

In The Box

The Official Newsletter of The International Miniature Aerobatic Club



2019 International Judging School

Feature Articles:

2019 International Judging School

Novice Class

Toby's How To

Aerobatic Poetry

And Much, Much, More!

Regular Columns:

Letter From the President

Letter From the Editor

Secretary's Report

Regional RD Reports

Entering the Box (for new Pilots)

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Letter from the Editor

Rich Whitlow

The year has certainly started off with a bang! The Southwest Region hosted the International Judging School in Mesa, Arizona. Oh, you noticed..yes, INTERNATIONAL Judging School. Every two years we have historically had "National" Judging Schools, but as most of you know we now have a growing membership Internationally. So, it is only natural that we evolved with our second International Judging School. A big Thank You to all of the International participants and Adi Kochav for organizing getting everyone to the US.

Something you may have noticed online is the sweeping new trend to tag posts and images with the #IAMIMAC tag. This is a popular tag to show your pride in IMAC and the people in IMAC. It is a sign that it is up to ME to promote and present IMAC as a positive experience. It is up to ME to bring in more members. It is up to me to make IMAC even better. #IAMIMAC!

The last thing I have to write about is the upcoming season. We have a LOT of events. I am only at a small portion of the events. I can cover Nats and South Central events. Maybe get to Clover Creek or the Tucson Aerobatic Shootout. BUT, there are many more events out there that I am not able to cover. So, please take a few pics, write down a little about the event and send it to me! I want to cover as many events that we can. Remember, we are digital. So, I can add as many pages as I have content. So, take it upon yourself (#IAMIMAC) to make sure this coverage happens.

Now that the Newsletter is a year old, we have settled on 4 issues per year. For now that will be March, June, September and December. We also have back issues available for download on the mini-iac.org website. So, spread the word and let everyone know this resource is available.

Till next issue, see you at the field.

Rich Whitlow
Newsletter Editor
imacinthebox@gmail.com





Letter From The President

Mike Karnes



Spring is Just Around the Corner

Hard to believe it's already March and the contest season here in the Midwest is just around the corner. Can't wait to get out of the house and back to the field.



Weak Signals Show

A few of the North Central guys decided they wanted to still have IMAC at the Weak Signal Show in Toledo, OH. They have been gathering volunteers to work the booth and put on a workshop at no cost to IMAC. So please visit the show and thanks the guys for supporting IMAC. 65th Annual Toledo Show R/C Expo - April 5, 6, 7 - 2019 Doors open at 9:00.

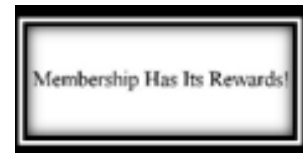


Novice Class is something we would like to try in 2019 to see if we can spark some more interest from new pilots to get them to attend your contest and

let them see what IMAC is about. If we personally ask them to visit who knows what will happen. If we just sit and wait and don't ask, well nothing will ever change. Get out there and also do your part, invite a friend to go to the next contest with you.

IMAC Hats

Hats will be available for purchase from your Regional Director or an ARD at a local contest. The hats are a Two-Tone Stonewashed Canvas Hat with the IMAC logo on the front and #IAMIMAC on the back. Be sure to get yours.



I want to thank all those that completed their profiles so a membership card could be mailed to you. As of today there are 85 members left that have not received a card due to no address in their profile. If you think you might like to have one check your profile

Mike Karnes
#IAMIMAC



Notes from the Officers



**Vice-President
Doug Pilcher**

From the Desk of the Vice President

As my first message to my IMAC family and friends as VP, first I must thank you for your confidence in me to continue with the Board of Directors and allowing me to be your Vice President for the next 2 years. Since I joined the BOD in 2014 as South-Central RD, I have seen and worked with a lot of amazing people. As I start my sixth year on the BOD, I would be remiss in not commending both those before me, and during my time with the board. Every member I have worked with brought new and fresh ideas to the table. These ideas and thoughts and concerns come straight from you the members. And the BOD listens. I look forward to many new and exciting things in the next two years. I would also like to thank Jeff Marsuchek and Steve Sides for their time on the board, and welcome Ray Morton for NC, Rich Whitlow for SC and Primo Rivera in the SE. The influx of new board members widens and brings again new and fresh ideas to the table and these are good things for progression within IMAC.

So, the 2019 season is here and the 2018 seemed to just fly by! (Pun Intended). 2018 marked the end of very daunting and very rewarding season to include new contests

and old alike. For myself, to include first of the season in El Paso for the SC – SW Smackdown in April, the NATS in Muncie in June and to onto to the IWC 18 World Championship in Muncie again in September, and for myself and Rosie and Leasha in tow, in Sherman for our Regional Finals in November with many local contests in between. A lot of travel in 2018 but every mile was worth it. It also was a year of loss of our dear friends, John Schroder and Allen Eklund who passed this year. True IMAC to the core individuals who brought so much time and dedication to the world of IMAC. May they RIP.

So, what does 2019 have in store? Outside of the work that the board has been doing on many facets of changes starting in about November of 2018 include the new Novice Class and preparing for the coming season in all our current 7 regions. We started off on the schedule with IJS in MESA AZ. A fantastic school and time of education with Alex Dreiling (our South-West RD) and the building of the school for us, and Mr. Ty Lyman who tirelessly worked, put together a cleaner and clearer Judging School presentation. I am also working on bringing this content to the Education Page of the mini-iac Website [“Found Here”](#), and while a challenging task, one that I believe important to you the membership. It will be completed

as soon as possible, so be sure to keep checking back. As I write this, we have had 4 Regional Judging Schools already and plenty more on the region schedules to come yet. I encourage all to participate at a school near you. Brad Davy in the North-East region is again holding his online school (GoToMeeting) class beginning April 3rd and if you are unable to attend a local school you can jump in on this one and [“Sign Up Here”](#)!

I have heard from so many of you, and I encourage you to continue to contact me and share your thoughts, ideas and yes, complaints of what you would like to see added to IMAC and or changed. It is how we further grow our SIG and strengthen our core. My direct email and cell are listed everywhere. I offer you all to contact me directly. My door is always a “Virtual Open One”!

So, let 2019 begin (has already happened in some of southern most reaches) and let the points race begin. I hope to see as many of you as possible thru out the season and my personal goal in the next term is to visit each region personally and see you at the field!

Doug Pilcher
Vice President
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Secretary
Samantha McKinney

The 2019 Season has begun in a few of our regions! Some of the regions are still dealing with winter. Daylight Savings Time will be on March 10. Don't forget to "Spring Forward" one hour!

The IMAC BOD has established for the 2019 season the Novice class. The Novice class is a way for new pilots to experience IMAC without being in the competitive class. The Novice class will only compete on Saturday. The Novice pilot will fly in rotation with the Basic class; will fly the Basic sequence; and be scored just like the Basic class pilots. These pilots will be given back their raw score sheets and will be able to discuss their scores with the judges. For more information, go the IMAC site, www.mini-iac.org and under the "Downloads" tab, click "IMAC Forms" and the [Novice Class Document 2019](#).

There will be a Score Training held on Saturday, March 9th at 3:00 p.m. CST. This class is available to new or returning score keepers. For members, you can register under your regions page. Or, you can email myself, secretary@mini-iac.org or Doug Pilcher at douglas.pilcher@gmail.com to register. If there is an overwhelming interest for training, we will have a second training. The training will be recorded and posted to the website, along with the score manual and how to download score from the website. Many regions are beginning to host their judging schools. I would like to encourage everyone to attend. Whether you are a veteran-judge or new, these schools are

very important just as a refresher or to review the new rules after a rules cycle. Brad Davy, our North East Regional Director, will also be hosting an online judging school. Contact Brad at nerd@mini-iac.org for more information. AMA has released the dates for the 2019 NATS. The dates are July 7-10, 2019. For registration, please contact AMA. If there are any questions on the contest, please contact Doug Pilcher at douglas.pilcher@gmail.com. There is a forum on the IMAC website on the format of the contest. Let us know what you think, whether it should be the same as 2018 or different. We value your opinion! This newsletter I would like to start recognizing our members and their accomplishments. Please send me their information at secretary@mini-iac.org if you would like them recognized in the newsletter.

Congratulations to Evan Turner, from the South East Region, on becoming the 2018 Multigp Drone Racing National Champion!

Congratulations to Joshua McCreary, from the South East Region, on being a 2018 AMA Scholarship Recipient! I would like to wish everyone a great season, safe travels, and God's Blessings on 2019!

Samantha McKinney
IMAC Secretary
#IAmIMAC



Treasurer
Phil Vance

Hello Everyone!

I was a bit relieved when 2018 ended, for it was an extremely busy year. With the normal treasury duties to fulfill, we also hosted the 2nd World Championship here, in the United States. Keeping up with the additional income and expenses, took a bit more time than I anticipated.

I am finding that 2019 is going to be just as active as 2018. January started out getting the Year End Operating reports completed. It took a little longer this year since I had both the IMAC Year End Financial Report and the IMAC Worlds Financial Report to complete. Both reports have been submitted to the Board of Directors for approval and should be available to the membership by the time this edition of "In The Box" is published. The Board of Directors did vote to purchase a \$1,000.00 brick, from the World Championship revenue, in appreciation to AMA for allowing IMAC to use their venue to host the IMAC Worlds.

We also held the National Judging School in Mesa AZ in January, 2019. This year, it truly became the International Judging School as we had our International Regional Director, Adi Kochav from Israel, and Manrico Mincuzzi from Italy, attend.

Our membership count is definitely on the upswing in all regions. By the end of February, the international membership had almost tripled from what it was in 2018. I think the biggest factor for this growth is allowing a first-time IMAC member to join for the special rate of \$20 for their first year's membership.

Until next time.....



2019 International Judging School

Rich Whitlow

IMAC started it's year in late January with a gathering of International Judges and aspiring Judges in Mesa, AZ.

This gathering was orchestrated by the Southwest Regional Director, Alex Dreiling and the Chief Judging Instructor, Ty Lyman. It was masterfully put together and was a great event for everyone that attended.

The event started on Friday with an Instructor training. This included a review of the rules changes, including the clarification of the turn around rules, and some of the traditional instruction and discussion of the rules and how to judge. But, the afternoon session brought some new challenges and ideas on how to prepare our Judging Instructors to impart the needed knowledge to new and existing judges.

The Judging Instructors broke into groups and worked through a lesson plan on a particular session of the training. They worked this lesson plan and developed a presentation that would be less "Pow-



erpoint Cenbtric" and more direct with examples and props to get the students involved with the learning. This was designed to keep the student engaged with the materials and to retain more of the information.

The day was a complete success and everyone, no matter their experience, took



away something that would help them with their upcoming Judging Schools. Plus, the teamwork and group discussions helped further bonds of camaraderie and friendship. It also gave exposure to everyone some different teaching styles to help expand their teaching skills.

Saturday was a traditional Judging School that included the new and old material. It also included a streamlined Presentation that Ty Lyman produced to help get across the information in an efficient and interactive way. Some of the students from the Instructor Class also participat-



ed in the teaching.

Sunday was practical day. Everyone met at the Beautifully scenic, Superstition Field. The background to the flying was quite a sight to behold. Having the mountains as a backdrop is a very special treat.

The flights began with some basic maneuvers, one at a time and discussion of what everyone saw in these maneuvers,

Then the flights moves to Sportsman and Advance Sequences, in parts, so that discussion could be had on each of the sequences. Some of the flights were flown with some of the most commonly found (and missed) items that a Judge should be aware of.

In the end, everyone walked away a better judge than when they arrived.

IMAC owes a great deal of appreciation to Ty and Alex for their hard work in getting this event organized and executed!



Entering The Box

(A Column for Pilots New to IMAC)

Greg Hladky

The Weight of Nothing

It was a brisk day in November, and I was raking leaves from a bald cypress tree in my front yard. If you are not familiar with the bald cypress, the leaves are very fine. In summer they look like the small needles of an evergreen tree. The tree is in fact a deciduous conifer. When fall arrives the leaves turn brown and the stems they are attached to drop to the ground, soft as feathers. They feel like they have no weight at all.

When a pilot decides to give IMAC a try, having flown enough circles around the field and looking for a challenge, enthusiasm can be very high. Individual maneuvers in the Basic sequence don't look too intimidating, yet the challenge of stringing them together into a recognizable sequence is clearly present. It is fun to take up the challenge!

Like any sport it is possible to advance quickly in that first year when enthusiasm is high. Enthusiasm provides the motivation to pack up your plane and all the flight gear needed, including transmitter, fuel, food, jacket - if it's still cold out, hat, sunscreen, sequences, tools and spare parts, and head to the field. It may be a long drive, which provides time to review the sequence in your mind, or work on memorizing a new sequence. You arrive at the field, greet other club members if they're out, or just get busy unpacking plane and equipment and preparing for that first flight of the day. It is always thrilling to see that empty runway and picture your plane taking to the air again.

But what happens when that initial enthusiasm fades? What do you do when you feel you have reached a plateau and aren't progressing as rapidly as before? Combine that with weather that is not ideal,

and it is easy to start putting practice off for another day. It's easy to let gravity take over and plop down on the couch. After all, it's just a hobby, and it's supposed to be fun! Right?

If by "fun" you mean amusement, then yes, it can be that. But "fun" can also mean something that provides enjoyment. And it is not hard to find examples in your life of the things that provide the most enjoyment. For me it is those things that required some effort: a hike to the top of Yosemite Falls, making that first solo flight, or completing my first IMAC contest.

At that moment when the pull of gravity feels stronger than enthusiasm for another trip to the field, remember what your end goal is. When you look back on another year, what memories will give you the most enjoyment? What experiences will stand out? Who will you miss, and how will your absence be felt, if you skip a contest or a day at the field?

I've had plenty of discouraging days trying to improve my aerobatic skills, days when I felt that I made no progress at all. But looking back over the course of an entire season I noticed a trend, both in Basic and Sportsman. I rarely, if ever, won a contest early in the year. By Au-

gust, however, I really started flying well. While each practice day felt insignificant, it mattered. The accumulated practices became significant.

When I finally gathered all the bald cypress leaves into a bag, I was surprised at how much they weighed. The accumulated weight of something that weighs "nothing" came close to ten pounds!

Every step when climbing up a rocky trail is not always "fun." In fact, focusing just on the steps and not the sights along the way, or the end goal, is a sure way to get discouraged quickly. Another day of practice at the field may also feel more like work than fun. Or that it won't make a difference. Take some flights around the field without any sequence work, if a break is needed. The pace of advancement is entirely up to you. It can be fun to attend a contest just for the pleasure of flying with other pilots who share your interests. Every flight is significant. Like a bag full of bald cypress leaves gathered from an entire lawn, the weight of "nothing" can add up to a whole lot of something.

Comments are welcome. Send a letter to the editor with suggestions for future articles. Until then, stay tuned and fly right! (Or left, if Schedule C. ;-))



Press Release

From: International Miniature Aerobatic Club

Office of the President

Date: February 11, 2019

The International Miniature Aerobatic Club (IMAC) announced that a new level was added to its competition classes starting January 1, 2019.

The new class (Novice) being a noncompetitive class has been added to provide new prospective members to fly at an IMAC Event, without the pressure of the competition portion of the event.

This new class will allow the pilot to participate along with the Basic Class, receive help from more experienced pilots and fly in the actual event, without being scored against the more experienced pilots.

When asked about this change, Vice-President Doug Pilcher remarked, “We hope this will encourage pilots that have any interest in IMAC Competition to give IMAC a try. This gives them an avenue to learn what IMAC is about, without worrying about the stress of not knowing the details of how to compete. We will have a more experienced pilot mentor them, so that they can be ready to enter into a competition class with confidence.”

This change, along with the International Growth, positions IMAC to have a healthy membership increase for 2019.

“We are excited at the new changes and prospects for another great year”, says President, Mike Karnes.

For this to succeed every Contest Director MUST do the work. They need to send out the invitations to their area clubs and let them know about IMAC and get them to visit and see what we are all about.



Daedalus

Poetry by:
Greg Hladky

And did those wings in ancient time
Soar upward in the sun burnt sky:
And was the father of our dreams
Seen boldly taking us on high!

And did the clever man of arts
Shed light upon our lofty bent?
And was a seed implanted in
That Cretan's dark imprisonment?

Bring me my wings of fair design;
Bring me the power of desire!
Bring me my aerobatic lines;
Bring me the chariot of fire!

I will not cease from mental flight,
Nor shall my sequence sleep in hand,
Till I have reached the sun kissed heights
In hallowed halls o'er sea and land.

Inspired by William Blake's poem, Jerusalem ("And did those feet in ancient time").



Toby's How-To

By: Toby Silhavy



This column, I would like to discuss how to successfully bond balsa and foam around complex curves using epoxy. Many of these techniques can be applied to using polyurethane glues such as Gorilla Glue as well. Generally, I use 10" wide 1/16" balsa to sheet most of my planes. If I require something wider than 10" I butt the sheets up and glue with Titebond II. I will use blue painters tape to hold the sheets together. On the show side of the balsa (the part that will be covered) I will run a wet washcloth to remove any excess of the Titebond II.



As can be seen by this picture, I pull all of the sheets together with blue painters tape while the Titebond II dries. I also place a figure X connecting the corners of the piece using blue painters tape. The figure X will greatly help strengthen the balsa when you try to go around tight turns (like belly pans and top turtle decks). I will generally let the sheeting dry over-

Once dry, I'll apply a mixture of water and rubbing alcohol (50:50 mix) on the side that is going to be receiving the epoxy. I'll use a spray bottle with the mixture and lightly mist the side receiving epoxy



After about 10 minutes the balsa will start to bow. At this point I'll place the balsa in the shuck side of the part. There is nothing worse than spending time and money on balsa sheeting and hearing the heart breaking snap of the balsa cracking as you try to bend it around a sharp corner. Applying the water/alcohol mixture will help reduce that infamous cracking sound. Once in the shuck, I'll apply a small sandbag or a small piece of 2" PVC pipe (about a 1/2 to 1 pound of weight) to let the balsa start forming the curve of the shuck. Let the piece slowly take the shape of the shuck. Don't force it, or it could still snap. Let the mixture do its job. Once the balsa has deformed to the shape of the shuck, place your foam part in and trim your balsa to within about 1/16-1/8" of the perimeter of the foam part.



Now the moment of truth to start applying some adhesive. I personally like West Systems epoxy (105 resin and 206 hardener). It gives me a good 30-35 minutes of working time. Before I start applying epoxy I'll let the balsa dry (from the water/alcohol mixture). I'll start gathering all of my tools to start applying epoxy. I like a large squeegee to apply the epoxy. I'll also use 3 or 5 mill disposable gloves to keep my hands and the parts clean. I use plastic disposable cups to mix the epoxy as the foam cups will generally break down as the epoxy heats up in its drying process. A couple of drops of food coloring will help color the epoxy so its easy to see as you spread the mixture over the balsa.



Have plenty of paper towels around to clean up your table so your parts don't get covered on the wrong side with epoxy. Next time around we will discuss how to vacuum bag your parts.



Toby Silhavy

"Chase The Dream, Not The Competition"

Continuing Education

Judging School

By: Ty Lyman
Education Committee

While ole man winter has yet to release his grip on many parts of the IMAC realm, the 2019 competition season is well underway for those fortunate enough to be in the more temperate climes. We here in the mid-Atlantic have had a few of those pre-spring teaser days that gets your flying blood moving and reminds you that the real thing is just around the corner. Since many are still in winter hiatus, now is a great time to brush up on your judging skills and rules knowledge base. As luck would have it, there are still opportunities to attend judging schools in several regions.

The importance of the schools simply cannot be overstated, especially in rules change years, which 2019 happens to be. IMAC is a community, a community whose ultimate success or failure is directly related to its members taking ownership and responsibility for maintaining a strong, skilled, and knowledgeable pool of judges. Perhaps in a utopian Scale Aerobatics arena we'd have professional, full-time, dedicated judges. The reality, however, is that every pilot needs to take ownership of their IMAC and be a full and complete participant, which includes fulfilling your judging responsibilities just as you expect others to do for you.

I'll put my soapbox back in the closet now. Let's talk a little about the rules changes that are in place for 2019. Most of the changes involve rewording or restructuring of how the rule is organized in the rulebook and have no substantial impact on contest flights. However, there is one significant change that could potentially affect contest outcomes if people are not aware of it. Rule 13.5, legal turn-around figures, contains a major change in 2019. Just so it's fresh in everyone's mind:

13.5: Prior to entering the aerobatic airspace, between sequences, and prior

to landing, pilots shall be allowed to perform only the following trim and positioning maneuvers:

- Turns.
 - Half Cubans or Reverse Half Cubans with only a single $\frac{1}{2}$ roll on the 45 degree line. Note: The $\frac{1}{2}$ roll is optional based on the aircraft orientation required to initiate the aerobatic sequence.
 - Single $\frac{1}{2}$ roll to inverted immediately prior to an attempt when the first figure requires an inverted entry.
 - Single $\frac{1}{2}$ roll to upright following an inverted exit from the last maneuver.
 - Half Loops:
 - 1) Half inside loop with only a single $\frac{1}{2}$ roll on entry or exit. Note: The $\frac{1}{2}$ roll is optional based on the aircraft orientation required to initiate or exit the aerobatic sequence.
 - 2) Half outside loop to upright for sequences that end in inverted flight. Note: For sequences that start inverted, once inverted the pilot is committed to the attempt and must initiate the sequence. Unless specifically noted, all turn-around figures must initiate from upright flight, and aircraft must be returned to upright flight upon completion of the first sequence.

There are two notable changes that all must be aware of:

- Vertical lines are no longer legal turn-around figures before, between, or following sequences.
- Half outside loops are allowable figures following sequences that end inverted. Note that half outside loops are only allowable after sequences that end inverted.

While certainly the most noteworthy,

turn-arounds are not the only change. Resumption of scored flight following an interruption also contains some changes for 2019. Previously we had different procedures for resuming scored maneuver depending on whether the sequence interrupted was a known or unknown. Under our new rules, every sequence interruption requires the pilot to re-fly the last scored maneuver in order to resume the flight. This includes Breaks in Sequence, avoidances, as well as weather and safety breaks.

As you stroll through your 2019 Scale Aerobatics rulebook, please also take time to peruse the updated Freestyle criteria. A great deal of effort went into streamlining and simplifying freestyle rules in the hopes of encouraging more people to participate in the event, and encouraging CDs to embrace the discipline a little more.

Though the substantial ones, the changes I've mentioned are by no means the only changes to our Scale Aerobatics rules. What's the best way to get fully up to speed on the rules changes? Go to a judging school near you!

If there is not a school near you or at a time that works for you, check out Brad Davy's online offering. Details can be found on the Northeast Region page of the website. Of course, if all else fails, you can download a current rule book and review the changes on your own. Whatever your method, please make sure you are up to date with the rules cycle before you kick off your contest season. I hope everyone has a great season, and don't forget to take ownership and do your part.

Ty Lyman

European's Championship

By: Rich Whitlow

One of the great events that will be happening between now and the next IMAC Worlds, is the European's Championship, or "The Europeans" in Italy in 2020.

Pilots from every country in the IMAC Europe region will be invited to compete for this prestigious championship title. There will be slots for 40 pilots for each competition class. That makes a potential of 160 pilots! If 160 European pilots do not register, then it will be open to Non-European competitors. These competitors will be ranked, but not eligible for podium positions.

For those not familiar with who is in the European Region it's: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Holland, India, Israel, Italy, Norway, Poland, South Africa, Spain, Sweden, Switzerland, Turkey, UAE & the United Kingdom.

The Freestyle class will also be flown and limited to 55 pilots.

Each class will be flown on its own dedicated runway and will fly the following schedule.



Day 1 - Registration/Opening Ceremony
Day 2 - 2 Knowns + 1 Unknown
Day 3 - 2 Knowns + 1 Unknown
Day 4 - Rest Day, Practice Allowed
Day 5 - 1 Unknown + 1 Freestyle
Day 6 - 2 Unknowns + 1 Freestyle

Gala Dinner and Celebrations after flying on Day 6.

Each country will have a team, with 2 participants in each class. If the teams are not full, slots will be allocated.

There will also be a Junior Classification, which is a pilot younger than 16 years old. Each country will have slots for 2 Junior Participants per team.

This promises to be a great event that will give pilots an opportunity to fly against the best and show their skills to pilots from all over Europe.

If you would like more information about the Europeans, please contact Manrico Mincuzzi at manricomincuzzi@gmail.com.



Marketing Committee

Matt Komar
Membership & Marketing Committee Chairman

It's no secret that there has been some concern in the IMAC community about a noticeable decline in membership since our numbers peaked in 2011. At that time we benefited from a wave of interest in internationally renowned competitions like the Tournament of Championships, Down Lowe Masters and Tucson Aerobatic Shootout. The scale aerobatic scene was put on a pedestal for the aspiring pilot. Interest in this arena also helped push new giant scale advancements in reliable larger displacement gas engines and evolving aircraft designs including a budding ARF market. Everyone wanted the latest and greatest and many could not wait to put them into action in the IMAC scene.

As time passed, the novelty of IMAC began to fade and new trends started taking the spotlight. Giant scale enthusiasts were flocking to give the hot new 3D market a try. Other options also opened up with continued developments in turbine powered aircraft, 3D helicopters and more recently, drone technology. All of these hot new avenues were detracting prime targets for participation in the IMAC community. With our drop in popularity, we also faced unexpected challenges in our own circle. An expanding urban sprawl added issues with airspace and noise violations at many contest locations. Additionally, there are always the uncontrollable issues such as the economic decline that left many families abandoning their extracurricular activities. We continued to evolve with the times, attempting to adapt to these new obstacles but the reality was that our membership numbers continued to slip and something had to be done.

Two years ago the IMAC Board of Directors took action and put a special committee together in an attempt to strategize ways to help boost our membership.

The board knew they were asking a monumental task, one that had a basic goal but with no previous guidelines to follow or direct path to completion. In spite of that, a group of outspoken members were brought together to wade through the available information and public opinion in an effort to try and find answers to our declining membership issues.

The committee's work together has been very exploratory. We discussed the obvious, the radical and everything in between. We quickly realized that we each had a different opinion on what actions we needed to take to make the most difference. Some felt IMAC was broken and needed to be fixed, some thought IMAC needed to be totally reinvented, while others thought IMAC needed to focus on outreach. The one thing we could all agree upon was that there was something polarizing about IMAC that continued to keep people talking about it long after they had moved on from actively participating.

At this point, we still have a lot of work to do, but we have made some big strides toward our goals. The big news for this year is the introduction of the Novice class that will hopefully find new groups of enthusiasts to appreciate our sport. We have established a presence on various social media outlets to help promote our organization. We have worked to offer more tangible membership benefits, notably the new membership cards and discounted entry fees at competitions. The newsletter has been revamped and revitalized to share the latest news and developments with all model aviation enthusiasts. There has also been work done to reduce costs associated with promoting IMAC until our membership numbers have turned around.

As we move through 2019, there is still

plenty left to do. We are currently working on plans to establish an outreach program in hopes of finding new members and contest locations. We are working on media driven promotions to grow excitement and awareness for IMAC. The international market is exploding right now and we hope to capitalize on that to help reinvigorate participation in the states. We are addressing communication between the board and the membership. We are looking into a better website interface and potentially bringing back the IMAC app. Additionally, the AMA has been contacted about helping with IMAC promotion and they have been very responsive for future ventures.

As we are almost a decade removed from our hay-day, I feel we need to focus on finding more of those special people that can truly enjoy what IMAC is. We are a niche part of a hobby that is, in itself, feeling the pain of lower participation. However, I know there are pilots out there that will thrive in competition with us but they are just unaware of our existence. Without having the spotlight on us, we each need to do the work to spread the word about how enjoyable our sport is. I plan to continue having fun, building friendships and making life long memories in IMAC for years to come.

I would like to thank all of our volunteers on the committee, both past and present, for their time and effort. It has been a very challenging road but I am confident that our efforts will result in a resurgence in participation and interest in scale aerobatics.

Respectfully,
Matt Komar
Marketing and Membership Committee Chair
#IAmIMAC

Novice Class - **NEW**

Brad Davy

You have no doubt heard at this point that IMAC has introduced a new “class” for 2019. Although not a new competitive class per the AMA rules, IMAC is hoping this will offer newcomers to IMAC a better introduction, and stimulate new growth.

You may be thinking to your self “why?” What is this approach offering that we haven’t been offering to new pilots for the past 20 plus years? Think back to your first IMAC experience? Where was it? What are your most vivid memories? Why did you decide to stick around?

For most of us that are regularly competing in IMAC, we probably felt some apprehension when we came to our first contest. Maybe it was at our home field, or maybe we drove an hour or more to get there. Perhaps we had already been flying the sequences. We may or may not have purchased an IMAC plane. Maybe other club members at our home field had been telling us what great pilots we were. In all cases, we probably already decided we were ready to compete, and were bringing what we thought was our “A” game.

We arrived at the contest, set up our plane, introduced ourselves to a few new faces, attended the pilots meeting. Our turn to fly arrived, and we took off, probably nervous as heck. For the first time ever we had someone standing behind us telling us what to fly, and two people with clipboards judging us. But we flew it perfect, right? Surely we were the best pilot there that day.

Then we see the scores posted. What were all those zeros? I flew the figures perfectly, didn’t I? Our scores completely conflicted with our world view. How many pilots had that experience at their first contest, and decided IMAC was screwed up. Or maybe allowing basic

pilots to fly big planes gave those people and unfair advantage.

One problem clearly is managing the expectations of the new pilot. For years, we have tried to introduce new pilots in less competitive venues. IMAC Clinics and Basic Only competitions have been one method, but these opportunities are too few and far between to be effective. We have lots of contests, but we don’t always reach out effectively to new pilots in the competitive arena.

So the Novice class is our attempt to better integrate new pilots into the contest, help them establish realistic expectations, and convince them that IMAC really is worth the time and effort it takes to compete well. Now new pilots will have the opportunity, during the contest, to better understand what it takes to perform well, and do it without the pressure of competing. Many times I’ve heard people say IMAC is about competing with yourself. Novice pilots will get this experience first before they start competing against others.

Just to recap, Novice pilots will be in the Basic rotation for Saturday only. They can fly any plane they want, up to a 97 inch wing span. They will be judged, but rather than putting their scores into the computer and comparing them with all the basic pilots, the judges will hand the novice the raw scores, and hopefully have a chance to discuss any significant errors. The CD should have one or more experienced pilots paired with the Novice to act as a mentor for the day. The Mentors will act as caller and coach on the flight line. A person can fly Novice all season long, or start competing when they’re ready. Hopefully one or two contests will be all it takes to get the novice to start competing.

Success in this effort will take everyone’s help. I hope everyone that reads this newsletter makes the commitment to reach out and coach a new pilot this year. Let’s show them what IMAC is really about – bringing the world together, one figure at a time!



BE PROUD

IAmIMAC

INTERNATIONAL MINIATURE AEROBATIC CLUB



What does this mean? Where did this come from?

I was enjoying some great live music (Samantha Fish & Johnathon Boogie Long) in downtown Baton Rouge, and I noticed a bumper sticker on the wall of the club that was leftover from a Baton Rouge Downtown marketing campaign. The bumper sticker said #IAmRedStick. This caught my attention and I started to think about what that message means, or could mean. Then an idea was born.

We all see the finger pointing all over the online world exclaiming what is so wrong with IMAC. We do it on Facebook, we do it on the Public Forums and we do it on the IMAC Forum pages. Everyone has an opinion of what *Somebody Else* can do to make IMAC better. When the truth is every face to face IMAC event and IMAC competition is typically a wonderful experience.

What is the disconnect?

I believe that what it boils down to is it is up to each and every one of us to take responsibility and say "I Am IMAC"! If I think something needs to be done, I am the one to make sure it gets done. If I meet someone who is interested in IMAC, I am the one responsible to explain IMAC in such way that they walk away with a positive opinion of IMAC. IMAC and IMAC competition is not for everyone. But, there must be a positive message presented to one who is new to IMAC so that they can determine if IMAC is what they are looking for.

It is imperative, if we want to continue to grow as an organization (and yes I meant to say continue to grow!) that we highlight the positives of IMAC and we not only present them, but we believe in these positive aspects. It is obvious when you are speaking with someone, if you do not believe in what you are saying. Especially when it is something that so many can be passionate about. Every post, conversation and comment can potentially influence someone or change someone's mind about IMAC and what it is about. In just about every little informal survey I have done, the number one thing that pilots say is key to why they continue to fly IMAC, includes the fact that the people are great and they love their IMAC family. So, when someone new is asking about IMAC let's be one of those great people and let's highlight this to them. Its easy.

Lastly, take pride in what IMAC is. This is an International Family of great people, who happen to love RC Aerobatics. That's it. Wear your IMAC shirts with pride, your IMAC hats, your event shirts and take offense when someone is talking down your IMAC. There is a place for constructive criticism, but in the *Outrage Happy* world, it is easy for people to cross the line from constructive and destructive. Ask the person (or yourself) what positive thing will this comment do for IMAC. If no positive aspect can be accounted for, then maybe that comment should be left unsaid or typed.

So, now you know. Tag yourself and others. Raise up those doing positive things for IMAC and question those that are not doing things that will ultimately help our beloved sport.

Rich Whitlow
#IAmIMAC

Regional Reports

International Region Adi Kochav



“We are what we repeatedly do. Excellence, then, is not an act, but a habit.”
Aristotle.

Hello to all our International IMAC friends.

I would like to welcome all new 43 IMAC Italy members that joined us just recently, with the help of Manrico Mincuzzi our European Director and IMAC Italy President they've made The international Region IMACs second biggest region and Italy the third biggest country.

Now that we've started our mass registration method we have the ability to make IMAC even bigger and stronger. Once every IMAC pilot also becomes a member the club will grow and become more accessible to more pilots that want to fly Scale Aerobatics. From here we call all other countries that want to fly IMAC to sign in and be part of this great hobby.

2019 in my perspective is a turning point to IMAC and the International region is here to make it happen.

I do believe that with the help of the BoD we will have the ability to split the International region to 3 full regions, Latin America, Europe and Asia Pacific and by doing that will have these Regions the ability to generate more IMAC pilots and members.

It's our responsibility as RDs to make this happen.

It will create more contests world wide and in the end more contests mean more pilots traffic between the different regions.

As for contests, we've started in Italy the

OPEN class contests in 2016 when Italy made their first IMAC Italian Open, by doing that they've set a high standard of regional contest that IMHO and Manrico's should be mimics and spread to the rest of the countries and regions.

Now we're in 2019, Italy will make for the 3rd time the Italian Open with 80 registered pilots for all 4 classes, Sportsman thru Unlimited. The standard is made, countries like France, Spain, Switzerland and more are planning to have their Open class regional contests.

Australia, part of our Asia / Pacific area scheduled a regional contest as well and its called the IMAC Asia / Pacific Championship, this contest is open to all IMAC pilots out there so if you thinking of making a trip down under think about adding this contest to your traveling planes.

The International Region is getting ready for the next IMAC Worlds 2022 to be held in Italy. As part of this plan, Italy will be hosting the first ever IMAC Europeans in 2020 estimated number of pilots...160, let the number soak. With all that being said, IMAC must keep its growing momentum, it won't be done without your help,

Keep flying and enjoy this great hobby.

Thank you all
Safe flying and happy landings.
Adi, Luiz, Manrico and Michael



South Central Region Rich Whitlow



I want to take a moment and thank everyone for your support and lacing your faith in me to be your new South Central Regional Director.

I can tell you already that it is amazing how much the Regional Directors are responsible for and how much they can influence the region. I have a lot of respect for the guys that do this job and have done this job in the past. I also have a lot of respect for all of the Board of Directors, because it is truly amazing how much they continue to do to help the sport of IMAC. I know everyone cannot always see what is going on behind the scenes, but from what I have seen so far there is a “Rushing River” of activity that goes on, before most things can even be made public.

So, I will do my best to hold my standards high in this position and to continue to do what I feel is best for the Region and for IMAC.

I have big shoes to fill. But, know I am no Doug Pilcher. Doug was on top of everything. He managed every detail masterfully and sacrificed a lot in pursuit of that. One sacrifice being his ability to compete at the contests he worked to make sure ran so well. That is definitely a special dedication to do that for so many years.

So, know that I will be there to help in any way I can. If you need something or thing something could be done better in a different way, let me know. I am not shy about making changes, when I think the changes are the better for everyone. Let me know what you think.

In that particular aspect I am not very different from Doug. I have witnessed first hand that he listens to everyone and considers their point of view and sometimes asked for advice or perspective. But in the end he made the decision that he believed was best for the region and for IMAC overall. Even if he was not able to suit that one individual. We have to remember that we need to consider what is best for the group, over what is best for the individual. We need to work to make things fair and balanced and provide a competitive environment that is equal to all competitors. We need to work to have a variety of competitions available to those competitors.

My plan is to be there to support the contests, but I plan on continuing to compete. That is the only way all of this is going to stay fun. I am not a Micro Manager. I will help where needed, but I will leave the details to the ARD's & CD's. I also believe in having a dedicated Score person, if possible. If not, we can team up and get the scores in. I think we have a lot of talent in the Region and a great group of ARD's.

As we grow our contests, we are going to have to have some crossover on weekends or at least not 2 weeks in between every contest. So, if 2 CD's want to schedule a contest on the same weekend or consecutive weekends, we need to consider that if they are a certain distance apart. Our region is huge and other regions have the same issue. It may draw one or 2 iron men from one contest to another, but it also adds availability and centrality to others. We have to make it so there are more contests closer to the competitors. Just about everyone that wants to come to the Bayou BASH IMAC in Baton Rouge, has to drive a very long time to get here. It goes both ways. Most contests I attend are beyond a 7-hours drive.

It is the reality of what we have. When we have 4000 members, then we can consider smaller regions, or maybe we don't. We just allow more contests to happen, so that everyone has a place to compete. It's a balance for sure. We want enough people at a particular contest, but we also want to be able to provide contests for the contestants that are not as far away. So, next year when we schedule, we will try to use this philosophy to maybe get some more contests scheduled.

Lastly, if you take some time to look at the schedule you will see that we are FULL. Just about every other weekend has a contest. So, please make your plans early and attend a contest. Come out and see everyone and enjoy the wonderful people that we have in the South Central. #IAMIMAC

Northwest Region Clark Hymas



None submitted.

Southwest Region Alex Dreiling



The 2019 season is now underway. We started the season at the Superstition Challenge in Apache Junction, Arizona. We had a total of 27 pilots who decided to play in the cold!

At the very end of January the SW region had the opportunity to host the International Judging School in Mesa, AZ. We had a total of 54 people in attendance and it was an amazing event.

We are going to be introducing a couple new contests this year. We will be having the Gold Rush Challenge the weekend of August 3rd. We will also be bringing Victorville back on the weekend of August 17th.

If you know someone that would like to give IMAC a try please let them know about the new Novice class that was first announced at the beginning of the year. This will allow them to work with experienced IMAC pilots and gain knowledge of trimming their airplane and improve their flying skills exponentially! Please see the website for details.

For the contest directors please update yourself with the new documents listed under the downloads tab. There are some small changes that are on the contest director's checklist.

Thank you all for being a part of this amazing organization. I will see you at the field soon!

Northeast Region Brad Davy



First – my apologies as the Northeast Regional Director that this is my first update to the quarterly newsletter. It's easy to think that the directors aren't busy over the fall and winter, since it's off season. But the exact opposite is the reality. In addition to the normal work duties, this is the busy season for IMAC leaders. Getting the schedule in place for the coming season, organizing judging schools, promoting existing contests, looking for new contest venues. Over the past couple years, I've almost come to dread the off season.

Which leads me to my second point. Last November, I posted on the IMAC Forums, Facebook, and sent an email blast out to the Northeast Region looking for help. Several people responded, and we have some new ARDs. Thanks to Tom Chabot, Jim Cyr, and Steve Stanton for continuing as ARDs, and to Earle Andrews, Mark Sullivan, Juan Velasquez, and Terry Pellerin for stepping up as new ARDs.

My desire is for these new ARDs to be a resource to everyone to help identify new contest venues, help facilitate new contests, and be an information source for the region. If you have a question about how to do something related to running a contest, understanding the rules, please

reach out to the closest ARD. They may not know the answer right off, but they can help you get to the right answer. Third, although I don't bother responding to articles on FG, I do keep my finger on the pulse. There are often discussions going on there that I believe are better suited to the IMAC forums, and I would urge you to think of our Northeast Regional forum as your first choice for questions, answers, and suggestions about IMAC. You'll get the attention of the people that actually know the answers, not a host of opinions about what the answer should be.

One recent complaint that I took personally was the lack of contests in the Northern reaches. The complaint came from a relative newcomer to IMAC. There are pilots out there that are interested in learning about IMAC, but don't want to drive 6-8 hours to go to their first contest. The contest density in Maryland has resulted not because the Regional Director went out and recruited contests, but because individuals that belonged to clubs in the region opted to have contests. So if you're a member that doesn't have a nearby contest, think about the field you practice at, and help us get a contest going there. I'm sure there are opportunities in Western PA and Western NY where we would also get some crossover between the NE and NC regions.

Fourth - The calendar is slowly coming together. If you're wondering why one of the contests you're looking forward to isn't posted yet, please contact the person you expect to be running it directly. I have contacted all the CDs, given them their reserved weekend dates. I usually get contests approved within 24-48 hours of the request coming in.

Final point - Please take advantage of the upcoming judging schools. We have the online school Wednesday nights in April and the first two Wednesdays in May. We will also have a 1 day school in Parkton, MD. We haven't found a site yet for a judging school up north yet, so please try to attend the online school. For those that are experienced judges, I'm considering a 1 time, 1-2 hour conference call where we would focus on the new rule

changes and some of the problem areas I've noticed. I'll probably try to do it in late March, before the online school.

I hope everyone is looking forward to a good season. Remember to sign up early for the contests on the website. If something happens that you cannot attend a contest, please unregister yourself. This helps the CD plan flight lines and judging matrices, to help get contests rolling faster on Saturday, and keep things moving



Hello SE, so far we have had two Judging schools and one contest and about to have the second contest of the year with over 30 pilots already registered. Our region is set to have an amazing year with 13-contest schedule; everyone should be able to attend a few or enough to get points to win some cash at the end of the year. If you would like to know more about it, please contact me directly.

As a new Regional Director I have a lot to learn but I hope that so far you can see that I want to bring back the enthusiasm that the SE once had, I can already see it, the Piedmont contest is back on the Schedule AND a new contest in Tennessee on my Birthday weekend HM-MMM!!!! Just might have to make that one.

Let us talk safety: LET US NOT FIND SAFETY ISSUES BY ACCIDENT, it is a personal responsibility.

This is a topic that I believe needs to be addressed more often during the pilots meetings. There are many aspects of safety. Let us start with when and where.

When? Answer, ALWAYS! More specifically if you are flying alone. Have your phone on you when flying alone let someone know where you are and about what time you will be finished, have that person call you have a first aid kit with you, know where the nearest hospital is.

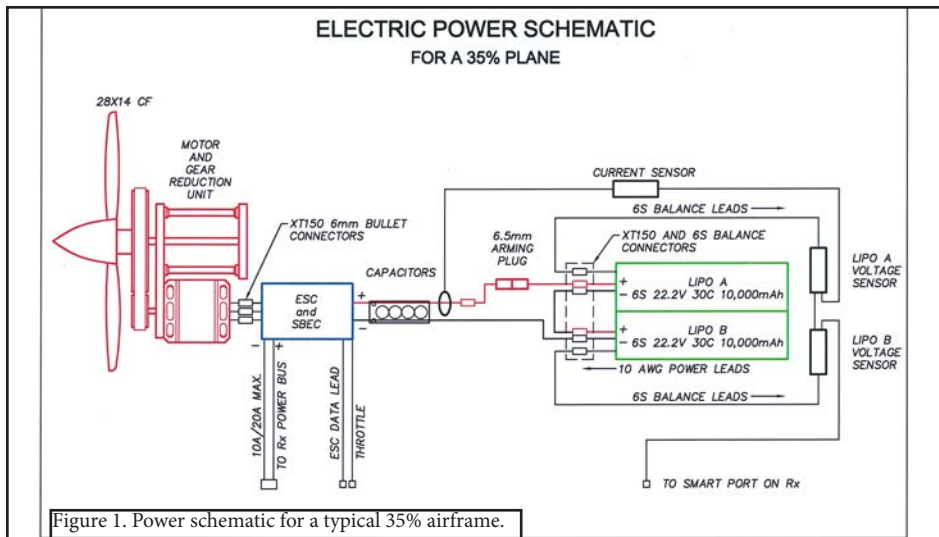
Where? Not running up engines in the pits, and alone. I have witness people starting engines without anything anchoring the plane down. Paying attention where the prop arc is pointing, keeping your radio strap from getting tangle on the prop.



**Electric Power For A 35% IMAC Plane
Part 1: Planning for Success**
By: Greg Hladky

This is a great time to be flying scale aerobatics with electric power. Current technology makes electric power a viable option at most scales typically flown today. It has already been demonstrated by Greg Marsden, flying Advanced for Canada in the 2014 World Championship, to be competitive at 35%. Following his example, I'm assembling a new 35% IMAC plane for the Intermediate class and planning to make it electric. This article will cover the planning stages, including components and construction aspects unique to electric power. Part two will cover impressions and telemetry data from initial flights, and perhaps a contest or two.

First, let's look at the components needed for an electric power system in a giant scale plane. (Refer to power schematic, Figure 1.)



All components must be carefully matched to avoid overheating or stressing a weak link, including wiring, connectors and soldering. First are the batteries, which must have sufficient capacity and C rating to handle the load at full throttle when current, measured in Amps, is at maximum. For safety, an arming plug is inserted next to make the final connection once the plane is ready for takeoff. The arming plug can use an Anti-Spark Connector (ASC) to minimize pitting on contact. Additional safety measures, essential for any size electric plane, are Failsafe, set in the receiver to reduce throttle to zero when it detects a loss of radio signal, and a physical Kill switch on the transmitter to disable the throttle. It is critical to establish a safe start up and shut down procedure and follow it for every flight to avoid injury or damage to property.

If telemetry is used to monitor the system in flight (highly recommended) voltage sensors are connected to the balance leads and a current sensor is positioned around the main positive (red) wire. Next is a bank of capacitors added between the batteries and the electronic speed control (ESC) to minimize ripple currents, which must be kept below 10% of total pack voltage. The capacitors (caps) are charged almost instantaneously when the system is armed, hence the need for the ASC. Next is the ESC, which must be sized to handle the expected continuous and maximum current. The ESC can include a Switching Battery Eliminator Circuit (SBEC) to supply power to the receiver

and servos, eliminating the need for an extra set of batteries. If this is done, a backup battery is provided in case of failure. Next is the brushless motor, which also must be sized based on continuous and maximum current expected. In addition to these ratings, the motor velocity constant, Kv (no load RPMs/Volt) will be used to find the current it will operate at most efficiently. A lower Kv motor will turn a propeller more slowly than a similar sized motor with a higher Kv but do so with more torque. Next is the gear reduction unit (GRU), which will allow the motor to rotate a large propeller at a slower RPM, increasing efficiency of the system. Finally, the propeller itself must be sized so that the motor spins at its optimum current for the majority of the flight envelope.

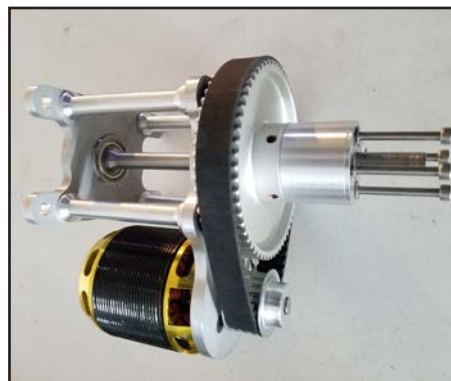


Figure 2. Photograph of the Scorpion motor and Jim Kitt's gear reduction unit

The heart of this project is the StinGR (Figure 2), a new belt drive gear reduction unit developed by Jim Kitt that delivers 91% efficiency. The main gear is 60T. It can be geared 3.158:1 with a 19T pinion, or 3.33:1 with the 18T. Built for the high precession forces found in 3D flight, the unit is robust, yet weighs only 784 grams. Matched with an inexpensive Scorpion helicopter motor at 756 grams, the combined weight is less than a comparable direct drive system, and can put out more power with greater efficiency. It will go into Extreme Flight's newest 104" Extra 300, the V2. Although designed for gas power up to 120cc, the use of composites makes the V2 a good candidate for conversion to electric. The empty airframe weighs only 15.58 lbs. I'll call the electric version the EV2.

Before purchasing the airframe or any components, the first step is running some numbers through a program like eCalc to determine the best combination of components. I used an estimated all up weight (AUW) of 30 lbs to determine how much thrust would be needed to get the same performance I was used to from my electric 30% Extra 330. That plane had a static thrust to weight ratio (T/W) of about 1.5:1 and was very competitive in Sportsman, taking me all the way to first place in the NC Regional Championships. A similar T/W in the EV2 would require about 45 lbs of static thrust. Adding 2 lbs for the additional drag of the larger airframe brings us to 47 lbs. With the Scorpion 5040 motor, the StinGR could turn a 28x14 prop to 6425 RPM, producing 77 lbs of thrust, the gas equivalent of 13.16 HP. For comparison a 120cc DA gas engine can spin a 28x12 prop up to 6800 RPM, producing about 75 lbs of static thrust at 13 HP.

As much fun as that kind of thrust would be on a 30 lb plane, the reality, as with all engineering, requires a bit of compromise. In order to get the flight times needed for IMAC it is necessary to scale back the thrust, use a lighter motor, and reduce the weight further with smaller capacity packs. So, for the Scorpion 5035 with 410 Kv on nominal 12S with a 19T pinion:

$$\text{RPM} = 44.4\text{V} * (410\text{Kv} * (19\text{T} / 60\text{T}) * 0.91 \text{KvE} = 5246 \text{RPM}$$

To determine thrust we need to know the prop constant, pK. Jim has developed formulas from extensive testing of electric beechwood propellers, but he explains the problem here: "The tough part is that pK is also a home grown formula and it is not really a constant, but a variable that changes with RPM. [A] rule of thumb would be to use 1.033 for 24", 1.035 for 25", 1.037 for 26", 1.039 for 27", etc." Keeping with an electric beechwood 28x14 for now, we can calculate thrust using the following formulas:

$$\begin{aligned}\text{Watts} &= ((\text{Prop Diam}/12)^4) * ((\text{RPM}/1000)^3) * \text{pK} * (\text{Pitch}/12) \\ \text{HP} &= \text{Watts}/745.7 \\ \text{Thrust} &= \text{HP} * 6.375\end{aligned}$$

Using a pK value of 1.041, we can now get thrust:

$$\begin{aligned}\text{Watts} &= ((28/12)^4) * ((5246/1000)^3) * 1.041 * (14/12) = 5197.44 \\ \text{HP} &= 5197.44/745.7 = 6.97 \\ \text{Thrust} &= 6.97 * 6.375 = 44.43 \text{ lbs}\end{aligned}$$

This gets us close, but we need to do better.

In addition to T/W, a good performance indicator is wing cube loading (WCL). WCL is a measure of weight per volume, or density, which gives us a fair comparison between different aircraft. The formula for WCL is $W/(S^{1.5})$; where W = weight in ounces; and S = wing area in square feet (area in sq. in./144). Using an estimated AUW of 30 lbs and wing area of 1900 square inches, I initially calculated the EV2 would have a WCL of $(30 \times 16)/(1900/144)^{1.5} = 10.0$. For comparison, the 43% Kam-Aero is about 8.0 (7.88 to 8.44, depending on fuel and build), my 30% Extra, designed specifically for electric only power, has a WCL of 9.5, and my little electric 55" Extra 300SP, which flew in exactly one IMAC contest and did OK, is about 12.8. The lower the number the more floaty the plane will feel, and that will translate into more time to stay ahead of the plane. For electric power to be competitive I would aim for a WCL less than 10.

To achieve a desirable WCL, one must be weight conscious. Once I knew that electric power was viable at 35% I purchased the plane and carefully weighed every nut, bolt and airframe component. The first items to go were the 6mm steel axles and the beautiful but overweight 4.5" rubber wheels with aluminum hubs. Substituting those with 4mm T6 aluminum axles and 4" foam wheels, the same wheels supplied with the 95", saves 295 grams (10.4 ounces), and will improve snap and roll performance. A spreadsheet helps to keep track of weights and can compute AUW, WCL and T/W as weights change.

One of many challenges unique to electric power is designing a canopy latch system that will permit easy access to the batteries. The V2 has six canopy bolts, making it impractical for electric power. The EV2 will use very light (15 grams) but powerful linear servos to drive six pins into the canopy tabs. The servos have built in limit switches and can be operated by the same DPDT switch that will be used to arm the ESC, using a similar servo, immediately before takeoff. A battery tray that automatically makes the connections to the onboard wiring, as I had on my 87" Extra, can further reduce ground chores and encourage more flying.

The numbers from eCalc showed the battery load for a 12S 10Ah system would be less than 12C, which means light, F3A pattern type batteries, rated at 30C, will be sufficient, saving about 1.75 lbs from my initial estimated battery weight. Reducing the number of servos used to control the ailerons, from two each to one, and burying them in the wing, not only saves weight, but costly drag as well. A very competitive plane was starting to emerge with an AUW of 28 lbs, a WCL of 9.6 and T/W of 1.6:1.

The next schematic, Figure 3, shows the radio and power components that I plan to use in the EV2. This may change as the configuration gets refined.

The key to getting the flight time necessary to take off, complete two IMAC sequences, and land with a safe reserve, is energy management. That starts by designing a system that keeps current as low as possible while still achieving the minimum thrust needed for good vertical performance. I tried numerous combinations of motor Kv, gear ratio, propeller diameter, pitch, battery cells (12S and 14S) and capacity. One of the better combinations is shown in Figure 4.

The formula for calculating estimated flight time (EFT) is

$$\text{EFT} = (C * 0.80 * 60) / ((\text{Power Usage}) * A)$$

104" EXTRA 300 EV2 RADIO AND POWER SCHEMATIC

AUW: 28 lbs, WCL: 9.6, Static Thrust: 46.9 lbs, Thrust-Weight 1.68:1, GRU 3.158:1, Motor RPM: 16173, Prop RPM: 5121; Battery Capacity: 10,000 mAh (12S1P)

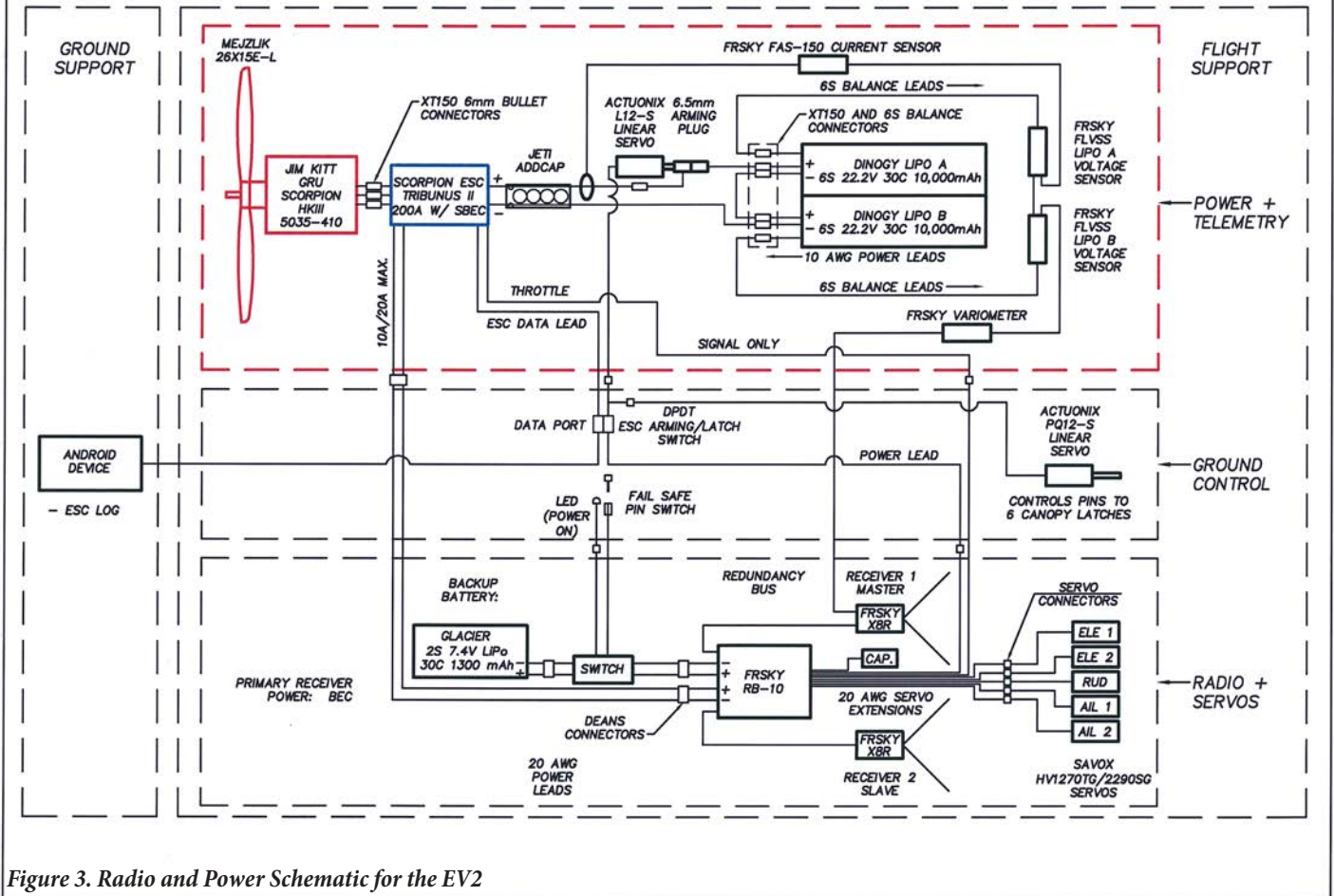


Figure 3. Radio and Power Schematic for the EV2

where C=battery capacity in Amp Hours; Power Usage is average for the flight (40%, or 0.40, is typical for my IMAC flights); and A = max Amps (from eCalc). With 10Ah batteries in the EV2

$$EFT = (10 \times 0.8 \times 60) / (0.4 \times 125) = 9.6 \text{ minutes.}$$

One way to help achieve a power usage of 40% or less is to limit the available power at the start of the flight. With a programmable radio this is very easy to achieve automatically. On my 95"

Extra I had it down to 78% at takeoff, and every twenty seconds the throttle mix would increase by 1 percent, so that by the end of the flight 100% of the available power would be used at full throttle. Since battery voltage drops over time, reducing rpm and thrust, metering the power in this way makes the throttle response the same for the entire flight.

To summarize, a competitive electric powered IMAC plane must balance a number of desirable outcomes that often oppose each other:

- minimize weight and drag
- maximize T/W; 1.5:1 or better
- minimize WCL; 10 or less
- minimize current at full throttle
- maximize safety margin in the power system to prevent overstressing components.
- minimize energy usage by metering available power
- maximize efficiency by use a large pitch propeller in combination with gear reduction

Converting to electric may seem like a daunting task, if you are not familiar with electric power. The following benefits may provide some incentive to consider it for your next plane:

- easy to start, which means less stress when the judges and line boss are waiting for you
- no risk of injury from the propeller, since it can be started remotely
- instant, linear power through most of the throttle range
- low vibration means less load and maintenance on servos and airframe
- no motor break-in, and easy to maintain
- clean; no oil residue or gas spills to clean up
- quiet; can be flown at fields with noise restrictions

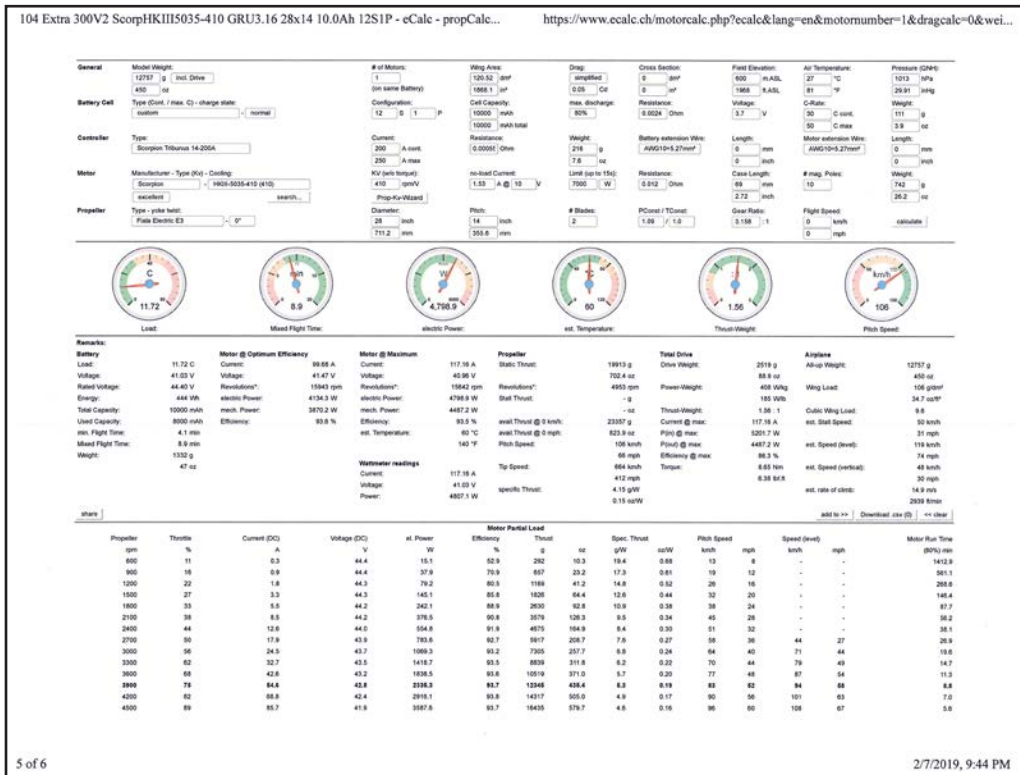


Figure 4. Performance specifications and estimates for the Scorpion HKIII 5035-410 motor, 200 Amp 14S Scorpion Tribunus ESC, Jim Kitt GRU, Fiala electric 2 blade 28x14 propeller and 30C 12S 10,000 mAh batteries using eCalc

Electric power does have some disadvantages compared to gas, but the gap is growing smaller. I will cover the weight differences in more detail next time, but for now:

- a comparable T/W can only be achieved by sacrificing flight time
- initial cost for batteries and charging equipment is high
- refueling between flights is more work, requiring the removal of canopy or hatch, removal of batteries, recharging and reloading batteries, and securing the hatch
- danger of an accidental start is always present once the batteries are loaded and the ESC is armed
- telemetry is needed to achieve the longest possible flight time without risk to batteries

Electric power for giant scale aerobatic planes has been around for decades now. Rather than a revolution in technology, we have witnessed an evolution, a steady refinement that has given us more thrust, with greater efficiency and duration, than ever before. That is a winning combination that can power us into the future.

In the next issue we'll look at the actual performance data to see how closely it matches the theoretical numbers.

Thanks to Ray Morton and Jim Kitt for their contributions to this article. Comments are welcome. Until next time, stay tuned and fly right! (Or left, if Schedule C. ;-))

2019 South Central Judging School

Sherman, TX

The annual South Central Judging School was held the weekend of March 2nd in Sherman, TX.

This Judging School was a full school that covered all aspects of judging, from learning how to read the Aresti language to getting the right deductions on an element in the Unlimited Sequence



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This is a new rules cycle year, so there were new rules and clarifications to review. There was also some discussion on turnarounds, since that was one of the biggest changes that was made. This is one item that Judges will need to keep their eyes open to monitor.

Though the practicals had to be cancelled, due to weather, a lot of information was discussed and reviewed. We have some new judges and some experienced judges that have gained a little knowledge.

It never a waste of time to get to a judging school. You can always pick up something new.



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Upcoming Events

April:

3rd - Online Judging School
6th - Southwest Florida Aerobatic Challenge
6th - Grizzly Bear - Richland, WA
6th - Hemet IMAC - Hemet, CA
6th - Palermo - Palermo, Italy
12th - IMAC Israel Spring Fest - Nitzana, South Israel
13th - Salinas IMAC - Salinas, CA
20th - NE Judging School - Pakton, MD
20th - Rochefort Grand Modele - Rochefort, Savoie, France
27th - 1st Annual "Heath Green Sky Ranch" IMAC - Hinesville, GA
27th - 2019 Pegasus FMAC IMAC Classic - Hagerstown, MD
27th - 2nd Annual SC-SW Smackdown - El Paso, TX
27th - 1st Annual "Heath Green Sky Ranch" IMAC Contest - Hinesville, GA
27th - THSF IMAC Turkish Championship - Istanbul, Turkey
27th - South African Power Nationals - Meyerton, Gauteng, South Africa
27th - Training Day - Buckminster, Lincolnshire, UK
27th - North Central Judging School - Muncie, IN

May:

3rd - Colorado Judging School - Denver, CO
4th - CAPI IMAC Basic Only - Upper Marlboro, MD
4th - SC Skillz Clinic - Shreveport, LA
4th - Oakdale IMAC "Spring Fling" - Oakdale, CO
11th - San Giovanni Rotondo - San Giovanni Rotondo, Varese, IT
18th - BCAM IMAC Challenge - Kutztown, PA
18th - Central Indiana IMAC Challenge - Muncie, IN
18th - BARKS IMAC Challenge - Boise, ID
18th - Cashmoor - Cashmoor, Dorset, UK
25th - 19th Annual Columbus IMAC Challenge - Westerville, OH
25th - 9th Annual Mid MS RC Club IMAC Challenge - Byram, MS
25th - Stampede IOPENER - Calgary AB, Alberta, CN
25th - Bear Mountain Flyers IMAC - Arvin, CA
25th - IMAC Norway Competition #1 - Fyresdal, Telemark, Norway
25th - Solvesborgspokalen - Solvesborg, Blekinge lan, Sweden
31st - Lectoure Scale Model Aerobatic Cup 2019 - Grenade, France

June:

1st - CAPI IMAC Competition - Upper Marlboro, MD
1st - 23rd Annual Spring Classic - Land O Lakes, FL
1st - Saranac IMAC - South Michigan
1st - "Big Bob" Memorial IMAC - Eagle Point, OR
7th - 2019 Granite State IMAC - Corcord, NH
7th - IMAC Italian Cup - Caorle, Varese, IT
8th - 2019 House Mountain IMAC Contest - Corryton, TN
8th - Flying Cardinals IMAC Challenge - Hebron, KY
8th - American Turf Flyers Annual IMAC - Broken Arrow, OK
8th - West Coast Aerobatic Challenge - Walnut Grove, CA
15th - IMAC Quebec 2019 - Levis, Quebec, CN
15th - ESAC Jack Stoval IMAC Challenge - Hebron, MD
15th - 5th Annual Woodstock IMAC Contest - Woodstock, Ontario, CN
15th - Wrexham - Wrexham, UK
15th - IMAC Norway Competition #2 - Elverum, Hedmark, Norway
15th - Phoenix - London Colney, Hertfordshire, UK
15th - IMAC Grand Modele Surin - Surin, Savoie, France
15th - IMAC Brannebrona - Gotene, Vastra Gotalands lan, Sweden
22nd - Piedmont IMAC - Wade, North Carolina
22nd - Smokey Hill Model Flying Club Nats Warmup - Salina, KS
22nd - Weavers Field IMAC - Othello, WA
29th - IMAC Borlange - Borlange, Dalarnas lan, Sweden

July:

6th - IMAC Beauce - Saint-Georges, Quebec, CN
6th - CRAMS IMAC Challenge - Irricana, Alberta, CN
6th - Orvieto - Terni, IT
7th - 2019 Scale Aerobatics National Championships - Muncie, IN
13th - Stetsons IMAC Weekend - Ottawa, Ontario, CN
19th - Mid Summer IMAC - Jacksonville, FL
20th - State College IMAC Challenge - Centre Hall, PA
20th - KRAM Grand Rapids IMAC Challenge - Alto, MI
20th - Lost Squadron IMAC - Wrightsville, AR
20th - Molalla Aerial Rodeo - Molalla, OR
20th - Gordano - Portishead, Somerset, UK
26th - Canadian Nationals - Sudbury, Ontario, CN
27th - Lums Pond IMAC Challenge - Kirkwood, DE



Why Join IMAC?

The International Miniature Aerobatic Club (IMAC) is an organization dedicated to sport of radio-controlled Scale Aerobatic competition. IMAC operates under the auspices of the USA's Academy of Model Aeronautics (AMA) with a designation as the Special Interest Group (SIG) for R/C Scale Aerobatics. While it's origin is American, the scope of IMAC operations now extends to over 15 countries throughout the world and continues to grow daily.

IMAC members are people just like yourself that love to fly scale aerobatic planes. Like any worthwhile endeavor it takes focus, energy and passion to succeed in this sport. As a pilot, you spend hours learning sequences, tuning your plane, or learning how to do the "perfect" spin entry. You pack up and head out to a contest all ready to compete head to head with your fellow pilots. It's great so far but think about it...what is going on behind the scenes?

- * Who organizes this stuff?
- * Who sets the standards so that all events operate on the same level playing field?
- * Who helps write and maintain the rules that we all fly by?
- * Who develops the judging schools and training programs?
- * Who actually writes, refines, and publishes the known sequences you so diligently practice?

It's IMAC – International Miniature Aerobatic CLUB

Yes a CLUB...people like yourself all contributing to the sport with their time, resources, and passion. If you are serious about flying scale aerobatics, IMAC membership is your way of giving back to the sport.

Yes...you get benefits like discounts off entry fees at every event and the ability to compete with other pilots in your class across your IMAC region for annual bragging rights. You get access to the full IMAC website including contest calendars, buy/sell classifies at no charge, and a full forum for sharing information with your fellow pilots

Without an international organization like IMAC, the sport of scale aerobatics as we know it may disappear! All of the activities of the organization are focused on making the sport better whether through national judging schools, holding monthly phone conferences, working with the website, working with vendors that contribute to IMAC and these activities cost money. As a not-for-profit organization, IMAC depends on it's members. Regardless if you are in the US/Canada or somewhere in the rest of the world, the sport needs you to be part of the CLUB



Joe Thibodeau & his father David

Join with the rest of us and support scale aerobatics!

If you fly even a few events throughout the year, you get your money back through event entry fee discounts but more importantly - you support the sport. It doesn't get any better than that!

www.mini-iac.org