TASK

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Inside This Issue:

Apologies for the delay in producing this latest issue of TASK. I've received several good articles recently, and am looking forward to sharing them with you. We've got a good selection this month, with some good technical advice from Bob, and the conclusion to Andy's Bubble Dancer Build.

If anyone would like to share their winter project progress with the club, please let me know, I'd be happy to add it in to a future issue of Task!

Marc Freeman

What It's Like to Fly at SOGGI – Bob Hammett

2017 has been another good flying year. At last count, we've had 65 flying sessions at our sod farm site, plus a smaller number of sessions at our slope-flying site. And there may still be a few good flying-days left in 2017.

This year's flying sessions at the sod farm set a professional example in etiquette and field safety. On every occasion, before equipment was unloaded from our cars, Air Traffic Control received our phone call asking that SOGGI's NOTAM be activated. Our NOTAM warned full-scale aircraft that model flying was in progress.

Taking wind direction into account, traffic cones were then set up in a standard pattern to outline our pit area, the flight line, and to mark the remote anchor point of each hi-start or winch. Landing-tapes marked landing zones. These markings warned people on the field to be aware of models being serviced, launched or landed. Since we know that electric motors can throttle-up without warning and can hurt you badly, electric-sailplanes in the pit area were at all times pointed outwards, away from people. People ready to launch, delayed launch as long as necessary to allow other people to exit the hazard zone in front of the flight line. Our Frequency Board was used, and is still relevant.

Our weekly "contests" were casual affairs. I don't think anyone took the "competitive" aspect too seriously ... it was all in fun. But practice did improve our flying skills, and our equipment improved either by tinkering, or by the unforgiving law of natural selection. Flying sessions usually ended with a visit to Tim Hortons in Caledonia. There, the day's proceedings were analyzed, and a productive exchange of ideas and information occurred.

The key to a happy club is "participation". Participants become familiar with standard field procedures, and they get to know each other. Both the use of the field and the duties of the field get shared fairly and equally. This healthy atmosphere

makes it possible to attract and retain dedicated people to fill the club's leadership roles.

If you are a beginner or new member, we strongly suggest that one of your highest priorities should be to visit our flying field while a flying session is underway. Attending flying sessions will acquaint you with the daily progression of events, so that when you eventually bring your own airplane to fly at the field, you will know how to fit into the activity that will be going on all around you.

The "Fly with Friends" Forum on the Message Board of SOGGI's website (www.soggi.ca) is used by members to coordinate our casual flying sessions. Sessions are planned with as little as 24 hours notice, in response to a favourable weather forecast. Monitor the Message Board and add your own message to let others know that you're coming. They will include you in their plans. If an instructor knows that you are coming, you may be able to get some stick-time on a club trainer.

At the field, you can see how SOGGI's comprehensive Flying Field Guidelines are interpreted in simple daily practice. An extra pair of hands is always appreciated at the start of the day when we are setting up field markings and the launching tackle. Observe and ask questions. Afterwards, join us for coffee.

When you fly your own airplane for the first time, your SOGGI Instructor will be at your side. Prior familiarity with other club members and with field operations will minimize any distraction, leaving you free to concentrate on that all-important first flight. And your entire Team will be rooting for you.

The Benefits of Telemetry - Bob Hammett

Telemetry was discussed during one of SOGGI's 2017 winter/spring Workshops.

There are at least two distinct types of telemetry systems. "Stand-alone" systems are physically independent from the aircraft's radio control system. They consist of a dedicated airborne Transmitter that sends telemetry data to its' own dedicated ground-station Receiver. The airborne telemetry unit can be connected to a variety of on-board sensors. The stand-alone ground-station reports data to the pilot via screen display, automated voice and/or sounds.

Two-way communication is now being incorporated into some 2.4 GHz frequency-hopping radio control systems. Frequency hopping R/C transmitters send control-

signals to the receiver via a blindingly fast, repetitive pattern of frequency hops. By pre-agreement, this repetitive pattern of hops is known to both the pilot's hand-held "transmitter", and the airborne "receiver". The hop-rate is so fast, and there are so many frequencies used in the pattern, that during any given time period, a bit of interference on a few of those frequencies amounts to diddly-squat compared to the flood of intentional control information that does get through successfully.

"Bi-directional" radio-control systems incorporate a telemetry downlink. A variety of telemetry sensors can be connected to the receiver. There is not much layman's information available about how the radio downlink is achieved. My surmise is that telemetry data is transmitted in fragments via the receiver's own antennae, back to the Pilot's transmitter during the duration of each frequency hop. (The terms "Transmitter" for the pilot's handheld device, and "Receiver" for the airborne device have been retained, but in truth they are now misnomers, because both devices continuously send and receive radio signals to and from each other.)

Compared to "Stand-alone" telemetry systems, "bi-directional" R/C systems make more efficient use of space in the aircraft, add less weight to the aircraft, and eliminate any concern that telemetry radio signals may interfere with the higher priority aircraft-guidance radio signals.

I am now in my second year of experimentation with one of Futaba's bi-directional R/C systems with telemetry (a Futaba T10J "Transmitter" and Futaba R3008SB "Receiver") This entry level R/C system can be equipped with various telemetry sensors. The pilot gets telemetry data via headphone "voice", warning buzzers, chimes or screen displays on the pilot's "transmitter". Here is what I am currently using:

Telemetry for my Line-Launched Sailplane

Receiver battery Low Voltage (by warning buzzer)

1200 foot Altitude limit per Air Traffic Control requirement (by warning buzzer)

*Rate-of-climb-or-sink (by headphone voice)

*Rate of climb if > 0 M/S (chime)

*Altitude (by headphone voice)

My Electric Sailplane telemetry is same as for my Line Launch sailplane, plus:

*LiPo propulsion-battery voltage during motor-run (by voice).

Rate of Climb if > 200 Meters/30 sec. (by continuous chime during motor run)

**these functions can be turned on and off individually, during flight*

One quirk of the Futaba system is that "voice" telemetry suffers from a variable delay of about 3-4 seconds. Conditions being experienced by your sailplane *right now*, may have changed substantially during this interval. Some of the delay is due to the time it takes to say "Rate of Climb two meters per second. Altitude three hundred and sixty five meters").

To reduce delay of the rate-of-climb data during thermal hunting, I programmed a "chime" sound to repeat as long as Rate-of-Climb exceeds zero meters per second, meaning the aircraft must be in a thermal. If the chime stops, your thermal is gone. The Altimeter Voice can be switched on intermittently, to confirm overall vertical progress.

Contrary to popular expectations, telemetry has greater value during test flights and practice sessions, than during contests:

- Telemetry can give you early warning that your on-board radio battery is failing, allowing you to land the airplane before total radio control failure occurs.
- When practicing for ALES contests
    - if your transmitter stop-watch and your motor are both controlled by the same ON-switch, the transmitter can provide an audible tone when 30 seconds have elapsed, indicating your motor-run target-time has elapsed.
    - Vario can be set to "ping" as long as your rate of climb is exceeding the 6.67 M/sec threshold needed to reach 200 Meters in 30 seconds.
    - Altimeter-telemetry can confirm if your motor run fell short, met, or exceeded the target launch altitude (and by how much).
    - Voltage-telemetry can report if your propulsion battery's voltage is collapsing before target-altitude is reached. You battery charger can tell you how much energy is consumed per launch. From this information, you can calculate the minimum required battery mah capacity and appropriate C-rating. A battery of minimum weight can then be selected.
    - Your propeller size and required motor rating can be optimized by a similar process.

- Vario-telemetry informs the pilot of sink rate more accurately than his human vision can perceive. With this better information, sink rate can be more closely optimized. The improvement can be amplified by installing a pitch-axis gyro.
- While flying around in level circles, your airplane alternately comes toward you, and flies away from you. Vario-telemetry can train your brain to beware of the optical illusion that your airplane is climbing and sinking while approaching or receding. You can learn to modify your control-stick activity accordingly.

Using telemetry for thermal hunting *during* a contest might provide some advantage, if the contest rules allow it, and if none of the other competitors have telemetry. But in my opinion, the far greater value of telemetry lies in the clues it provides for making basic improvements to your aircraft.

Bubble Dancer Progress Part 3, The Finale - Andy Meysner

Progress

I'm just going to describe the most interesting and troublesome parts of the build since part 2. I came across a few problems that resulted in some quiet profanity, but eventually got solved. The good news is she is finished and flies quite well to boot.

Wing Mid Sections

The wing tips and centre section had already been built, and I mistakenly thought that the mid sections would consequently be a breeze - not so. The mid sections incorporate the wing washout. This is optional but definitely worth incorporating as it reduces turn radius as well as wing tip stall speed in a turn. I knew that the two principal methods of incorporating washout are; a) build it into the wing on initial spar and rib assembly or, b) put a twist in the wing when gluing on the top sheet of the D box. Intuitively method a) seems better since it does not result in residual stress in the D box, which I thought would also likely result in an uneven washout from one wing to the other. I researched experience with this on RC Groups and concluded method a) was the way to go. While assembling the

Checking washout at the mid to tip wing

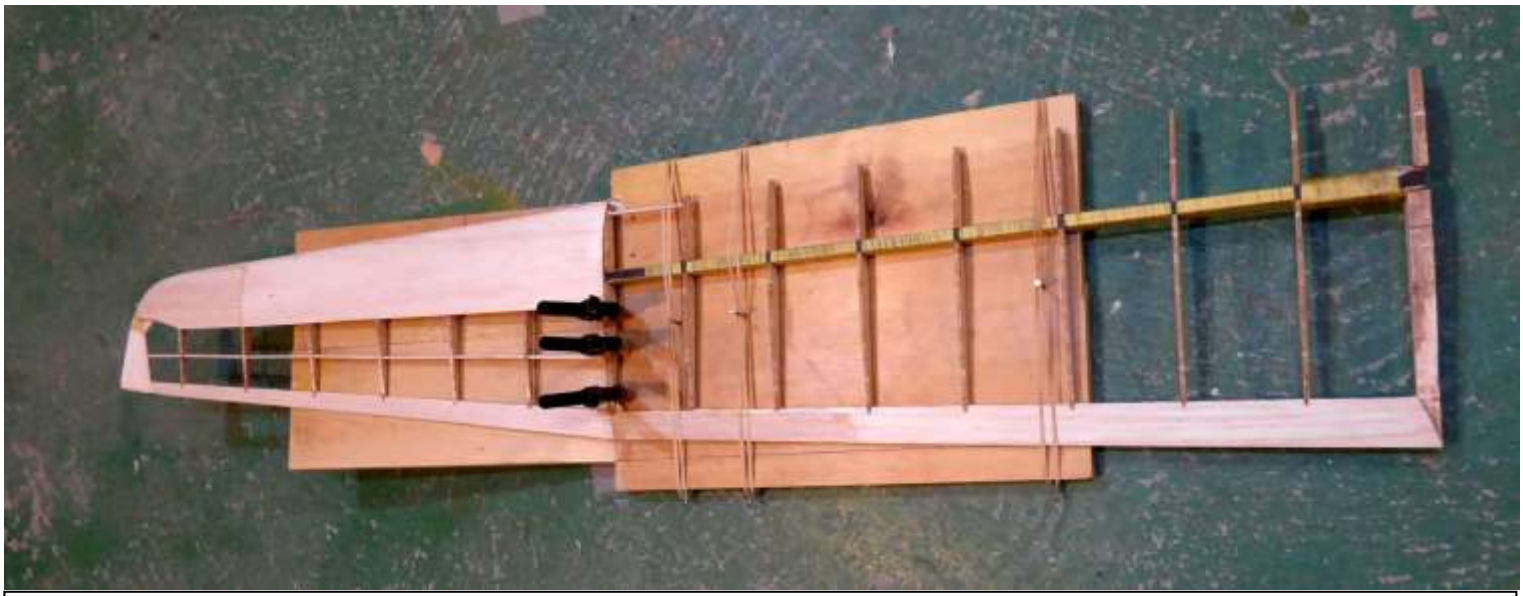
shear webs and ribs I shimmed the rear of all the ribs to give a 1 degree washout angle along the mid section.

But this did not work with this design of wing. There is no stiffness in the shear webs and rib assembly until the CF spar caps are glued to the shear webs. As soon as I had glued on the spar caps, the washout disappeared. In fact it resulted in a wavy trailing edge of the ribs, which understandably got me quite upset and worried.

The trailing edge waviness fortunately reduced to an acceptable level when attaching the TE to the ribs. Then when finally attaching the top sheet of the D box I again shimmed the TE to incorporate washout. Hey presto this worked like a dream and to my surprise and relief resulted in exactly the intended and equal washout on each wing mid section.

Centre to Mid Wing Section Joint

The 3 part wing breaks apart at the centre to mid dihedral break. The design is such that at the break, to eliminate the ribs from carrying the bursting load (150 lbf) at the break, the shear webs extend right to the break and the ribs are separated either side of the shear webs. The ribs fore of the spar consequently have to be shimmed above the building board to allow for the underside D box thickness. I did apply this shimming, but I discovered too late at final wing assembly that I had a droop of the ribs in each mid section fore of the spar, resulting in a 1/8" to 3/32" mismatch of the leading edges at the break. So my shimming was nowhere near accurate enough!



Mid and tip wing sections joined in dihedral jig.

I solved this by building up the D box surface between the spar and LE over a short span length of half of the first bay either side of the break. This was somewhat untidy but is hardly noticeable in the finished wing when covered.

Correcting LE mismatch at centre to mid wing joint

In hindsight there is a very easy way of avoiding this error. Before cutting the end ribs at the shear web break, make an exact template copy of the joint end ribs. Then when gluing the separated ribs to the shear webs, use the template, in addition to the shimming, to ensure that the fore and aft ribs are perfectly aligned to the template airfoil geometry.

The trailing edge alignment pins at the wing joints were also somewhat difficult, mainly because the trailing edge thickness leaves little room for the 5^0 angle of the pin and receiving tube in the TE. To ensure proper alignment it is necessary to assemble all the parts dry with the wings joined. Then glue them in while still joined, ensuring the epoxy does not stick the wings together or the pin in the receiving tube. Careful masking with mylar ensured it all worked out OK.

The completed wing prior to covering

Push-rod Assembly

I chose to use 1 mm dia. CF pushrods in Teflon tubing. These are very flexible so need to be restrained at frequent intervals between the servos and the control surface

horns. This is not so easy inside a 45" length of fuselage pod and a boom which is only 0.75" ID at the front end and 0.42" ID at the tail end.

The rod tubes are restrained at the front end between the wing bolt bulkheads and the fuselage pod inner wall. Thereafter towards the tail, the tubes are restrained by attachment to a 1/32" sheet of light balsa which fits exactly inside the mid section of the boom. The tubess exit the boom through Dremel cut slots which are reinforced with an epoxy/CF/Kevlar patch around the slot. At the attachment points to the balsa, every 125 mm, the tubes are lightly wrapped with good sticky masking tape and the tape CA'd to the balsa.

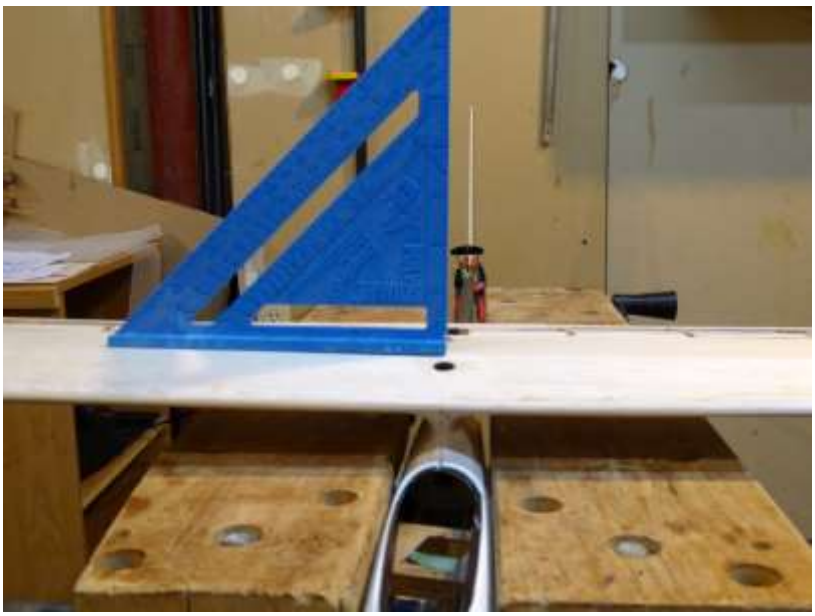
Pushrod tube restraint in the boom before assembly

The most important part of this was to ensure the assembly sequence was correct, because if not it would likely lead to an unrecoverable situation. I measured 10 times, cut once so to speak and it worked out fine. In this process I discovered that the rods and Teflon tube were individually matched, because at one point they inadvertently got swapped with each other and one was then very tight in the tube. I didn't figure out what the problem was until I tried swapping the rods with the tubes.

The balsa inside the boom added 1.7 gm and the reinforcement patches to the boom slots 0.17 gm each.

Final Assembly and Balancing

Final assembly went smoothly until it came to balancing. Balancing was not a problem, except for a very surprising amount of nose ballast needed, nearly 200 gm! I was very surprised at this as the boom and tail surfaces weights were virtually spot on the design target. The non-ballasted target weight of the entire model is 888 gm. My un-ballasted weight came out at 1024 gm. But needing to add 200 gm of ballast to this is very significant. This was a huge disappointment to me, - until it came to flying the model. More on that below.



Squaring the vertical stab/rudder before gluing to the boom

I've heard from other Bubble Dancer builders that hardly anyone is able to achieve the target weight. I paid a lot of attention to buying balsa that was at the lower end of the density range specified for the parts. So perhaps the target weight is somewhat theoretical. For ballast I use lead tape that is sold for balancing golf clubs. This is great stuff because it has adhesive on one side, you can mould it to virtually any shape and it ends up denser than lead shot.

Not as tight as a DLG, but still fiddly

Thoughts on the Build

Despite taking the easy route of buying a short kit of ribs and shear webs, and a pre-fabricated fuselage pod and boom, this was by far the most difficult model I have built. It would have been a lot more difficult without gaining help from the Charles River RC Allegro-Lite build log and Mark Haley's build

Balancing the model (I forgot to include the hatch cover!)

log. However, I learnt a lot and it was more than worthwhile given the end result. It took me about 10 months of actual building time over about 18 calendar months.

The material cost was about C$850.

Flying the Bubble Dancer

Finally at the field after the maiden flight

The maiden hand toss at Hwy 6 went fine, with no observed trim change needed, although later at altitude she did need some up-trim. A launch off the Hi-start also went well with a relatively steep climb. Later measured launch heights depending on amount of pull and wind conditions have been between 300' and 450'.

Other than needing some up-trim, moving the launch hook back a few mm and playing around with the amount of elevator to spoiler compensation, she has needed no adjustment. Rudder, elevator and spoiler response are all very effective. She signals lift very well and an example of hanging in low lift around 100' is shown in the RAM3 plot.

The final weight of 1.22 kg (43 oz) is about halfway between the design un-ballasted and fully ballasted weights. So in light winds I was not expecting her to fly that well. However, wing loading at this weight is still relatively low, 5.9 oz/ft^2, and she does still fly well in light winds.

The BD floating at around 100'. This was over the rise towards the West end of the Hwy 6 field

Stan Shaw

Stan Shaw passed away peacefully surrounded by family in Toronto on October 29, 2017 at the age of 81. He was MAAC President, and at various times a great President of SOGGI. In 1977 Stan was the Canadian F3B Manager at the FAI World Championships. Level 5 of the League of Silent Flight is a very difficult soaring accomplishment that required a 2 hour thermal soaring flight, an 8 hour slope soaring flight and a 10 Km goal-and-return flight, as well as some extensive contest credentials. Stan completed his Level 5 in 1990. Stan was also a one-time national record holder (slope duration). But more than anything, he was a decent guy.

It has been a few years since ill health prevented Stan's participation with our club. At our membership meeting this Sunday, perhaps people who knew Stan may have some recollections to share. It would seem appropriate to include their thoughts in an upcoming issue of TASK, and for publication in Model Aviation Canada magazine. Our website has a number of photos of Stan that could be made available for those purposes.

Our thanks to Dick, for making us aware of Stan's passing.

SOGGI's Website

SOGGI was one of the earliest MAAC clubs to have a website. Our website has been continuously improved through the years, and now serves many purposes. Here are a few:

- Promotes the experience of radio-controlled soaring, using words and images
- Provides the club's contact information
- Describes SOGGI's member-based organization
- Invites new members and explains benefits and responsibilities of membership
- Educates our membership concerning SOGGI's relations with external parties:
    - The Model Aeronautics Association of Canada (MAAC)
    - Owners of our flying sites
    - Sod Farm operators and the Hamilton Conservation Authority
    - Residential neighbours
    - Air-space regulators
- Supports members who are planning flying sessions, by providing:
    - A local 3 day hourly weather forecast, updated several times per day
    - A Message Board* to invite other members to come flying; SOGGI has no fixed schedule for casual flying. Flying Sessions may occur several times per week. Plans are usually based on the 3 day weather forecast.
- Promotes Flying-Field Safety by providing links to:
    - the current version of SOGGI's Flying Field Guidelines
    - Safety documents originated by MAAC
- Provides a Calendar of scheduled Events
    - Membership and Executive Meetings
    - Special club flying events
    - Winter workshops, and technical tours
- Houses a historical archive of photographs, aircraft designs and helpful tips originated by our members
- Provides a "Buy and Sell" marketplace (on the Message Board*)

*****Our message Board is publicly viewable, but you must be a SOGGI member to post messages on it. At their own discretion, members may also post messages on behalf of non-members. **For posting messages on our Message Board,** Members will first need their own Username and Password, which are normally provided as a part of SOGGI's New Member's Package. **Please do not lose or share your Message Board identity.**

Questions concerning the website or its' Message Board should be addressed to our Web-master Tom Crawford (905-662-3991, tomcr50@hotmail.com).

2017 SOGGI Executive

President	Bob Hammett	(226) 401-1966
Vice-president	Mike Sherlaw	(519) 752-1334
Treasurer	Anne Tekatch	
Secretary	Andy Meysner	(905) 601-4228
Contest Organizer	Lyle Jeakins	(905) 575-4115
Editor	Marc Freeman	(905) 962-4113

2017-18 Calendar of Events

- December 10th , Membership Meeting at Rockton Hall at 1:00 pm
- January 14th , Membership Meeting at Rockton Hall at 1:00 pm
- February 11th , Membership Meeting at Rockton Hall at 1:00 pm
- March 11th , Membership Meeting at Rockton Hall at 1:00 pm
- April 8th , Membership Meeting at Rockton Hall at 1:00 pm
- May 13th , Membership Meeting at Rockton Hall at 1:00 pm