Editor: Andy Blackburn

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Parish Notices

Flying at Trinity

Flyers are reminded that some Covid rules remain in force for the moment; please remember to bring your face mask for the next Trinity session. When you arrive, please try and fill-in the corners and short edges of the hall first so as to leave a decent unobstructed area for flying.

Feedback, Please…

I'd like to ask a favour of everyone; it's quite easy to assume that everything is fine and we can go on as we are, particularly if no-one says anything. So, if we're doing something that you don't really like, can you please drop either John Winfield or myself an email? Many thanks.

Special Mention

I'd like to thank Dave King for all the effort and sheer hard work that he's put in to writing and adapting the Trinity No-Cal rules, writing No-Cal articles for the newsletter and running the No-Cal competition on Saturday June 19th; I had a great time and I suspect that many other entrants did too.

Newsletter Dates

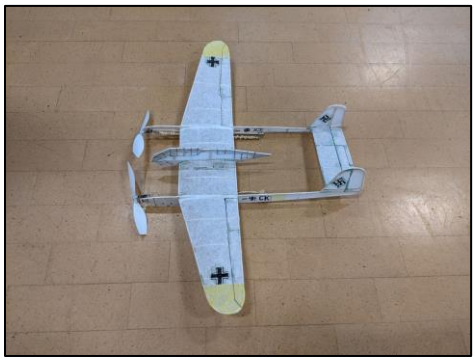
As its now summer the next newsletter won't be for a couple of months, but do please send me things to publish…

Contributors

Thanks to Dave King, The Lurker and Ray Goodenough for their valued contributions to the Newsletter.

Trinity Saturday June 19th

Mike Stuart's Ki 61 Hein No-Cal built from a Paul Bradley plan, weighed 7.8g with a loop of 0.070" rubber and a 5.5" North Pacific prop. Very impressive, except when being timed! Tissue is laser-printed. [Mike Stuart photo]



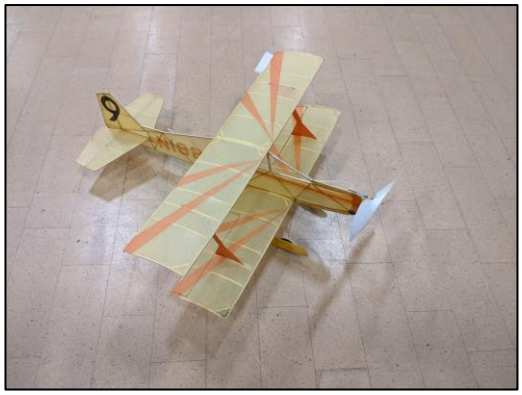
Peter Smart's own design Focke Wulf FW 189 Uhu No-Cal, an impressive model to watch in flight. There are, though, ugly rumours that – due to an unfortunate scaling error - the span is 18", a whole 2" over the maximum No-Cal wingspan of 16"... [Andy B photo]

John Whatmore's own design Auster J-4; nicely built. [Andy B photo]

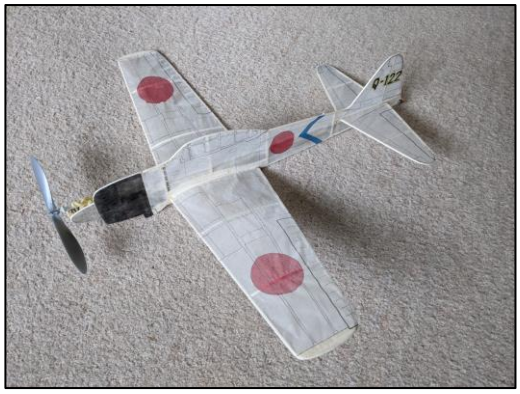
John Winfield's Auster J-4 built from John Whatmore's plan; another model that behaved itself impeccably except when being timed! [Andy B photo]

Mick Langford's No-Cal F8F Bearcat and Ki-61 Hein, both built from Paul Bradley plans – very nicely executed... [Andy B photo]

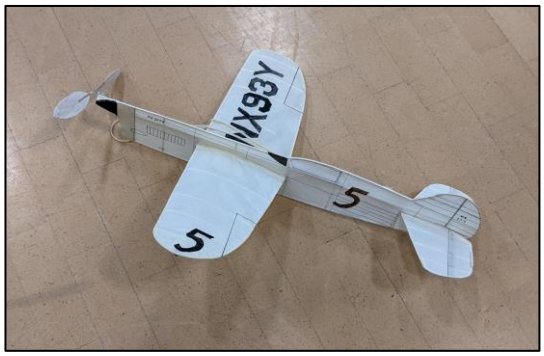
Robin Smith's No-Cal F6F Hellcat built from Paul Bradley plans. [Andy B photo]



Nick Peppiatt's No-Cal Speed F8F Beercat racer, built to some 1990s BMFA rules specifying 350mm wingspan, but flew very well. [Andy B photo]



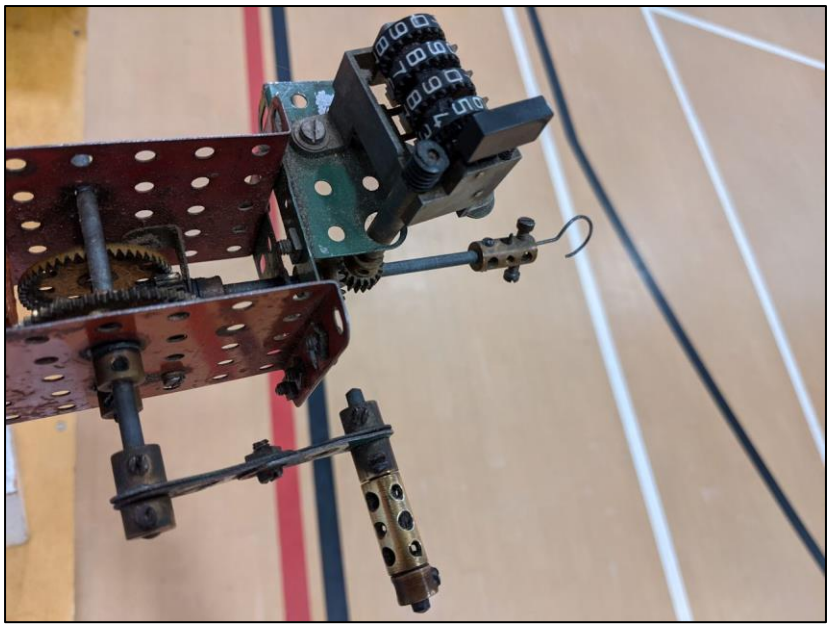
Andy Blackburn's Mitsubishi A6M3 Zero from a Paul Bradley plan; flew well, but if I'm honest it got lucky with the air... [Andy B photo]



Dave King's own-design No-Cal Goon racer, wasn't the same after hitting the ceiling... [Andy B photo]

Lurk's Mooney-designed Chiribiri Peanut shows promise, weighs 18g, really needs some long grass for test-gliding. [Lurker Industries photo]

SteamPunk at Trinity!



Nick Peppiatt's fantastic Steampunk-esque meccano winder, complete with counter. Extremely impressive - Victorian engineering at its best.

Lacey M-10 No-Cal – The Lurker

The Lacey in all its, um, glory. [Lurker Industries photo]

Thanks to John W. for his suggestion of the gurney strips to cure the lack of decalage. Flying performance is less than stellar, a repeatable 20-21s on 1,000 turns (80% is ~1200) of a 10" 2 strand 1/16" motor with a couple of degrees of downthrust and a smidgen of noseweight.

However... it succeeded admirably in its primary aim which was to wind up our esteemed editor who has conceived an inexplicable dislike for the machine (although rumour has it he is part way through building one). The Editor was threatening to publish the plan, if he does I would strongly suggest you don't build it as drawn. I took the lines from the Peck peanut plan, but as John pointed out that has a flat bottom wing, whereas this one has the single skin concave wing so needs a bit more decalage. If I can't find anything more interesting to do I may re-draw it and build another *[Oh dearie me - Ed]*.

No-Cal Competition – Dave King

This was our first No-Cal competition and I hope it won't be the last as these models are very quick to make but, as many of us found out, not quite so easy to trim and to get flying well and consistently.

There were seven entries, ranging from single engine high wing, through WW2 to a post war Reno racer.

I failed to enter as the best flight I got from my Goon was a trimming flight where I hit the ceiling, thereafter it persistently flew the length of hall knife-edge, a

warp having developed in the port wing in the space of minute! I think a flier near to me, who shall be nameless, took fright at my trimming flight and wiped a wet finger along the wing to make the tissue shrink! *[So, it was nothing to do with you clouting the ceiling, then? :-) Ed]*

Anyway, the results (total of best 2 flights from 3) were:

Flier	Model	Best Two Flights
Andy Blackburn	Mistsubishi A6M3 "Hamp"	121 secs
Pete Smart	FW 189 Uhu (twin)	107 secs
Nick Peppiatt	Speed F8F "Beercat"	83 secs
Rob Smith	Grumman F6F Hellcat	82 secs
Mike Stuart	Ki 61 Hien	81 secs
John Winfield	Auster J-4	49 secs
Lurk	Lacey M-10	41 secs

Thank you everyone for taking part and commiserations to me and others who just couldn't get our models trimmed properly to put in times. It was good to see Pete get such good times with an unusual model of his own design and a twin to boot. Now, there's a thought for the next No-Cal, must be own design, bonus points for multi and a 10 second handicap for Andy for being such a smart ar*e and winning?

No-Cal Competition Analysis/Notes – Andy Blackburn

I think Dave deserves kudos for coming up with some rules that so obviously work; tentative conclusions are that bigger is not always best - the winning model managed to put in flights of around a minute using a 4.75" Peck propeller.

The other thing that I notice is that models often ran out of turns whilst still at altitude - so the propwash over the stabiliser stops, the model pitches down a bit, the rubber slider forward and bunches around the propshaft and the model glides to the floor at about a 30 degree angle.

This leads me to suspect that most people hadn't got to the best prop/rubber combination - I'll put my own hand up to that! Applying more turns to the Zero just put it in the rafters and it *still* ran out of turns when only half-way down; I suspect that I need to reduce the rubber size by about 0.010" and wind on more turns so that the initial power burst has more of a role in the climb.

No-Cals are odd things – if they're built straight then you bend in a bit of sidethrust and downthrust and they generally fly perfectly, but if they develop a warp you can end up with something that wants to fly left but banks right at the same time – very disconcerting! The only way I've found of straightening them up again is to run a thumbnail – carefully – up a wing spar to make it curl, but it's a bit hit and miss. The alternative is to add loads of gurney strips to try and straighten it up again.

I think I got off lightly, actually, because it was quite turbulent in the hall and several people had trouble with models flying into the walls; I was expecting

Pete Smart's FW 189 to win because it was very impressive, and Mike Stuart's Ki-61 was capable of long flights as long as it wasn't being timed – I saw it fly for nearly a minute on a trimming flight. John Winfield's Auster was another one that got stage fright when shown a stopwatch.

A comparison of single-engine statistics is interesting:

Model	Weight	Prop	Rubber	Average Duration	Notes
Mistsubishi A6M3	8.48g	Peck 4.75"	0.063"	60 sec	
Speed F8F "Beercat"	13.0g	Tern 6"	0.100"	41 sec	~14" wingspan biplane
Grumman F6F Hellcat	9.7g	Peck 6"	0.075"	41 sec	
Ki 61 Hien	7.8g	North Pacific 5.5"	0.070"	40-60 sec	
Auster J-4	8.5g	Peck 4.75"	0.080"	24+ sec	Potential for 50+ sec
Lacey M-10	6.4g	Peck 4"	0.063"	20 sec	11" wingspan
Goon	12.75g	Tern 6" cut down to 5"	0.110	45+ sec?	Very big fuz, hence weight.

Conclusions

After a bit of thought and some examination of the data, I offer the following tentative conclusions:

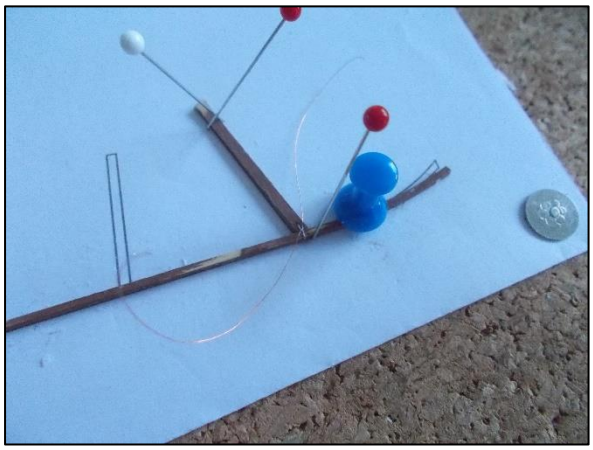
- It was really quite turbulent on Saturday; maybe we should get better at shutting the door and I wonder if there's any way we can get Trinity to turn off the fans? The Covid risk must be minimal, by now…
- There seems to be a relationship between all-up weight and duration, but interestingly, it's not as significant as expected. The effect of weight will probably show up more under a higher ceiling when the climb and cruise is extended and durations are longer.
- I tentatively observe that smaller plastic propellers (Peck 4.75", North Pacific 5.5") seem to be favoured by the best-performing models; this might be because the prop weight has a direct effect on the amount of tail ballast required, but equally it might be because under our relatively low ceiling, the prop/rubber match is easier when the prop is small.
- Given the low-ish ceiling at Trinity, I suspect that many people might have been carrying too much rubber; the Zero certainly was because I didn't use more than about 1200 turns on 0.063" (only ~57% of absolute max turns), so that's probably about 0.2-0.4 grams of dead weight + tail ballast that it's carting around for no good purpose.
- Given that most people seem to be using too much rubber for a 21-22 foot ceiling, maybe we could profitably remove the stipulation on rubber size in the rules? It would certainly make matters a lot simpler and rubber motors could then be braided.

Chiribiri No 5 undercarriage – The Lurker

Some of you may remember that my peanut Chiribiri No. 5 had an ignominious first outing with the UC collapsing on its first glide test. Well, it's taken a few months, but I finally worked out a way of making it robust without making it too heavy (well, I hope so). The changes are, in no particular order:

Fix the axle at the centre point of the forward spreader bar rather than at the skids. This provides a little bit of suspension and bounce, but has a scale appearance cost because it means the forward diagonal braces can no longer meet at the centre of the spreader bar.

I used epoxy rather than cyanoacrylate (CA) for almost all joints.



Drill 0.4mm holes in the UC legs and bind the legs to the skids with two or three loops of fine copper wire, then, very carefully, tin the wires before securing all with cyanoacrylate. I went for wire because it's the devil's own job trying to feed thread through a 0.4mm hole. I used very fine wire indeed, but if you ever do this and use thicker wire you probably won't need to tin it.

Bind the forward spreader bar carrying the axle to the skids with two or three loops of fine cotton and seal with CA (see above).

Fit 1/64th ply "fishplates" to the tops of the UC legs.

The plan is to glue the fishplates to the inside of the longerons through slits in the tissue. I may have to tinker with one of the horizontal spacers in the fuselage in order to make this work.

Fingers are now crossed for enough dry, calm weather for outdoor glide tests over nice, soft grass before the June meeting.

Designing a No-Cal – Dave King

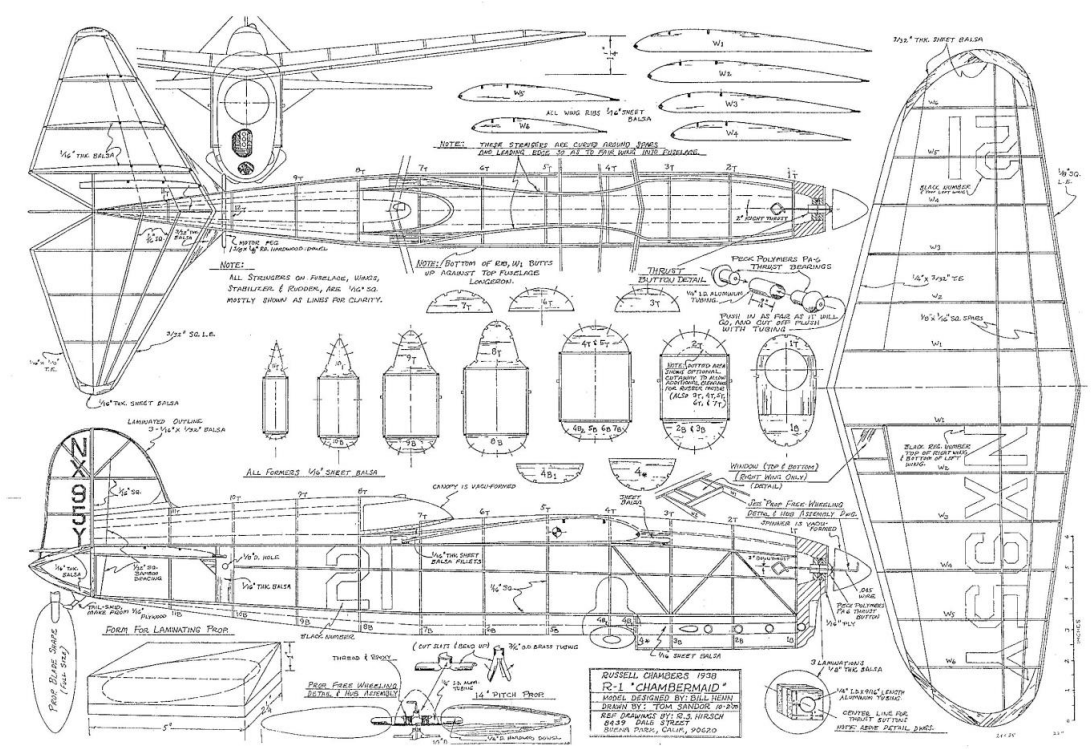
The easiest way to design a No-Cal is to take an existing plan for a scale model, reduce it to 16" span (I do this under Tileprint), print the plan and then either

a) Build just the outline using minimum balsa to support the motor stick and maintain integrity of the fuselage on the printed plan, or
b) Trace the outline and build on the tracing. Any curves can either be steamed in with a hot soldering iron, or laminated with strips of 1/32x1/16.

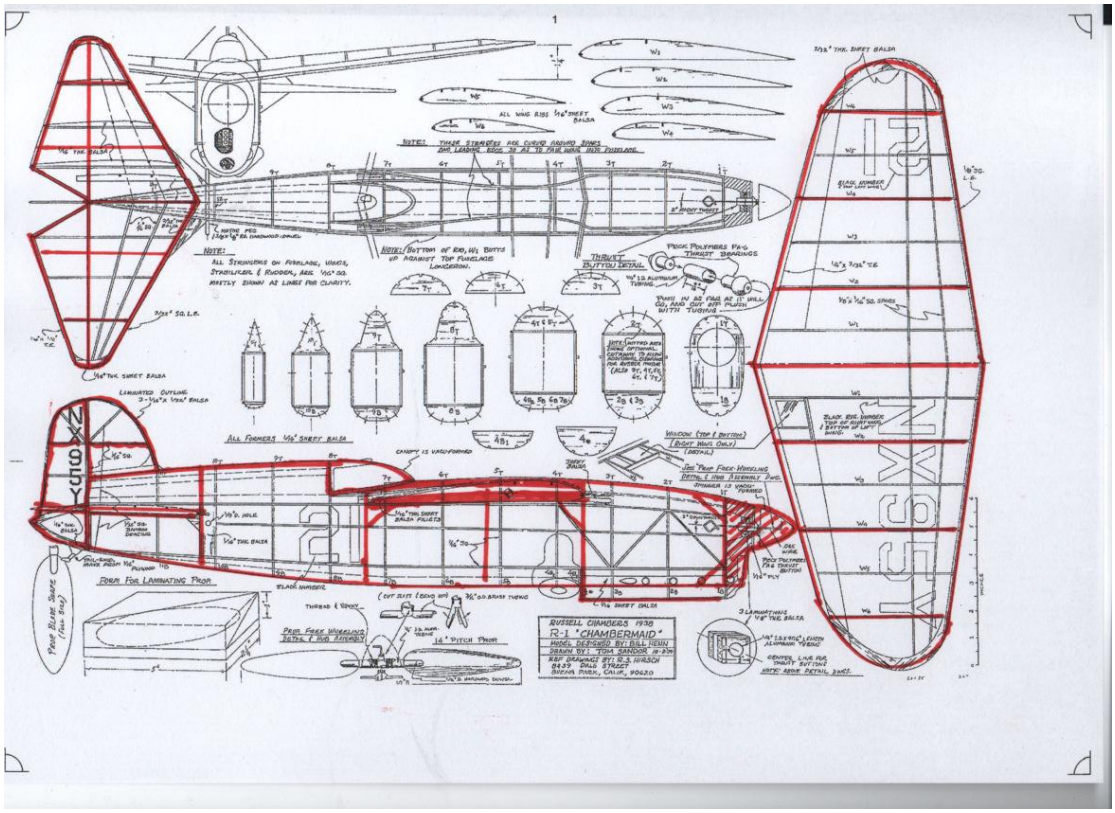
I build on the printed-out plan, but I draw in the fuselage uprights and wing and nose supports in red ink. The wing outline is laid out from 1/16 sq. The airfoil is not actually that critical at the speed at which these models fly but I tend to go with the Bradley brothers (see http://www.parmodels.com/flying-aces-club--fac--rules-no-cal-models.html) on the basis that they have designed several and they seem to work.

If the plan isn't available either from Outerzone or Hippocket then a three view can usually be found in a book or via Google, although when enlarged these will require some care as the outline can be quite thick.

As an example, the 22" span Chambermaid, on Outerzone can be reduced to 16" on 8 sheets of A4 under Tileprint.



The original 22" Chambermaid plan from Outerzone



After being reduced in size to 16" span, with red pen added to show where the structure goes.

Building Better Bostonians by Steve Gardner – via Ray Goodenough

[The following text has been adapted and anglicised where necessary - Ed]

I love Bostonians. I think they are the perfect blend of scale and endurance. They look pretty and are more interesting in design than most endurance models. They fly long enough to be satisfying and they are beautiful to watch in flight. For those of us who do not compete regularly, they are very nice sport models for the moderate size sites, places a bit too small for scale models. They are great demonstration models since they look like real airplanes and fly very much like them too. They have the colour and variety that the typical endurance model lacks.

Bostonians can be difficult to build well. They are not so easily built to weight and they can be a bit fragile. The very long motors needed for competitive flight times often cause problems with bunching and balance. While they are easy to get to fly, they can be tricky to trim for best performance.

Design

The best Bostonians have several design features in common. All of the best do not have all of these features, but they all have many of them.

They all have very large stabilizers with camber. The limit is 50% of the wing area (24 square inches) not including the area occluded by the fuselage. This is important for several reasons; it lowers the total area loading, it allows the CG to be much further back than smaller stabbed models and it makes the models more tolerant of shifts in the CG from motor bunching.

The best stabs are very high aspect ratio - they have large spans and narrow chords. The higher aspect stabs are generally more efficient, and they also get the stab area as far back as possible, which helps stability. A gentle taper is OK, but a stab that is too sharply tapered will have too small a tip chord and will suffer.

The motor should run the entire length of the model. Some of the best models are using 38-inch motors and it is bad enough getting such motors to work with a 13 inch or so hook to peg distance. Having the peg forward of the model's tail will make matters even worse. It is best to get the peg as far from the hook as the rules allow.

Make the fuselage large enough for the motor. These long motors will make huge clots of knots which need room to thrash around. At least .75" clearance all the way back to the peg is about the lower limit. Narrow noses and tails are just good places for knots to hang up and ruin the flight. Make sure the noseplug is large enough so that the nose opening will accept a blast tube big enough for the motor. Make the tail cross section large enough to allow this tube all the way back to the peg too.

Stability is important. The faster a disturbed model finds its trimmed speed and attitude again, the longer it will fly. Low winged models can work, but they will need a great deal of dihedral and this is not good for endurance. Shoulder or high wing models are much better and even they should have a moderate amount of dihedral to ensure their recovery abilities. It is also best to avoid any excessive amounts of washout or other warps in any of the flight surfaces. Washout is a performance robber that is very overrated as an aid to stability. The fin should be large enough to prevent any wandering flight, but not so large as to induce any spiralling problems. Models with insufficient dihedral will be very picky about the fin size and they may not circle well tightly enough for the smaller sites. Bostonians use very little fin offset to get the right-hand circling flight pattern. A 1/16"offset at the fin trailing edge is plenty for most models.

Since the rubber motor is distributed over the entire length of the model, the CG will tend to be very far back. To balance the model without needing ballast, you should mount the wing so that the leading edge is at least 3" behind the noseplug. The farther back you put the wing, the better the stability will be but the poorer the efficiency of the model, so too far back is bad too. Putting the wing back beyond 4" or so will just give performance away and gain more stability than the model needs. If you fly in a very gusty site, you might tend to the more rearward wing locations.

Stay away from the wing taper, it just gives away area. Make sure your model is legal, but also make sure it is not too short of the limits set by the rules. A 15" span model built that way to make sure it is under 16" gives away around 7% of its wing area. A wing ¼" narrower than the 3" allowed gives away almost 9%.

Mount the landing gear as far forward as is possible. This increases stability with no efficiency penalty at all.

Use a thin airfoil. At the Reynolds Numbers our models fly at, the airfoils are not very critical in shape, but the thickness should be at or under 6% and the leading edge should be very sharp. Same thing on the stab for the same reasons. Sharp trailing edges are probably a good idea too, although there is some variation in thought here.

Weight

A Bostonian is not the lightest indoor model you will be building, but you still have to plan ahead to get them down to weight and not need to add nose weight. There are also things you can do to make them less fragile to handle and still light.

Choose very light covering material. Not counting the prop and noseplug, almost half the weight of a well-built Bostonian is covering! Gampi paper is very nice in this case, with good Esaki tissue a nice second. Condenser paper is a possible choice, but it is really a bit brittle for Bostonian use and it is not too attractive in colour or texture. I have had wonderful success using ink jet printers to add colour to white tissue without adding weight. In any case do not use any heavy paints or multiple layers of coloured tissue since this will add weight very quickly.

Pick your balsa with great care. Use very hard balsa (10 lb) for the leading edges of the wings; medium hard balsa (7–8 lb) for the wing trailing edge, longerons and uprights in the nose area; and firm, light balsa (5–6 lb) for everything else. Use the good wood!

The stock sizes are important to building lightly. Do not use 1/16" longerons, they are far too big and heavy. The wing spars are the only 1/16" wood in the whole model. Longerons are fine at 1/20" square, as are the stab spars and the basic fuselage structure. Ribs are OK made from 1/32" sheet or so, and the fin can be very lightly built since it takes almost no loads at all.

The wheels, wire and prop are big weight problems. I make my wheels from blue foam turned on a Dremel tool and painted with artist's acrylic paints. It is a very light way to make wheels and they look great. Be sure to make them not too much over the ¾" minimum diameter and no thicker than (say) 3/16".

I use 0.3mm (30 swg) wire for my landing gear, this saves 36% of the weight of 0.4mm (27 swg) wire. The gear is soft and bouncy, but it works just great.

Props made from carved balsa can be very heavy so be sure you get the blades thin enough. The best prop is made from a wooden dowel or aluminium hub and balsa sheet blades formed over a can, and it is much lighter than a carved prop.

There has been a good deal of talk over the weight of various adhesives. CA glue is very heavy and dense when cured, ambroid or water based glues are much lighter. While this is true, it makes very little difference since the weight of the adhesive is around .5% of the model's finished weight. The weight difference between CA and the lightest cement is around 20 milligrams on a Bostonian.

You can, however, easily use 2 or 3 times as much glue as you really need. Over-gluing will make a much greater difference than choice of adhesives, plus it will make hard spots that will sand poorly and make covering the model a harder job to do neatly.

Strength

Bostonians get mashed, squashed, crushed, and otherwise damaged much more often than they should. Far and away the greatest cause of damage is in handling the model. Wings and tail groups are not too bad to get broken, but the fuselage gets beaten up pretty good in most cases. The longerons are very easily broken between the uprights and crosspieces. The uprights and crosspieces themselves are pretty easily broken too by just a bit too much of a squeeze.

The major reason is that these pieces are already under stress from the tissue and motor tensions. The tissue pulls sideways on the thin balsa sticks while the motor tension tries to collapse them. Your finger then comes along and pushes in the same direction the tissue does and you feel the wood crack. Using larger wood sizes for the longerons can help keep them from getting broken, but this can easily result in the weight getting way over the 7g minimum. Harder wood for the longerons is a pretty good idea too but has the same problem of weight.

Before you go to larger than recommended wood sizes or weights, try using the method that is used to handle real aircraft. Real aircraft have hard points built into them to allow safe handling without structural damage. The skin is reinforced where it is to be walked on and there are handles mounted where the aircraft is to be pushed when moving it on the ground. There are strengthened points designed to allow the aircraft to be lifted and where it is to be tied down in the wind.

To do this with your Bostonian, you just have to figure out where you need to handle the model and add a bit of wood right there only. I make sure that the front of the model is firm where I handle it to attach the noseplug after winding. This is also a good area to use for landing gear wire attachment. I make the crosspieces out of larger wood sizes and space them much closer between the lower longerons right under the wing trailing edge because this is where I hold the model when I launch it.

Once this area is strengthened it becomes the preferred area to hold the model whenever you are handling it. The final area to strengthen is the rear rubber peg

mount. Once there is the extra strength in these areas, then you reduce the strength and weight everywhere else. Everywhere is the key word here. Since the reason you get breakage is from handling and you have strengthened the area you have to handle, reduce the weight of all the other structure until it is adequate for the loads of flying the model and the winding loads. These loads are much lower than those of handling the model and you can easily use very small, light wood sizes and so save a great deal of weight.

Trimming

Bostonians are not too tricky to get flying well, but there are some things you need to work with to get the most out of them. The more rubber you carry (up to around 1.5 times the model weight) the longer the model will fly, all other things being equal. To get the times needed for a competitive Bostonian, you need to have a slow turning prop with lots and lots of turns to use up. The prop diameter limit of 6 inches forces you to use a pitch to diameter ratio of around 2 to get the RPM down and make the turns last. While you need these high pitched props it is very easy to get just the least bit too much pitch in a given prop and so make it a real dog. Before you give up on a prop try twisting just the least touch of pitch out of it and see if makes a large difference.

While it is important to have enough rubber in the model, it is easy to waste the power and so lose the benefit of the extra rubber. Poor props, draggy designs, unwanted warps and extra weight will rob time from you if you let them. Motors should be sized just as other indoor models motors are, to run out of turns just after touchdown.

Start with too long a motor of moderate cross section, say .090", and test fly the model. Shorten this motor until the model is using almost all of the turns. If the model starts to hit a very high ceiling before you have shortened the motor to this point you have too large a cross section. Go down about .010" in rubber size and start again. This method will only work for very high ceilings that allow a full power climb.

For lower ceilings *[Trinity! - Ed]* you will have to experiment with backing off turns to allow the climb to be less while retaining the cruise portion of the flight. For very low ceilings you may even have to increase rubber cross section and/or shorten the motor to extend the cruise portion as much as possible.

Be sure that you use good lube on the motors and blast tubes so that you can get the energy into and out of the rubber. Good prop bearings are also important with Teflon washers and brass tubing or Peck Polymers nose bearings for the noseplug. Make sure that all of the little tatters of tissue are pasted down well to make the model as clean as possible.

Pick your batch of rubber very carefully with the fragility and vulnerability of Bostonians in mind. The super rubber batch 7–97 that has set so many new records is a really poor choice for Bostonians due to its breakage rate. My best times are with 10-97 or 12-97 rubber which is not as good as the 7-97 but is much tougher and safer for Bostonians. When winding make sure that the

rubber is in the middle of the rear peg when you start so that it will clear the rear fuselage structure to reduce bunching. Watch the knots form when winding and do what you can to even the build-up of the huge clumps of rubber that these very long motors feature.

2021 Trinity Dates/Times and Events Calendar

There's no official event for the next meeting on July 24th. The one after (August 21st) isn't really a completion either, I'm expecting a missive from John W that will explain how it'll work.

For the moment, flying starts at 09:00 and finishes at 1:00 with the usual FF & RC half-hour slots. Having to get up at oh-dark-thirty does mean that it's too early to be woken up by the planes landing at Heathrow, for which I should be grateful, I suppose.

Date	Event	Contest Director
July 24th	<No official competition, normal flying>	N/A
August 21st	Best Scale Model Non-Competition	John Winfield
September 18th	Battle of Britain Competition	Andy Blackburn
October 16th	<No official competition, normal flying>	N/A
November 20th	Bostonian	T Calvert
December 18th	Christmas KK Elf	The Lurker / T Calvert