

*President: Dave Braun*

*Vice: Gary Oakins*

*Secretary: Dave Edmonson*

*Treasurer: Ron Cota*

*Tele: 651-210-0868*

# Minneapolis Modeler

Issue #357 September thru December, 2019

Dedicated to the encouragement and advancement of Free Flight  
Published four times each year by the Minneapolis Model Aero Club



Annual Dues: \$25. AMA Senior:- \$5. AMA Juniors- Free  
Newsletter Only: \$6.00

Newsletter Editor: Dave Edmonson 4747 Westminster Circle, Eagan, MN 55122  
Tele: 612-220-5239 email: [dedmonson@comcast.net](mailto:dedmonson@comcast.net) Last Issue, 2019

## *Time for 2019/2020 Indoor Flying*

### *Monthly Meetings:*

Most of the meetings are held at the EAA building at the Anoka County Airport, **first Friday of the month, unless it falls on a Holiday.** Directions, take 35 W north from Minneapolis to Highway 10 west. Note that there is a county road 10 just prior to Highway 10...don't take that road. Proceed west on **highway 10** to 93<sup>rd</sup> lane (Airport Road), and go right..north, to the bend in the road where you will see a gated entrance. Drive up to the gate and it will open. Proceed on the road until it Ts to the right. Go right until you see the EAA building. *The meetings start at 11:30AM or later?*

### *Upcoming 2019/2020 Events:*

*Friday December 6, Monthly meeting at EAA.*

*Friday January 3, Monthly meeting at EAA.*

*Sunday, January 19 Indoor Contest*

*Friday February 7, Monthly meeting at the EAA, and annual MMAC Auction!*

*Sunday, February 16, Indoor Contest*

*Friday March 6, Monthly meeting at EAA.*

*Sunday, March 15, Indoor Contest*

*Friday April 3, Monthly meeting at EAA.*

*April, next newsletter*

### *December 6 Meeting: Bring some goodies to share!*

We will be signing Christmas cards for our wonderful land owners who allow us to continue our free flight activities.

Ron Cota will be accepting dues for 2020 and has his list of those already signed up. Also Ron will have "Prize Cash" for our contest season of flying based on "high point scores".

### **Prez..News from the Shop..**

**By Dave Braun**

Well, that's a wrap for the 2019 flying season. Seems like only yesterday we were snowed out in April (indoor) and blown/rained out for the June picnic contest. Another wet and windy one for the Oktoberflug and the outdoor season came to a crashing end. Fortunately, the indoor season opened on November 17 with a fair turnout at Christ the King church. See Dave Edmonson's full report for details. Stuff that I had flying reasonably well last year refused to cooperate this year which led to some frustration. Hit a few walls and my old/cold and much repaired Bostonian had a strong desire to repeatedly hit the hanging backboard structure. Some damage to the oft repaired front end means a new one is already in the works. The building season is upon us.

Speaking of which, as there is no December meet, it's a good time to spend some quality shop time getting ready for the January indoor meet or if you're so inclined, start on some of those projects for the 2020 outdoor season. Embryos and P-30s go together quickly and are very popular events. Also, a few hours and some decent wood will yield a fleet of cat gliders which are easy on aging arms. You can probably guess that I'm trying to encourage participation.

Pretty sure club elections are coming up at the next meeting but as my attendance as president this past year has been spotty at best, I'll defer the nomination (should one come my way) to others. I suspect a likely successor will trade-in his fishin' pole for the gavel when the time comes.

Oh, and to quote Frank Sinatra, "Dues are due, do dooby dooby do."

And Now for Something Completely Different:

Ever wonder about the weight/quality of that stack of balsa that your hoarding? I came across a handy formula in an old issue of the Free Flight Quarterly that works for 3" X 36" sheets which is generally the most common

size. Simply weigh the sheet in ounces (or grams, then convert to ounces) then multiply that times the number of thicknesses necessary to equal one inch. This will by voodoo magic give you the number of pounds per cubic foot. Confused? Ok, Lucy, lemme 'splain.

Say you weigh a piece of 1/16" X 3" X 36" and it comes out to 0.29 Oz. As it's 1/16" thick, multiply 0.29 X 16 and you'll get 4.6 lbs./cubic ft. Put that piece in the pile marked "sacred." Another piece might weigh 0.71 ounces. That comes out to 11.4 lbs./cubic ft., suitable for building a bird house or selling to Edmonson. Same for 1/8" but multiply times 8, etc.

**Note from Gary Fezzler:**

Electronic news letter is preferred for future issues, should have let you know that years ago! Thanks for keeping me on the list despite my lack of active involvement in MMAC. I really enjoy reading the newsletter and seeing what members are up to. As for me ... I have moved out of my (rental) town house in Blaine and Gail and I reside full time in a 33 foot Motor Home RV. On the 29th of Sep we will move into a 3 BR Beach Front CONDO on PERDIDIO KEY Florida just a little south and east of Pensacola. We will stay there for six months and in Apr 2020 pile into the RV again and head for Key West for a month or two. When it's "safe" to return to MN we will ramble back up to the Twin Cities and spend a few months visiting family and friends. Fall of 2020 looks like a trip from Chicago to LA via the storied ROUTE 66 and a winter stay in southern California. Summer of 2021 will again include a stop in the TC area to visit family etc. From there on we will shoot from the hip on travel plans with the main priority being avoidance of Snow and temperatures requiring footwear harder than flip-flops. People not familiar with Minnesota winters are really surprised to learn that we put beer in the fridge to keep it "warm" December through March ! Will keep you informed of future plans as they evolve.  
Best Regards FEZ !

**Prizes: Note from Dave Braun**

It was agreed on that in lieu of physical prizes, (kits, wood, etc.) that there would a cumulative cash award of fifty cents per contest point to be paid at the end of the calendar year. Ex. If at the end of the year you have won fifty contest points you would receive \$25. This would allow those who fly only an event or two to receive something for their efforts. There are a few drawbacks, of course, but as the "prize committee" is currently in questionable health and difficult to communicate with we have taken this path. Also, it's not much fun. There's a kid in all of us that likes to win a prize. I suppose we could easily go back to the way things were if and when circumstances change and prizes again become available.

**Greg Thomas latest scale project!**

At our November meeting, the question was raised how is Greg doing on his latest **BIG PROJECT?**

I called Greg to see how he was doing on it, and received some beautiful pictures, with total completion less a finished prop. The replica of the Hazel Sig.... Cub has been the culmination of the last 1 ½ years of skillful work. Greg creates 3D cad models in great detail, and then engineers the construction. This is a 56" wingspan rubber powered model for FAC competition weighing only 300 grams (11 ounces) without prop and rubber, very light weight for the size, and yet with supreme scale detail. I asked for a small article, and received a 13 page document detailing construction methods. I am sending this to members on the email list, but you may also view it on the NFFS club newsletter link: <https://freeflight.org/community/club-newsletters/>

**Meeting Minutes:**

**September 6, 2019 7 members in attendance**

Reviewed indoor schedule, and added an April session. Also agreed to expand the light weight event to any AMA indoor class. Dave Braun brought in a new Coupe model and Edmonson showed his old Hustler models again.

**October 4, 8 members in attendance**

April 19 was added to the indoor schedule. Edmonson brought in the CLG that had been found by Kevin Mann in a far away field and carefully stored for pickup at a later date.

**November 1, 2019 10 members in attendance**

Gary Oakins and O'Leary visited Joe Huettle the prior week. The club decided that there was no need to renew a state sales tax license. Also discussed AMA licensing of club members, no decision. Prizes for 2020 to remain the same as 2019 with cash based on club points. Garry Peterson showed a Bostonian model just completed, and Edmonson showed some all balsa RC high start gliders.

End of the calendar year for 2019. Includes indoor and all outdoor points. The first place for an event is 3 points if there are 3 or fewer entrants in an event. If there are more than 3 entrants, last place gets one, and it goes up from there. More entries, more points!

**2019 Club high point scores:**

2019 Points	L-NAME	F-NAME
91	Braun	Dave
57	Ringlien	Andy
1	Oakins	Gary
8.5	Dona	Gordon
7	Berggren	Don
126	Edmonson	Dave
54	Jorgensen	Jim
3	Hansen	Dean
11	Kuhl	Bill
62	Decker	Matt
14	Ringlien	Larson
12	Ladwig	Jim



**Mini-Model Meet, September 8, 2019 Dave Edmonson, CD**

A cloudy day, but 5-10 winds out of the east kept most models on the grass and the longer ones an easy pickup from the road, but then Andy decided to put his nice flying P-30 into the 10 foot corn on his first flight. Andy declined help after the meet to go look for the P-30. Dave Braun did an "oh crap" and forgot his trusty mulvihill wing at home. He still did well enough to capture high point for the contest. Tom Gustafson did a nice job of timing because his locators were not working, better check them out before the next contest. Bill Kuhl was up early from Winona, but mostly did test flying on his electrics, although did get in 3 flights in Jimmy Allen. We did not have one drop of rain during the contest. Ron Cota did a nice job of observing.

CLG					
Entrant	#1	#2	#3	Total	Place
Dave Edmonson	74	100	120	294	1
Andy Ringlien	74	76	70	220	2
Dave Braun	31	37	26	94	3
Don Berggren	26	25	27	78	4

HoSoFo	class					
Entrant		#1	#2	#3	Total	Place
Andy Ringlien	OT Stick	120	93	118	331	1
Dave Braun	Mulvi	96	115	88	299	2
Dave Edmonson	B gas	95	117	84	296	3

Jimmy Allen	Model					
Entrant		#1	#2	#3	Total	Place
Dave Braun		50	50	108	208	1
Bill Kuhl		33	42	56	131	2

P-30						
Entrant	#1	#2	#3	FO	Total	Place
Dave Braun	120	117	90		327	1
Dave Edmonson	83	120	111		314	2
Andy Ringlien	120				120	3

Gas	class					
Entrant		#1	#2	#3	Total	Place
Dave Edmonson	C gas	11	21	33	65	1

HLG					
Entrant	#1	#2	#3	Total	Place
Andy Ringlien	67	62	77	206	1
Dave Edmonson	33	29	33	95	2
Dave Braun	23	21	27	71	3

SAM Rubber	OT	Model					
Entrant			#1	#2	#3	Total	Place
Andy Ringlien		Golly	102	120	120	342	1
Dave Braun		Smith	85	120	103	308	2
Dave Edmonson		Korda	90	67	77	234	3

Embryo	Bonus					
Entrant		#1	#2	#3	Total	Place
Dave Braun	6	68	74	56	204	1
Dave Edmonson	5	27	30	29	91	2
Don Berggren	9	60			69	3

Entrant	Points
Dave Braun	17
Dave Edmonson	15
Andy Ringlien	14
Bill Kuhl	2
Don Berggren	2

**Oktoberflug, 10-6- 2019 Dave Braun, CD (notes by editor)**

It was a wet and windy day and only Matt Decker, Dave Braun, and myself were on hand at 9:30 when we called off the contest. Edmonson put up 3 flights in Classic Towline event for National Cup points, but although the wind was flyable, the fields were too wet for retrieving.

We made some calls to alert some late comers, but some thought it easier to drive up to North Branch 2 hours later rather than checking their voice mail?

## Sunday, November 17, 2019: Indoor Session (notes by Edmonson)

Arriving at 4:30, found Jim Jorgensen there already, and by 4:45 most of the eager participants had arrived. Weather was perfect!

As can be seen by the overall results, everyone flew multiple events and had a good time, especially Matt Decker who set new site records for the Scale and Bostonian events. The other kid, Jim Ladwig, did well in two events. Andy Ringlien showed up with his handy technician, Ashley, and set a record in Phantom Flash. Dave Braun continues to dominate in No-Cal, but let me squeak by in the overall point totals. Jim Jorgensen improved on his record in Firefly by 19 seconds after hearing that Decker was closing in on his old record. I was able to find the CLG trajectory to take advantage of the few feet between the beams to improve on the high time in that event. Thanks to everyone for helping in cleanup and returning tables to storage, a good time might have been had by ALL?

No-Cal				Total	
Entrant					Place
Dave Braun	72	94	95	261	1
Jim Ladwig	68	61	64	193	2
Matt Decker	46	44	41	131	3
Jim Jorgensen	16			16	4

Bostonian			Total	
Entrant	#1	#2		Place
Matt Decker	52	49	101	1
Andy Ringlien	43	35	78	2
Dave Edmonson	29	34	63	3
Dave Braun	22	22	44	4
Jim Jorgensen	16		16	5

Phantom Flash				Best 3	
Entrant	#1	#2	#3	Total	Place
Andy Ringlien	68	66	66	200	1
Jim Ladwig	53	65	58	176	2
Dave Edmonson	47	55	49	151	3
Dave Braun	39	63	47	149	4
Matt Decker	31			31	5

HLG/CLG (best 2)				
Entrant	#1	#2	Total	Place
Dave Edmonson	21	20.3	41.3	1
Dave Braun	18.9	18.0	36.9	2
Andy Ringlien	15	20	35	3

FireFly					
Entrant	#1	#2	#3	Total	Place
Jim Jorgensen	58	62	60	180	1
Matt Decker	52	52	56	160	2
Dave Edmonson	49	52	54	155	3

Mini/Parlor/A-6				
Entrant	#1	#2	Total	Place
Dave Edmonson	224		224	1
Dave Braun	136	90	136	2
Jim Jorgensen	123	134	134	3

Scale						
Entrant		#1	#2	#3	Total	Place
Matt Decker	Lening-grad ec	43	56	56	155	1
Dave Braun	Farman	20	15	9	44	2
Jim Jorgensen	DV II	14	16		30	3

Entrant	Points
Dave Edmonson	16
Dave Braun	14
Matt Decker	13
Andy Ringlien	10
Jim Jorgensen	9
Jim Ladwig	8

Butterfly				
Entrant	#1	#2	Total	Place
Dave Edmonson	73	79	79	1
Jim Jorgensen	60	72	72	2

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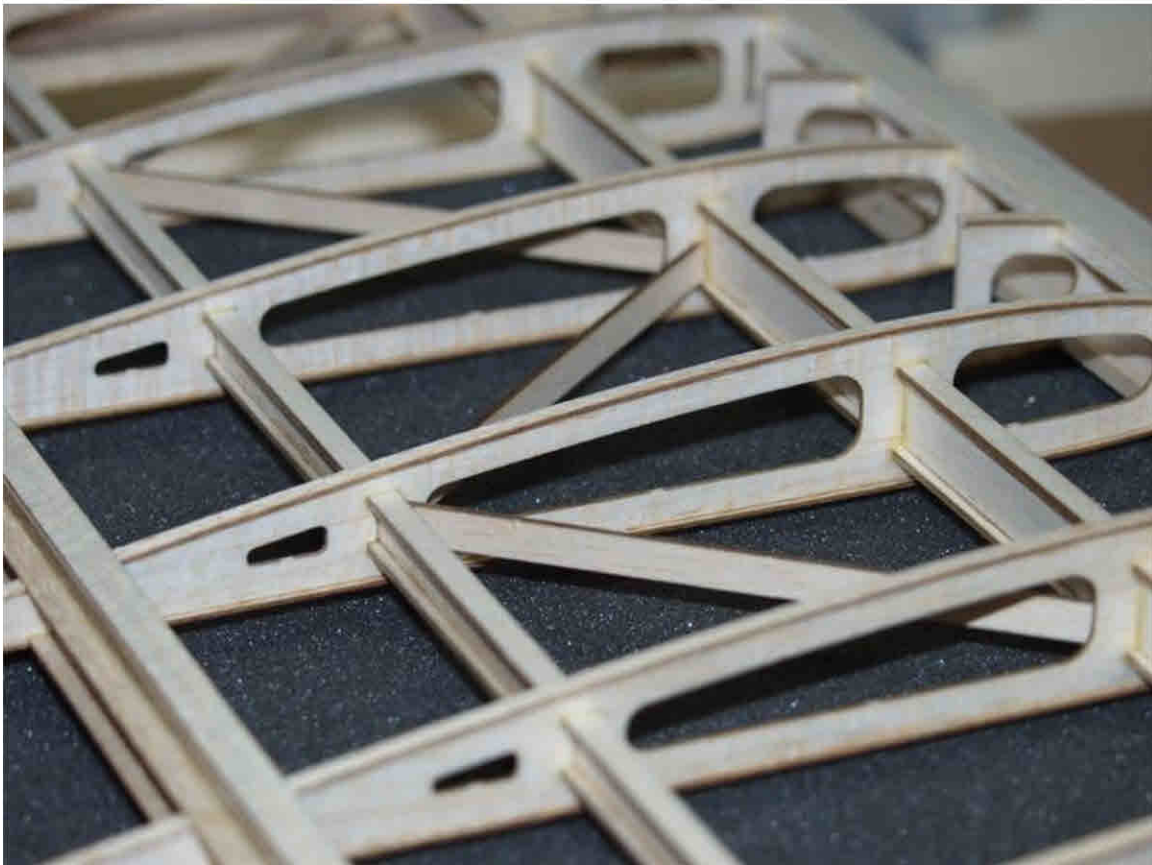
## *Greg Thomas Giant "Cub Project"*



FAC created a class of model in a category based loosely on the Comet series of 54-inch wingspan models of times past. I wanted to build a model that would compete in this newer category. I've always had a soft spot for Hazel Sigafoose's full-size Clipped Wing Cub, which is now hangared in Wisconsin.

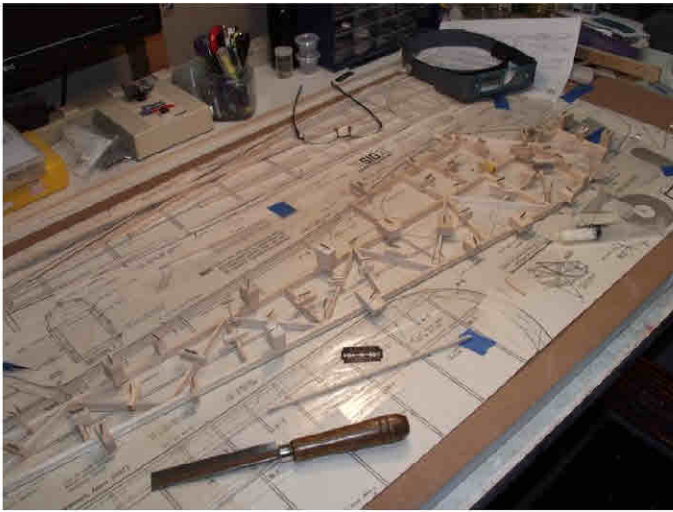
First step was to photograph the full-size airplane now owned by Mark Robotti. As it turns out, Jim Ladwig knew Mark and put me in touch with him. The full-size airplane is hangared about an hour's drive from my home. Mark was very gracious in allowing me full access to any part of the aircraft that I needed. I spent a whole day taking photos.

The serious work started when I returned home. The fundamental outline of the airplane was a SIG 56-inch wingspan RC kit. Outlines were used in a 3D modeling software called SDR3/IDEAS (which I consider the Rolls Royce of 3D modeling software). Airfoil is at ten percent of the cord. This seemed to look about right comparing full-size to the model form factor. Plus, it just looked right so I used it. The design process took about four months. I started work on the model bits and pieces at the same time I was designing. Actually, the entire build took place while continuing the model design.

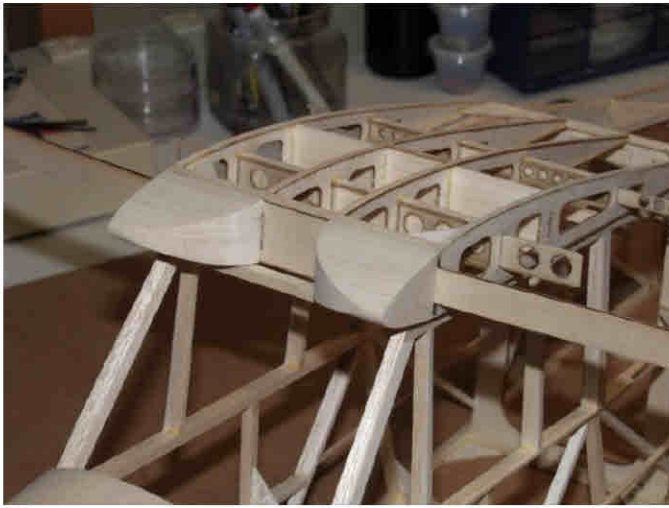


The wing features two main "I" beam structures with ribs from .050 thick balsa material with cap strips. Each rib and "I" beam spar had to be constructed as a separate sub-kit to get the desired result. My thoughts for this process, as I recall, took about three weeks of fiddling. Material was, in most cases, at six lbs per cubic foot. I used nothing heavier than that.

Fuselage, stabilizer, fin/rudder were constructed in the usual manner. Fuselage primarily used 3/16 square, four lb balsa with vertical and diagonal truss work of 3/32 x 3/16 balsa.



Engine details were provided in a kit from a specialized manufacturer of such items in 1/6th scale. Unfortunately, they no longer offer the engine in 1/6th scale. Assembly time was about a week; detail and paint, another couple days.



Fin/Rudder and stabilizer were fabricated featuring laminated outlines for each component. Ailerons were separated from the wing for covering at a later time. Fin was attached to the fuselage same as full-size airplane.

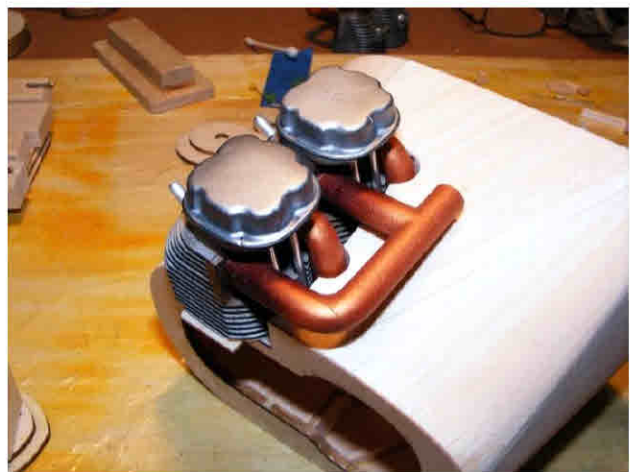


Stabilizer utilized two carbon fiber tubes as fuselage pass-throughs as connectors to give a scale look exactly the same as the full-size airplane when assembled.

Cowling and nose required quite a bit of 3D modeling to accomplish the desired result. Formers were developed and laser cut, assembled, and wrapped with 1/16 sheet balsa. Nose components were developed and fabricated from 3/32 sheet balsa and laminated to form a rough shape to be smoothed to final shape.

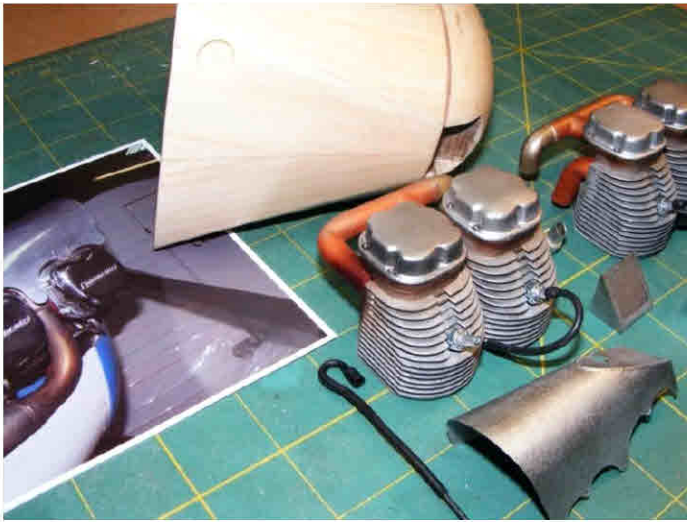


Scale engine details required considerable fit-up making sure there were no issues as finishing progressed. As the Continental Engine is horizontally opposed, each side at this scale worked out to be 1/4 inch difference from side to side. Allowances had to be made for the proper appearance.

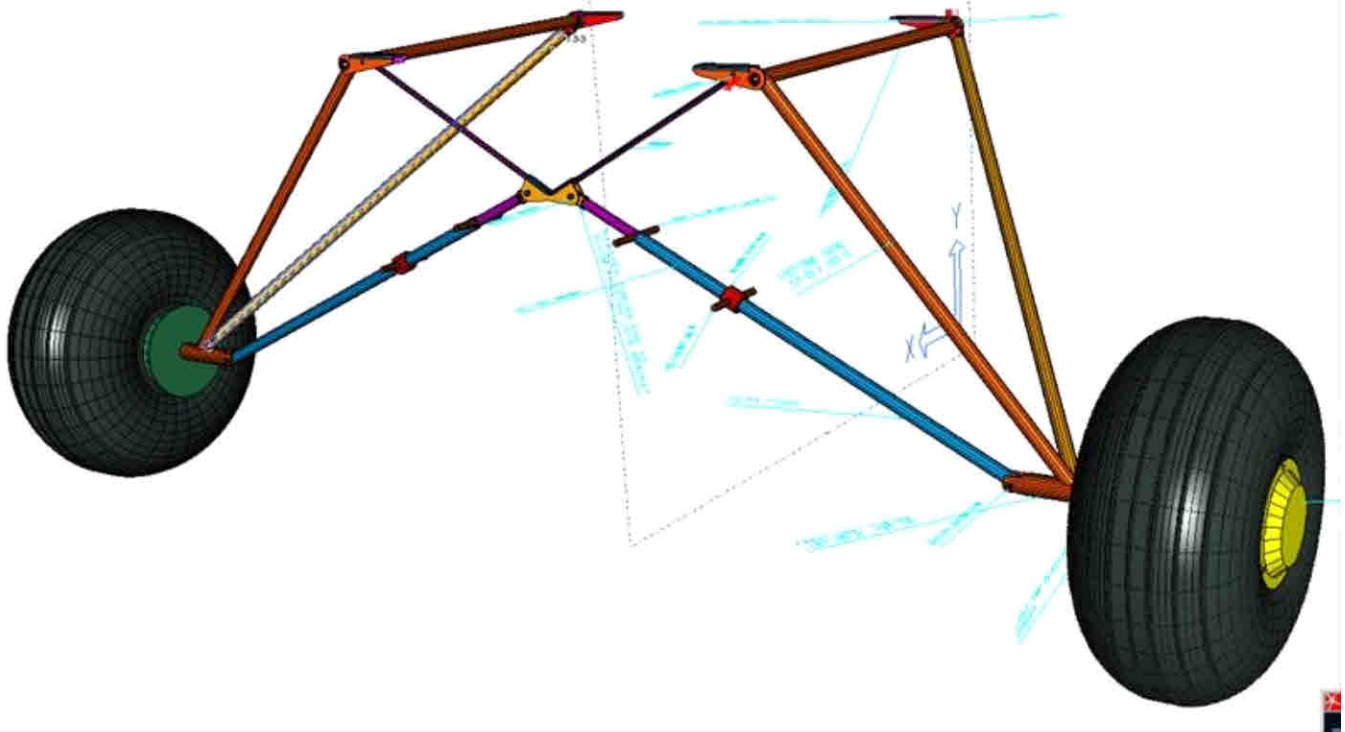


Nose cutouts finished-up and fitted to the cowl. Cooling air, external cylinder head air scoops were 3D modeled and turned into flats, laser cut, and formed from 100 LB artist watercolor paper. These had to fit-up to the valve cover bolt head pattern when formed. Keep in mind, the holes were only .020 diameter! See next images:



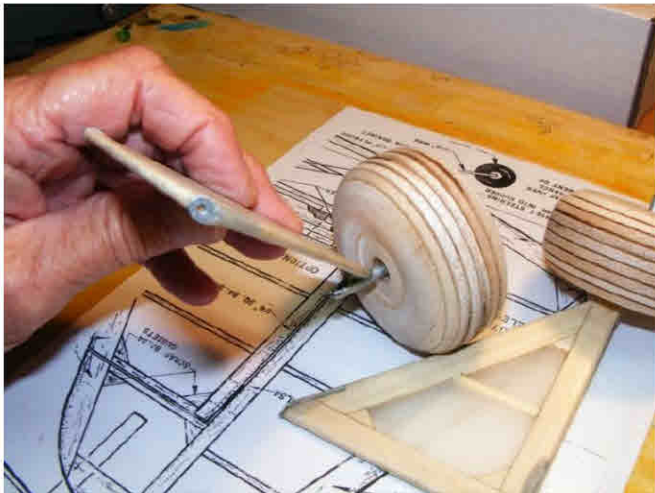


One of the significant design tasks was simulating the landing gear. Once again, I relied heavily on 3D

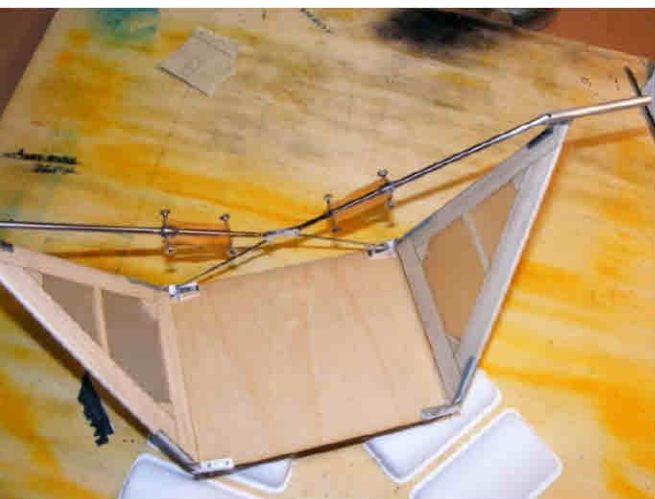
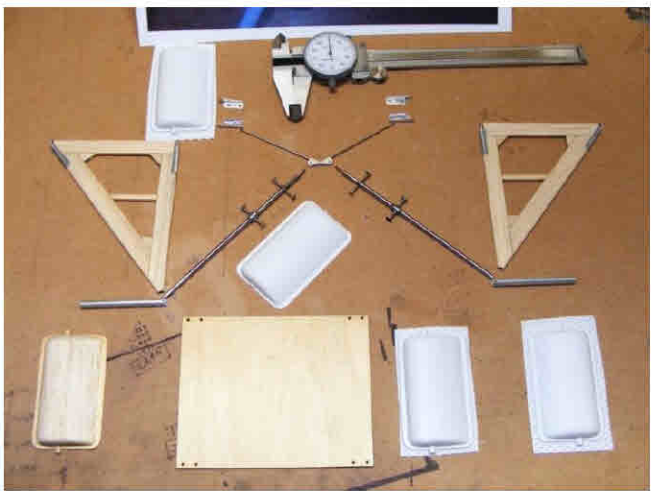
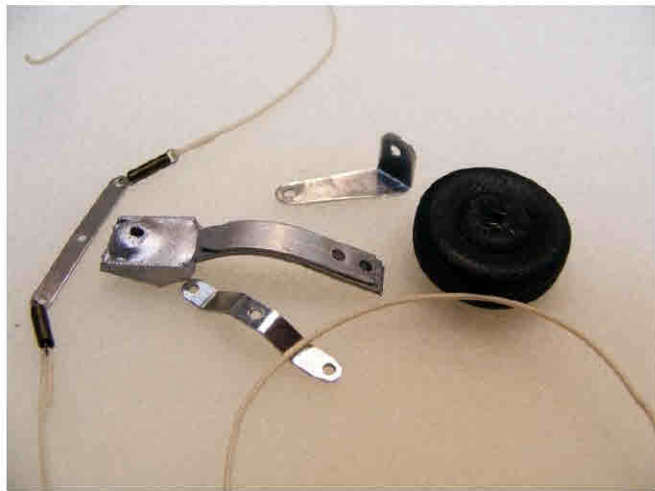


modeling to accomplish the design and fabrication. It was important from the modeling standpoint to have the gear, at 1/6th scale, be fully functional. How long it will last during hard landings is still anyone's guess. All the tubing used is stainless steel needle tubing. Fuselage fairings fabricated from very hard 20 lb balsa and silk covered. Each LG fairing also had special lugs fit to allow fit-up to the fuselage in a scale manner.

In addition to the fundamental LG latitude of movement and related to same, LG bungee cord covers were designed. Molds had to be fabricated to vacuum form the covers. On this airplane they are a somewhat streamlined shape. Initial thoughts were to use Trexler balloon wheels but decided against it for the simple reasons they didn't look right (too fat) nor did they have the scale tread on them.



Tail wheel Parts and LG dry fit-up:



Continuing construction had me planning final assembly, paint and masking. All the paint

masks were created using Frisket brand airbrush masking. Some of which is shown here, starting with the nose of the model which is colored to match the full size. Notice considerable detail is added to this assembly and it's pretty much ready to add to the fuselage.

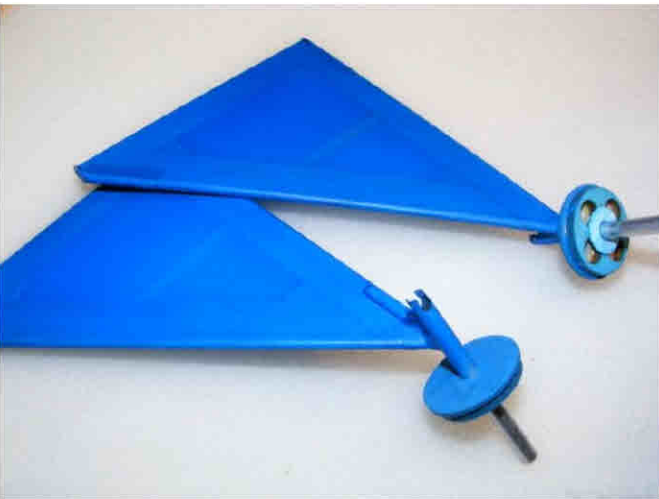


Water slide decals were fabricated and added to the valve covers along with more engine detailing. I should mention at this juncture, as this model is 1/6th scale, there is no way to skip details on the airplane. Every detail that is on the full-size airplane needs to be shown simply because of its size. Notice that there are actual miniature screws holding the valve covers in place.



Next task was the arduous and tedious task of paint. A person may think this was a simple task and, frankly, I thought it would be one of the easier things to do --- was I ever wrong. I may build models of this size in the future but probably not one with this complex of a color scheme. Having said that, after completing the task, I amazed myself when it all came together.

Started with the fuselage and tail feathers. As you may gather, tail feathers were the simplest. As the Frisket only comes in a 17-inch length I didn't have to splice any Frisket as I did on the wings and fuselage. All the color splits on the fuselage and wings were greater than the 17-inch sheet size of the Frisket, which created its own set of issues.



Wings presented the most difficulty due to having to create long narrow masks for color separation. However, as is always the case, we figure out what is needed and work to that end. One of the more critical of problems was figuring out how many coats of color were needed for each swatch so that it matched the previous color swatch of the same color. In the end it all worked out.



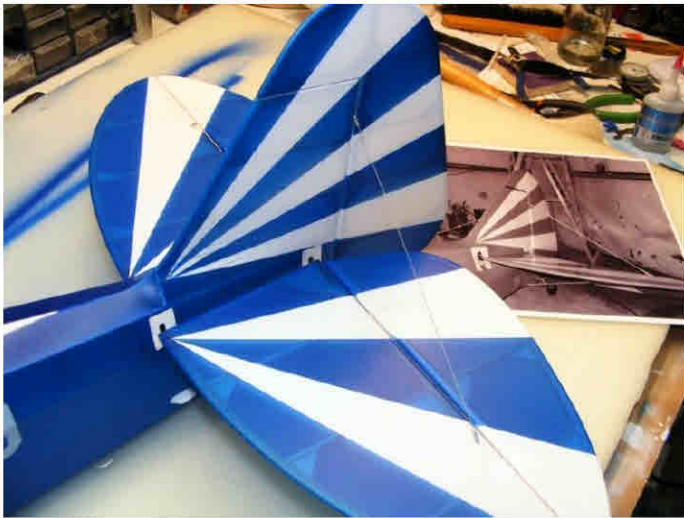
Finally ready to add some detail. Note the wing is in one piece. There's a good reason for this. If the wings are separate panels, there would have to be a clever way of getting all the details added to the struts and strut joints, none of which replicated the full scale airplane. Thus, the wing had to be one piece. The full scale airplane has a lot of detail related to the wing struts themselves.



Wing details:

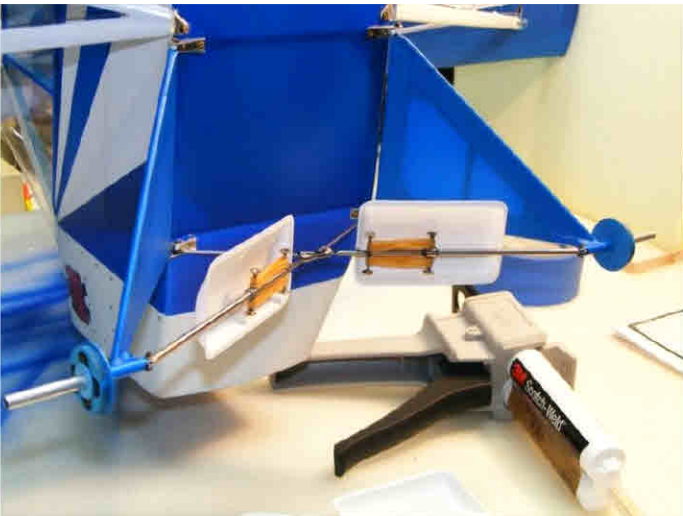
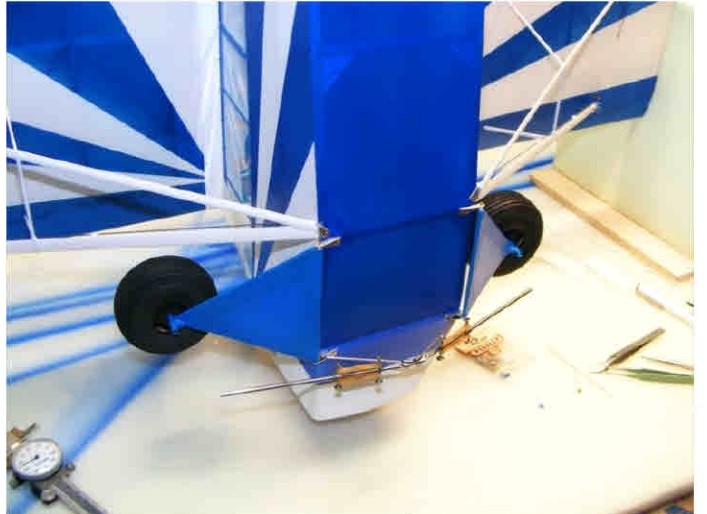
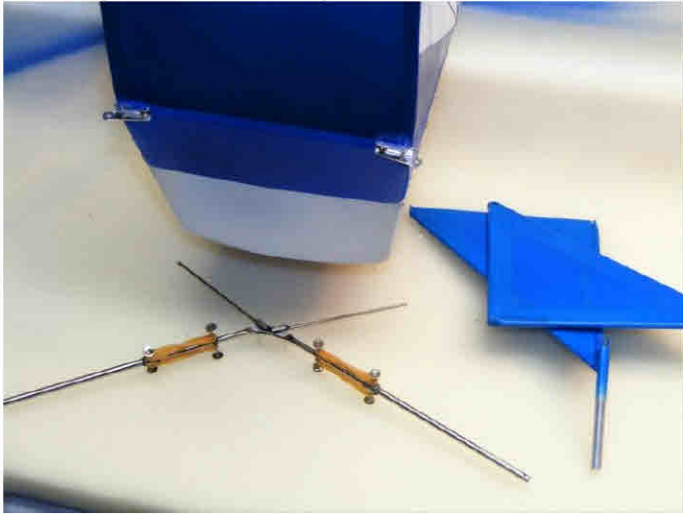


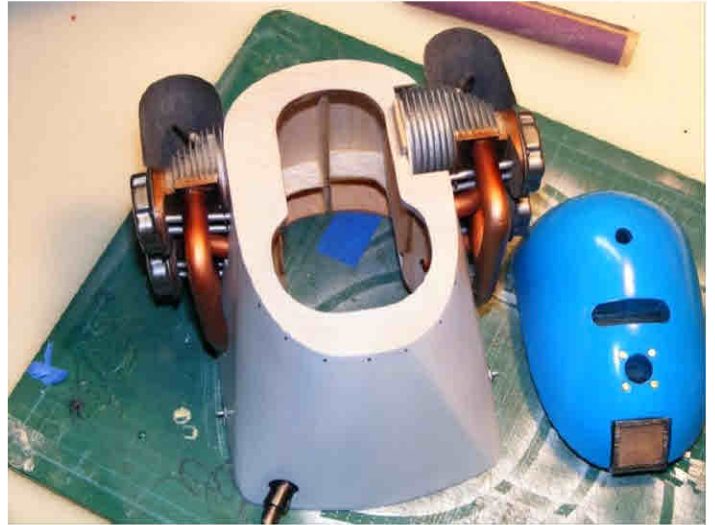
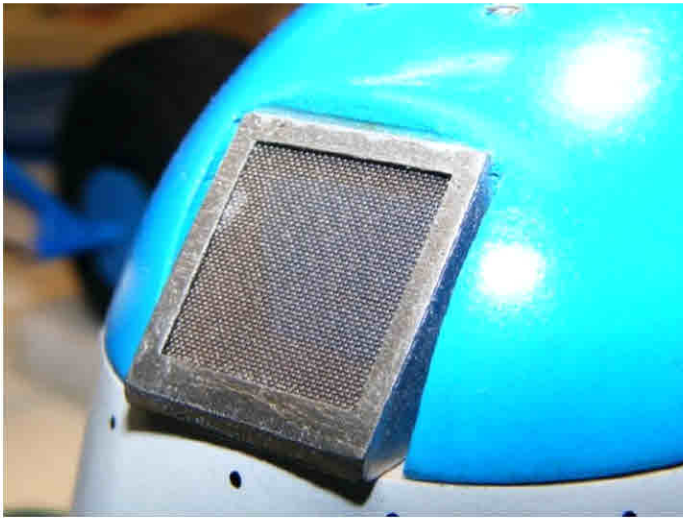
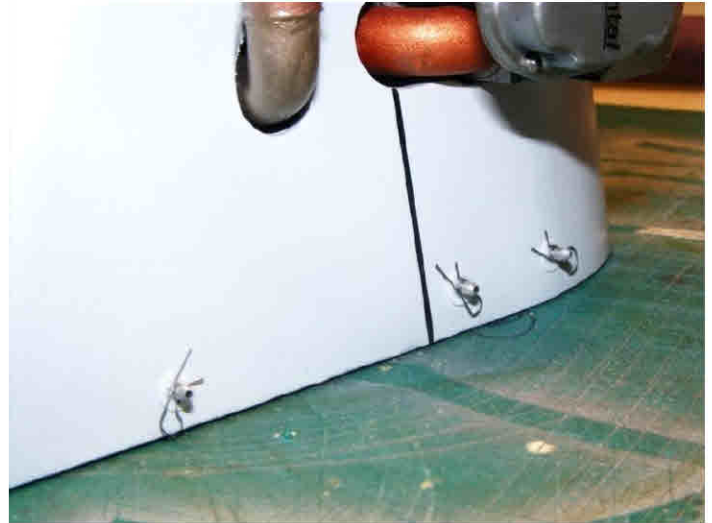
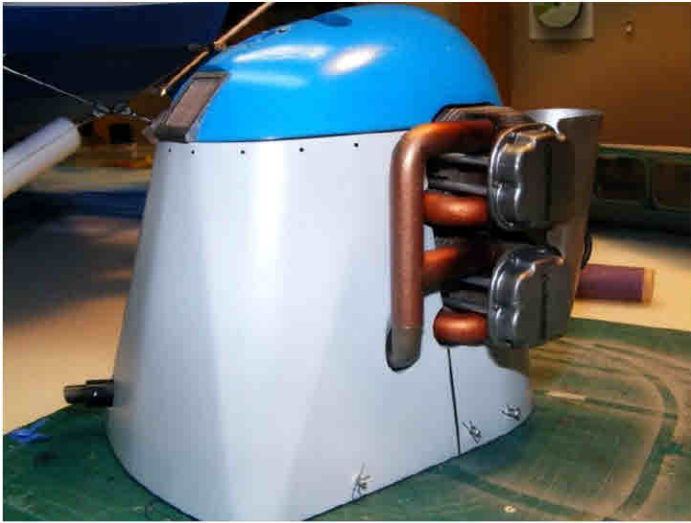
Fuselage detailing:



Moving on to final component assembly:

Landing Gear assembly:





I've intentionally disregarded a significant amount of work for this article because it would require too many additional pages, unfortunately. If you'd like some how-to's and the fiddly bit information, you may always call me and we can talk through it.

Final assembly and just about ready to fly, minus prop and nose bearing. These components have been fabricated but not shown in the photos here.





A transport box was built with a few inches to spare all around. Would you believe it's too big to fit in our travel vehicle?! I'll be able to get it flying but only locally. Oh well...



End/gt

# *Minneapolis Model Aero Club*

*2019-2020 Indoor Free-Flight Session*

**Sundays,**

**November 17, January 19, February 16, March 15,  
& April 19**

**5:00 to 9:00 PM..... 18+ ceiling height**

**Contested events are:**

**Phantom Flash, Firefly, Bostonian (14 gram), Butterfly, No-Cal,  
Peanut and Walnut Scale combined, HLG/CLG combined, and  
lightweights.**

**Note, lightweights can be any AMA indoor event such as mini-stick, EZ-B,  
Pennyplane...etc.**

**Entry fee \$10 per session. Visitors free.**

**Where:**

**Christ the King Lutheran Church**

**1900 7<sup>th</sup> Street NW**

**New Brighton, MN**

**Directions:**

**From 35 W, go West on 694 to Silver Lake Road, exit 39**

**South on Silver Lake Road about 2 blocks to 7<sup>th</sup> St. NW**

**East on 7<sup>th</sup> Street about 3 blocks to church on left side. Go around to  
North side of church to park, gymnasium just inside door.**

**Contact Dave Edmonson if you have any questions:**

**Cell # 1-612-220-5239**

# Minneapolis Model Aero Club

## 2020 Outdoor Free-Flight Contest Schedule

### **Events: Free Flight Events per AMA, NFFS, MMAC, and FAI rules**

All Contests are held at The Sod Farm, North Branch, Minnesota: 40 miles North of the Twin Cities on US 35, 1 mile east on MN 95, left on County Road #30 (stop light in the center of town), north approx 2.5 miles, right on 420<sup>th</sup> Street (continue east 2 miles to road just prior of Central Turf Sign, south to field). Must be an AMA member, and NFFS membership encouraged. **GPS coordinates: 45.54997, -92.92455**

Call or email Dave Edmonson for more detailed directions or contest questions:

Tele: 612-220-5239 email: [dedmonson@comcast.net](mailto:dedmonson@comcast.net)

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*Sunday, May 17 "Fun Fly" Fly your favorites or new models!*

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*Sunday, June 7 "MMAC Picnic Contest" Don Monson, CD (651-457-2321)*

#1. Junior Event #2. HLG #3. CLG #4. HoSoFo #5. P-30 #6. Large Rubber  
#7. Small Gas #8. Large Gas #9. Embryo-FAC #10. Rubber Scale Event  
Flying until 3:00 PM Picnic afterwards

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*Sunday July 12 "Summer Meet" Dale Mendenhall, CD (763-535-2976)*

#1. Junior Event #2. HLG #3. CLG #4. HoSoFo #5. P-30 #6. Large Rubber  
#7. Small Gas #8. Large Gas #9. Embryo-FAC #10. Towline Glider 11. Jimmy Allen

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*Sunday, August 9 "Almost Silent Meet" Gary Oakins CD (651-429-3150)*

#1. Junior Event #2. HLG #3. CLG #4. P-30 #5. HoSoFo #6. Large Rubber  
#7. Small Gas #8. Large Gas #9. Embryo-FAC #10. Towline Glider 11. Rubber Scale Event

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*Sunday, September 6 "Fall Mini Model" Dave Edmonson CD (612-220-5239)*

#1. Junior Event #2. HLG #3. CLG #4. HoSoFo #5. P-30 #6. ¼ Nos Gas/.020 Rep  
#7. Gas #8. SAM OT Rubber #9. Embryo-FAC 10. Jimmy Allen

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*Sunday, Oktober 4 "Oktoberflug" Dave Braun (651-731-6179)*

#1. Junior Event #2. HLG #3. CLG #4. HoSoFo #5. P-30 #6. Large Rubber  
#7. Gas #8. Embryo-FAC #9. Towline Glider #10. Rubber Scale Event

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**Note:** Entries accepted until 2:00 PM. For all contests, 3 scoring flights, and no rounds. You may enter multiple class models in an event if desired (additional class model only). Class 3 field, all maxes except for flyoffs to be 2 minutes, or 90 seconds if the wind is above 12mph at the start of the contest. Combined events, please specify "EXACT" NFFS event for points on score sheet.

1. Large Rubber: Any rubber model including SAM oldtimers.

2. Small Gas: .061 or less size gas powered model. 7 sec engine for AMA and Classic, 9 for Nos, 5 for any FAI model..

3. Large Gas: Larger than .061 size gas powered model. 7 sec engine for AMA and Classic, 9 for Nos, 5 for any FAI model..

4. Towline Glider: Any A-1, A-2, F1H, F1A, or Classic Towline (50 meter towline length)

5. HoSoFo: Fly any event, 3 flight total, specify model type if you want NFFS points.. In memory of Herman Fessler.

6. Rubber Scale, any size or class