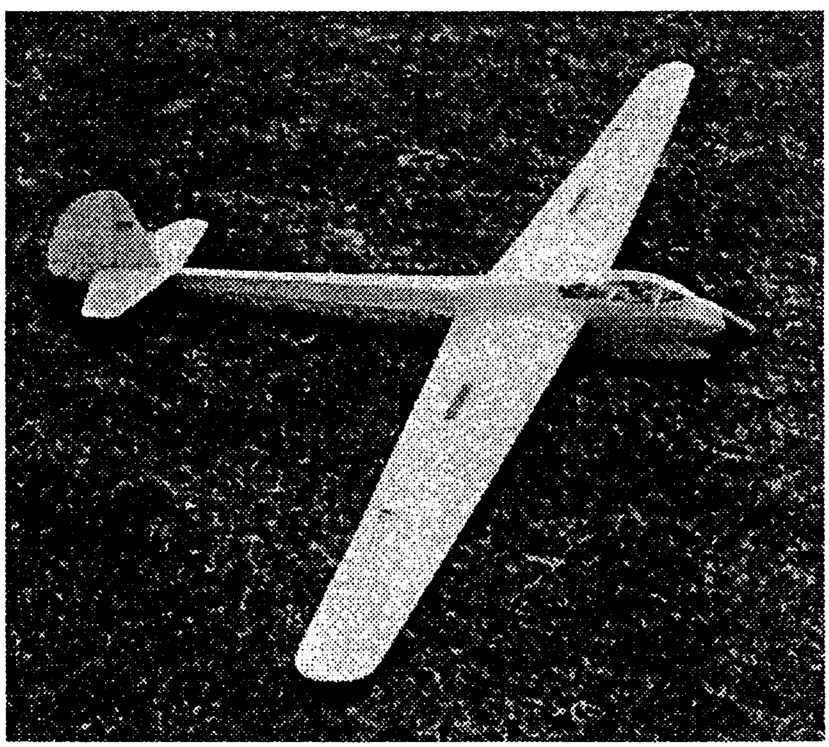
3. Size - try not to be bamboozled by the 1/4 or 1/3 monsters seen in the pages of "R/C Muddler" or "Muddled Airplane News", etc. True, the larger models do tend to fly better, but some smaller models are just as satisfying; there is a good case for simple scale types similar in size to a Gentle Lady or Riser, say around 2 - 2.5 metres in span.

4. Cost - Again - it depends on what the modeller wants to do as regards size; larger models tend to be more expensive simply because they demand more materials like carbon fibre, fibre glass, etc.; even covering a really large model can cost an arm and a leg, so why not think smaller?

5. Convenience - Larger models also take up more space, not only in storage in the workshop, but also in the car - I've seen photographs of some that look as it they'd need a 22 wheeler to get them to the field; such large planes usually require air towing or a very powerful winch to get them off the ground. The size I'm advocating would be capable of being launched with a standard hi-start.

About the only good thing going for 'big 'uns' is that they are easier to see at great heights!
That's all for now - see you next time - till then, remember to drift with the lift!

The photo below is of Fred's 1/5th scale Scheibe Mu13D.This aircraft had its first flights around 1954-56. The model spans 126" with an area of 950 sq.in. Weight is 5 lbs and Fred says it flies well!



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Big Bird Bash Report
by Ann Tekatch

Once again, our annual "Big Bird Bash" was a success. Thirteen pilots registered for the day and what a day it was! The lift started early and remained strong until at least mid-afternoon.

I promise to have photos in next issue's TASK - I couldn't get them developed in time for this issue.

The task for this year's Bash was 3 minutes, 5 minutes, 8 minutes and 11 minutes.

Our winning pilots were:

Stanley Shaw	1699 pts
Mike Thomas	1681 pts
Bill Moar	1680 pts

Your most humble editor won Best Sportsman - MUCH to her surprise!

Special thanks go to Stan Shaw for organizing the day and especially for arranging the finest weather imaginable!

July 6th Triathalon Contest
by Stan Shaw

With terrific weather - hot and sunny - some fourteen people showed up to try their luck. The task was to fly exactly 2 or 4 or 6 or 8 or 10 minutes for maximum points or fly straight time. The landing circle counted 100 points if inside a 25 foot circle. We flew four rounds and the action heated up as the temperature rose to generate great thermals. The visiting GNATS members, Larry Literovich, Ed Plowes, Lou Kleiman and Gil Levesque, made it a memorable, jovial and enjoyable contest with their presence. Thanks for coming to suppport our events!

The results after the last exciting round were:

Stan Shaw	2751 points
Kurt Fritz	2671 points
Bob Hammett	2216 points

Gil Levesque was Best Sportsman with 1297 points.

July 7th Sunday Novathon Contest
by Stan Shaw

Boy, getting up for the second day was a drag. It was going to be a very hot, sunny day with high humidex. Thirteen flyers showed up to try their luck. The task was to fly exactly 3, 5, 7 or 9 minutes for maximum points or fly straight time. Landing int he circle got you 25 points more. With the wind picking up from the southwest, we had our work cut out to find the thermals. Ed Plowes and Lou Kleiman came from St. Catharines to experience both the glory and anguish of defeat and/or broken wings. After four rounds, the results were:

Lou Kleiman	1478 points
Joseph Baltaza	1408 points
Gerald Fritz	1241 points

Best Sportsman was Paul Penney scoring 395 points for his first contest. Congratulations to the winners.

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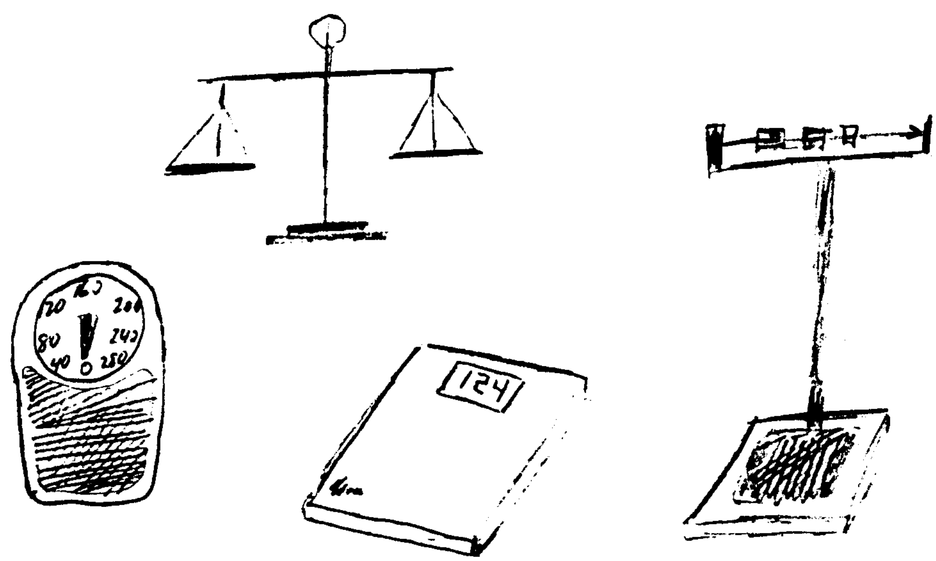
Deadline for October issue of TASK: Oct.11/96
Phone, fax,email, modem, mail, hand-deliver or tie your articles/photos to a scale glider and aero-tow them to us!

Artist's Conception

The Date: June 1996
The Place: SOGGI Field
The Situation: Scale Rally



1996 Calendar of Events

September 15	GNATS Invitational Novathon Contest at club field.
September 21 & 22	*GNATS Scale Fun Fly for sailplanes and motorgliders at the club field. Contact Gerry Knight (905)934-7451 or Don Smith (905) 934-3815 for details. Robin Lehman of Sailplanes Unlimited will be attending this event! Don't miss it!*
October 20	SOGGI meeting. 2:00 p.m., Rockton Library, Rockton, Ontario
November 17	SOGGI meeting. 2:00 p.m., Rockton Library, Rockton, Ontario
December 8	SOGGI meeting. 2:00 p.m., Rockton Library, Rockton, Ontario