

Newsletter of the Jet Pilot's Organization

Contrails

Fall 2013

Volume 25, Issue 4



David Reid's EVF-powered BVM F-86 poses
for the camera in Waco, TX.



The Jet Pilots Organization: We Need Your Help!

One challenge most organizations face is communicating its mission and charter to both current and potential members. If we are asking you to spend \$25 in support of the organization, you have every right to know what that money will be used for. Here is a brief synopsis:

Representation: The JPO, as the AMA-recognized Special Interest Group (SIG) for jet pilots, participates in many AMA regulatory, rule-making and safety-related activities. These started with the data collection effort many years ago to prove that the installation of speed controls to turbine jet models would not improve safety. The AMA listened to our case, and subsequently decided not to mandate this technology. Since then, we have had representatives participate on the insurance committee, working groups to update Large Model Aircraft regulations, the FAA's UAS submissions in advance of the upcoming NPRM, proposals on eliminating thrust-to-weight limitations, and we also work closely with the AMA Safety Committee.

Training and Assistance: One of our primary goals is providing assistance and guidance to newer jet pilots. For years, our district representatives have been a source of information and assistance to newer jet pilots in their districts. Most of this is behind-the-scenes, while some occurs at jet events. Our website contains a *Knowledge Bank* with a variety of technical articles, and we have discussed the development of video clips that would reduce the learning curve of entering the jet segment of the hobby: training a spotter, maintaining aircraft and recurrent training. Additionally, we would like to become more active as a source of information and assistance to the growing electric jet population. These are but a sample of the types of information the JPO could generate and distribute.

Information: Through the website and *Contrails*, the JPO attempts to deliver current event and other relevant information to its membership. This includes the latest information on safety issues, regulatory happenings, jet event coverage and aircraft flight reviews. It could be expanded to include more comprehensive information on emerging technologies (such as 3D printing), real world experience with various model kits, and sources for lower cost parts and components. To this latter point, if our membership grows, we may be able to put purchasing leverage into play in negotiating volume discounts on

commonly-used parts, like servos. Visit the JPO website at www.jetpilots.org to see our current inventory of information and merchandise available.

These are the core contributions that the JPO could make on behalf of its members. We have done and continue to do a number of these items. Having said this, our capacity to fulfill these needs fully and effectively depends on volunteers. If we are to remain a viable organization, we need to increase the number of people working on behalf of the JPO to help deliver value to the rest of the membership. We have a real need for people to fill District Vice President and other Board positions, help with communications and technology, and to develop the broad body of content that will be of value to fellow jet pilots.

You may have noticed that this issue is a bit late - life, work and family commitments, plus changing demands on diminishing free-time have led to several resignations among the Board positions - which has thrown a few things into minor, and temporary, disarray. Election notices are to be published in this issue - however we are delaying the electoral process for a quarter (one issue) to allow for volunteers to make their presence known, or as the Marines used to advertise: "We are looking for a few good men (or women)" to help us move STRONGLY into the future.

If you have an interest in any of these areas, please drop me a line at pilot114@mac.com - I would be happy to discuss the skills and contributions that you believe you have to offer the organization, and will do our best to custom fit these to one of the core objectives of the JPO. I encourage you to step forward ... no contribution is too small. Collectively, we can use the framework of the JPO to improve safety, reduce costs, manage regulatory demands, improve fellowship and increase the enjoyment of this wonderful hobby for all.

Keith



Vice President's Report

Lance Campbell

Just yesterday, as I write this, we had the first freeze of the season. Boo! The flying season is drawing to a close, but (yay!) the building season is about to get underway! For those of you who live in warm climates - I'm not sure I'd ever get anything built, since I'd always be trying to make it out to the airfield...

I'd like to use this column and give you a wrap-up of the 10th Jet World Masters which was recently held in Meiringen, Switzerland where our hosts put on an excellent event. The opening ceremonies were really something, with 6,000+ people there to cheer on the teams as they came in, accompanied by a Swiss drum corps. Opening ceremony speakers even included the Commander of the entire Swiss Air Force.

The event is not only a competition, but a social event, as well. Having been involved with a few of these now, I see many familiar faces from event to event. There were three banquets over the course of the event, with two of them being up in the mountains. One of those we all took buses to, but the other we rode up the mountainside by cable car to reach the restaurant. The entire area simply looks like it is a postcard, it is so picturesque.

All of our pilots (Jason Bauer, Scott Harris, David Ribbe and Andy Andrews), did an excellent job. One thing that a competition does is focuses your efforts for a specific time and place. If you have an issue at the local field, tuck the jet back into the trailer, and deal with it later. If you have an issue in a foreign country when you're due on the flight line in 2 hours, you need to figure out a way to make it work.

Every one of our team pilots overcame challenges and succeeded in putting up solid scores with most of these challenges being centered on getting the birds there and back in one piece.

Both Andy and David, had challenges on the shipping front to fray one's nerves. Andy's F-86 was held up in customs in Germany for days, as the shipping label had separated company with the crate. Somehow the company located Andy and asked him, "Are you Frank Borman?" At this point, Andy literally fell out of his chair, as he realized that someone on a shipping dock, has rifled deep through the carefully packed crate, and is reading the pilot's name on the side of the plane. David, too, was confronted with shipping woes, as his crate was gone through as well by

some unseen person in customs. Imagine how much effort we all take, to make our hatches fit in such a manner that you don't even know they are there? Now imaging a person in customs simply trying to pry them off to look inside, and it should make you cringe.

Another example is when shipping fuel tanks, they must not only be drained, but ideally flushed with alcohol so they don't reek of jet fuel. Scott's keen observance that his F-86 was not fueling correctly saved his bird, as he returned to the pit area and discovered a clunk line had gotten twisted up on one of his tanks during the flushing and shipping process. Also, Jason developed an air leak between rounds and was able to address it, and then turn in his best flights on his last two flights. The preceding examples are but a sample of things the guys had to handle in the course of putting Team USA in the best place we've ever reached, which was fourth overall, out of a field of 18 countries.

There was a bit of hubbub as ultimately one competitor from the Italian team was found to be cheating and was disqualified. It centered on documentation being forged, and Photoshopped, and what added to the drama was the fact that during this whole process, he was sitting in first place. The irony was that the cheating was not really needed since his plane was stunning and it flew great. But eventually, all the details came out, and the event went onward.

One detail that really struck me this time around was the level of craftsmanship, not only on the outside (like you'd expect), but internally too. By that I mean many planes would have maintenance panels or sections open with all the internals reproduced accurately, as well. We are all used to seeing planes that have the nosecone come off, and seeing batteries and receiver, etc. But there, if a nosecone came off, the entire front foot of the plane is detailed with all the full-scale boxes, wires, guns, and components that you'd expect to be in there. One of the Italian planes had its entire aft section removable to reveal a reproduction of a full-size turbine.

If you're interested in vying for the USA Team in the future, I'd like to encourage you to give it a shot. In the last five-to-six years, there has developed an excellent depth of knowledge on what it takes to do well at this event. Just ask and you'll get many people glad to tell you what you need and ways to get there.

Here are a few of the photos I took while there, including some of the surrounding area. I had a great time, and really enjoyed the trip with everyone.

Lastly, don't forget to renew your JPO membership, it's that time again!

Lance

Vice President's Report (cont'd)

Lance Campbell



Andy's crate gets priority seating after its late arrival.



Many birds had full-scale details INSIDE, too.



Andy Andrews and Jim McEwen with Andy's F-86.



An example of the extreme detail seen on the Russian team's Yak-130 main gear.



Camo schemes, like the one sported by this F-16 were a real challenge to see with the mountain backgrounds.



Jason Bauer readies his F-15 for the static judging.



David and Monica Ribbe just prior to the static judging of David's own-design Mig-15.



"Doc" Harris using his stethoscope-tubing skills to help Jason find an air leak in his retracts system.

Vice President's Report (cont'd)

Lance Campbell



One of these full sized planes doesn't look like the others.



Scott Harris' F-86 ready for static judging.



The Russian team took no end of enjoyment with the US Team Manager taking photos of their tail art depicting a Russian Bear swatti.



Lance and his wife at the awards banquet.



Collection of gifts presented at "Nation's Night." Team USA presented a mahogany model of the Wright Flyer and a Mason jar of moonshine.



This international event could not have been held in a more picturesque location.



The winning teams take the podium. Team USA was just 1/2 percentage point from taking 3rd place.



To say you have a magnifying glass on your flying at the JWM is an understatement! Here are some of the press covering the event.



District I Report

Bob

Connecticut
 Maine
 Massachusetts
 New Hampshire
 Rhode Island
 Vermont

After many years as your District I Rep it is time to say goodbye, as my term is up in December. Much has happened and been discussed over the years - the *KingCat* repair series was a success and I still use those techniques. The FAA has yet to release their Notice Of Proposed Rule Making on small Unmanned Aircraft Systems (sUAS), there are more quality turbine manufacturers with fine products on the market, and we are getting new blood into the jet segment of the hobby! I've seen a few new turbine guys who came up on R/C Flight simulators and edf foamies skipping the glow-ducted fan step that many of us fondly remember.

Well I finally did it, I'm flying my Tam Jets F-16 on 2.4 GHz. I still have my *BobCat XL* on 72 MHz with the frequency all to myself. One thing though, after flying the F-16 at Gardner, MA and then flying the *BobCat*, I was surprised that I noticed the antenna on my transmitter and thought to myself: "What is that thing in the way." So we will see what the future brings ... I have a new *KingCat* that came with everything less engine, and ECU that is on 2.4 GHz, so more than likely I'll now be flying two on 2.4.

The Eighth Annual New England Jet Rally at Gardner, MA was another great event with the team of Jeff Lynds and Karen and Mike Turocy putting on another first class show. Don Desandre took home the JPO "Top Gun Trophy." Congratulations, Don!

The Maine Jet Rally and Model Expo in Sanford, ME was a great event for jets - we had three fine days of flying and only a 25-knot crosswind prevented much jet flying on Sunday. Mike Turocy did brave the skies and put on a nice show with his *Reaction* in the wind, while Leonard "Max" Smart made up for lost time by flying multiple fine aircraft on Saturday. Jeff Lynds finished working out the bugs in his CARF *Tudor* and flew it with scale-like precision, and Larry Roper was constantly in the air with multiple aircraft. Reuben Malz had a good weekend - most impressive was Reuben's 10-year old son piloting his *KingCat* with great precision. Steve Stricker was very impressive with multiple aircraft including his very large F-4, while Frank Alvarez put on a clinic with his precision flying and flew a BAE *Hawk* formation halftime show. Jorge Escalona had a fun weekend with a very large sport jet while Don Desandre had his fleet of jets loaded up in his rolling hangar and was seen assisting many folks when not in the air. Steve Goller managed to put in some nice flights with his *Boomerang*.

Our second Plum Island event of the year was a fly anything event. We had mostly turbine-powered jets, but edf foamies, and a twin OS .91-powered ducted-fan F-4 flew, as well as 3D planes and a 40% Piper *Cub*! Mike Turocy was the CD and along with Sue kept things running smoothly. Saturday we had 38 pilots and lots of flights with Domenic Mirabello and Brian Lloyd tearing up the sky, as usual, with constant flights and precision landings

Sunday brought a steady west wind that kept many grounded, however it was pretty much down the runway so I took out the *BobCat* on 72 MHz. I didn't notice the antenna this time, but with the performance and response of the jet I was reminded why I'm reluctant to change anything on it. Meanwhile, Jason Plummer braved the winds and had a very rewarding flight with a superb landing, as Larry Roper was burning up the skies with some nice flights, and Steve Goller was impressive with his *Boomerang*!

JPO is now selling T-shirts, Polo shirts and hats on the website so check it out and renew via PayPal. If you select *e-contraails* you will get a T-shirt with the JPO Logo.

The Notice of Proposed Rule Making (NPRM) still has yet to be released by the FAA, so keep your eye out for that and be ready to submit comments as required.

My replacement is expected to be onboard in January . I'm sure you will be happy with the insight and perspective Brian Lloyd will bring to the position as your JPO Rep. I understand he is already lining up a staff of writers to assist. It has been a pleasure and an honor to represent District I over the past years. I wish you all the best and great success in all you do!

Bob



Pit area at the Homburg Jet Rally.



District III Report

Ohio
Pennsylvania
West Virginia

Mark McCracken

In the last issue of *Contraails* I wrote about the trailer set-up I have and the jet rack I put together to haul my aircraft. I wanted to thank the many of you that stopped by my tent at the last jet rally and checked out my set-up.

Some took pics, some even brought over measuring tapes to measure the size and just ask questions. I even had a few stop by and ask, but walked away thinking it would not work, as they had barn doors instead of a ramp door. Sitting with pen and paper, I came up with an easy way to eliminate the need for a ramp door and still have a rolling rack that can go from trailer to work shop leaving your aircraft still tied down, and that is using fold-up wheels. E-mail me for more info if interested at jpnepa@hotmail.com.

I have a few photos taken at this summer's jet rally hosted by the Farview R/C Flyers, courtesy of Tim Davidson, of their club. The 2013 Hamburg Jet Jamboree is in the record books, and following is a report on the event from Jim Ellis.

A well deserved thank you to all of the club members who put in the time to make this such a successful and fun event! And a big thank you to you guys, the pilots, and their friends and families who came to fly turbine and edf airplanes at Farview R/C Club! Trophies were:

Best Electric Jet: Bob Violet with the electric-powered Skymaster A10. It was flown so well and looked so good in the air! And just think, Bob and Dustin drove 17 hours each way to fly with us!

Best Sport Jet: Mark Giummeull with his BVM *Ultra Bandit*. Mark came from Brooklyn, NY and flew the *UB* so well and with great control. Great job, Mark!

Best Scale Jet: Nir Schwiezer with the Fly Eagle Jets *Vampire*. I love the look and lines of the *Vampire*, a rare airplane. Nir did a great job flying this model in a scale-like manner, and was a big hit with the spectators!

Pilot's Choice: Larry Wright with his FJ1 *Fury*. Larry built this airplane from scratch, doing drawings and making the molds himself. Larry should be so proud, since it was the votes of the pilots that chose him over everyone else, knowing the work that went into this project. Congratulations, Larry! By the way, the nickname of this jet is now "the popcorn machine." Maybe Larry will post the story and photo that goes along with it. As a side note, it brought tears to our eyes to see Larry receive this award!

JPO Top Gun: Greg Wright flying his BVM F100. Greg received this award, not only for the workmanship on his F100, but for the long trip he made from Illinois. He put in many flights and was then asked to participate in the half-time show, flying his F100 along with the Malchione's F100 and the Skymaster T33 owned by club member Bob Tursack, flown by Dustin. Greg, great job and many thanks for making the trip!

This was my first event as a CD. I am so glad to have gotten this under my belt, and I couldn't have done it without the help of my fellow board members, Lee, Erik, and Dave as well as Tina, Robin, Stacy, and the tireless work of the core group of folks, all of whom make this event possible!

I'm anxiously waiting to see all of my flying buds again! And, again, congratulations to the award winners!

Jim Ellis

At this time I would like to reach out to other clubs in District III hosting jet-related events. It is not easy for me to attend many events during the flying season as work keeps me busy, so I ask that if there are events you would like to see covered in *Contraails*, please contact me. I would like to find someone who can put together an article on the events in western PA, OH and parts of West VA. As always, if you have an interesting project you're working on over the winter, or a building tip, please send me the info and it can be posted in a future issue of *Contraails*.



District IV Report

Lee Reightler



Delaware
District of Columbia
Maryland
North Carolina
Virginia

What do jet pilots do in the "off season"? Fly of course! Unfortunately in District IV, we only have one event, which is the "First In Flight" in NC. We must look to other venues during the rest of the year. This year, several of us attended the Giant Scale Fly-in at Bealton, VA. This annual event is held the first weekend of September, hosted by Andy Kane and the DCRC club. It is a laid-back and enjoyable event with plenty of camaraderie, good food and a great full-scale air show. Following are some of the activities.

Lee



General views of the flight line, above and below.



A gaggle of bi-wings waiting for takeoff.



Brandon Dieter- future jet pilot. Bob Klenke in background



Connor Fisher (7) and Brandon Dieter (12), the youngest pilots present.

District VIII Report

Ron Schwarzkopf



Arkansas
Louisiana
New Mexico
Oklahoma
Texas

Hello again from District VIII! Jet Rallies are taking place all over our District, and I'm missing all of them. My last couple of months have been spent moving to another house, selling the old one, and setting up a shop so I can get back to some serious building at some point in the future. Usually Texas has nice weather in October, so I'm trying to get maximum use out of it by fixing up this new shop before the cold weather moves in - which is cutting into my flying time - and that is the reason why I was not able to make the Shreveport, Lubbock, and Houston events. Hopefully I should be settled into the shop in a couple months (oh, and the house too!) so we should be ready for the 2014 events.

Past Jet Events

I was able to make the Greater Southwest Jet Rally in September. This Waco, TX event had a pretty good turnout of about 58 registered pilots. The sponsoring HOTMAC club finally has a Waco resident/member who has successfully earned his turbine waiver - congrats to Bobby Spanos!

Weather for the event was pretty warm, but Saturday late in the day we were "treated" to something of a windstorm, that lasted for about 20 minutes. It felt like 60-mph straight line winds to me, and took down a couple tents - quite unusual. Luckily, most people had taken their stuff down for the evening, so hopefully damage was minimal. Following are a few photos of the event.

If you fly jets in District VIII, you probably have met Ken White from the Austin area. He was a turbine-model pilot and supporter of flying ducted-fan and turbine models for far longer than the 15 years I've known him. He always attended the jet events in the TX/MS/LA area, and had CD'd jet events and military fly-ins at Austin's ARCA club. Sadly, Ken passed away in August. Greater Southwest event attendees provided a moment of silence for Ken, as Bob Covish spoke about our friend. Ken, you are missed in our model jet community.

Future Jet Events

No events are scheduled for District VIII for the next few months, but I hope to make the drive to Mesa, AZ in November to attend the Arizona Jets event. This event draws in quite a few edf flyers from the area - maybe I'll see you there!

Happy Landings!

Ron



Ken White LOVED *Panthers*. His was on display along with his beloved Marine Corps flag.



Barry Raborn, from Houston, brought this gorgeous T-33.



A nice flying F-18.



The *Conrails* Editor's Jet Doggies from CO. With the warm weather, they were definitely "Hot Dogs."



A few of the planes the Tucson, AZ guys brought. They came to fly, and fly, and fly.



This turboprop *Duster*, owned by John Beran from Austin, flew constantly.



Addison Clark Jr.'s *Falcon* ready to touch down.



Mini-*Habus* were quite popular at the event this year.



Les Morrow's (L) and Greg Moore's F86Ds.



This foamy F-4 *Phantom* might be small in size, but it had tremendous performance (as shown below).



A nice-flying *Turbinator*.



Treasurer's Report

Beginning Balance as of July 1, 2013		\$3,377.56
Income:		
Dues:	\$221.41	
Decal Sales:	\$18.00	
Log Book Sales	\$49.75	
Total Income:		\$289.16
Expenses:		
Postage	\$57.57	
Stamps:	\$9.20	
Website:	\$113.97	
Trophies	\$1,288.00	
Total Expenses:		\$1,468.74
Ending Balance as of September 30, 2013		\$2,197.98
		<i>Respectfully Submitted: Carol Brusa</i>

Upcoming Events

- Desert Jet Storm: February 6-8, 2014
Speed World R/C Club Field
Phoenix, AZ
www.speedworldrcf.com
- Monster Energy Jet Jam: Feb 14-16, 2014
Coachella Valley, CA
Hosted by <http://www.cvrclub.com/>
- Florida Jets: March 6-8, 2014
Paradise Field, Lakeland, FL
CD: Frank Tiano 863-607-6611
www.franktiano.com
- Tucson Jet Rally: March 13-15, 2014
TIMPA Field, Tucson, AZ
www.tucsonwarbirds.com (registration)
www.timpa.org (map)
- Fortbend Jet Rally: March 27-29, 2014
Fortbend RC Club, Rosenberg, TX
lb.bernal@earthlink.net
- Mississippi Afterburner Jet Rally: April 24-26, 2014
John Bell Williams Airport
Raymond, MS (suburb of Jackson, MS)
www.mississippijets.com
- EDF Jet Jam: May 8-11, 2014
Muncie, IN at AMA HQ.
- Texas Jets: May 15-17, 2014
Mt. Pleasant, TX
www.mtpleasantrc.com
- Virginia Jets: June 6-8, 2014
Twin County Airport, Hillsville, VA
CD: Bill Jarrett 276-237-0607
- OC-Turbo Fest - Early Summer Edition: June 20-22, 2014
Titusville Airport; Titusville, PA
jacknbets@aol.com
- Jets over Kentucky: July 6-13, 2014
www.visiblebanonky.com/events/kyjets.htm
- Highland Jets: July 18-20, 2014
Frankfort Highland Airport, Frankfort, NY
<http://mvfirebirds.com>
- Wingham Jets: July 25-27, 2014
Wingham, Ontario, Canada.
- D.O.G.S. Show: August 29-31, 2014
Dayton, OH
www.nationalmuseum.af.mil/news&events/outdoor/index.asp
- Greater Southwest Jet Rally: September 4-6, 2014
HOTMAC club field; Waco, TX.
www.hotmacrc.org
garrettlarryd@aol.com
- Route 66 Jets: September 4-7, 2014
Litchfield, Illinois Municipal Airport
CDs: Roger Shipley and Jim Allen
www.route66jets.com

District X Report

David Reynolds



- Arizona
- California
- Guam
- Hawaii
- Nevada
- Utah

Best in the West

In October the BARKS club in California hosted the 24th Annual Best in the West Jet Rally. A few pictures have been sent to me - please enjoy them. Also, there are two videos from the event:

- Part one: www.youtube.com/watch?v=1lxGHpWkqo
- Part two: www.youtube.com/watch?v=wFHMm9rvTig

Or, if you are on Facebook, I have posted the videos on the Jet Pilots Organization District 10 Facebook page. If you have any pictures to share from Best in the West you can post them up there as well.



More VTOL action: As I mentioned previously, there is a rather dedicated group of model aviators that are working to solve the problem of the *Harrier*. These efforts are interesting to watch, however the *Harrier* is not the only VTOL game in town ... how about an F-35? Joel Vlashof has been putting his mind to the problem with some promising results.

He has managed to create a scale swivel-nozzle (www.youtube.com/watch?v=CeyJwzljYYM) and he has successfully done some limited outdoor-hovering tests sans wings. (www.youtube.com/watch?v=heTL_nt0yUI).

It looks as though he will soon be testing with a complete airframe, since he has been able to test indoors with the wings (www.youtube.com/watch?v=1YMX5HSpAs).

That is all I have for this issue, next time around I will have pictures from the 25th Annual Arizona Jet Rally. Until next time, keep the low passes where they belong, and send in those pictures!

Dave

District XI Report



Alaska
Idaho
Montana
Oregon
Washington

The big event for the Northwest - Jets Over Whidbey - is now history, the 23rd running having been held August 22-25. We had 20 or so registered pilots and the weather, although not super, was acceptable with highs in the 60's but no rain, so there was a lot of flying. Bruce Bender, from Edmonds, Canada, won the Best Sport Jet award with his nice looking BVM *Bandit*.



Roberto Flores, of Seattle, won Best Scale Jet with his beautiful BAE Hawk.



Bill Rietzel of Anacortes, WA, won the Best Fight award with his SM ViperJet which was custom painted by Bill Broderick, the CD for JOW this year.



Dean Wichmann, down from Kamloops, BC, in Canada, won the Top Gun trophy with his unusual turbine powered glider, which flew very well.

Bob Brusa



Bill Broderick's and Chuck Bower's F-18s share the ramp.



Noon-time line up at Jets Over Whidbey.

The fall jet meet in Princeton, BC, Canada, was held the third weekend of September, and turned out to be a spectacular event despite the poor weather forecast. Thursday and Friday had temps in the 70s with no wind, Saturday was overcast but no rain, and Sunday was also good. There were 22 or so registered pilots, and we had a Saturday night bar-b-q at the field that was just great.



It's time once again to start renewing your JPO dues for 2014. Annual dues are still only \$25. Any new members will still receive a free JPO Tee shirt while the supply lasts and if there are any members who did not renew in 2013 and receive a Tee shirt, we will include one in your 2014 renewal. Joining or renewing can be done online at www.jetpilots.org, or by sending a check to Carol Brusa, JPO Secretary/Treasurer. You can find her address on the inside back cover, or on the website.

Please note that I now have a new e-mail address jpbob@gmail.com. If you have me in your address book, please update it.

Bob

Canada District Report

Jeff Daly



Seems the jet flying season has almost ended for most of us up in Canada. We've had some very good events with great weather this late summer and fall in Ontario and BC.

For this edition, I have a mix of event and technical reports. For events, I have a report from JPO Western Canada Rep Paul Dries on the spring and fall Princeton Jet Rallys, and from Peter Doupnik reporting on the ThunderThrust over ChathamKent event that occurred in September. For technical reports, Paul Dries also provides an update on Smoke Systems, and I have a comprehensive report on jet fuels for our model jets.

For the Canadian pilots out there, don't forget to renew your JPO membership for 2014!

**ThunderThrust Over Chatham Kent Municipal Airport
September 2013**

by Peter Doupnik, CD, MAAC Jet Committee Member,
Deputy Zone Director

The idea behind this event was to extend the jet flying season in Ontario, Canada and have a low pressure, fun, year-end event. Many thanks must go to the Chatham Kent Municipal Airport Management and the Chatham Aeronauts who hosted the first annual, three-day event. The airport is located approximately 100 km due east of Detroit, MI. This event was open to turbine-powered and high-performance electric jets, as well as turbine helicopters; 31 pilots from Ontario took the opportunity to fly at the excellent location with a 75 x 5,000-foot long runway with clear approaches. There were over 60 jets and one helicopter with about 75% of the models being scale.

One of the highlights for me was test-flying Paul Sousa's PST F-84 *Thunderjet*. This plane has great presence in the sky! For three years, we watched this plane taxi back and forth, and we almost started a collection for a new set of tires.

The Saturday night dinner was held at T Bones Restaurant in Chatham. My #1 helper was Marie Bruce who decided the lucky recipients of the 16 fun-type plaques. Some of these were: "Most Landings in One Flight," "Best Body Language," and "Shaky Knees". We had very generous prizes compliments of Altecare RC, Jet North Canada, Action Hobbies in Kingsville, RC Canada, Gwen's Graphics and of course MAAC.

This part of the hobby keeps growing with many new jet pilots enjoying the camaraderie and experience of the seasoned pilots. Many new friendships were developed,

and in my case, I even managed to keep my old ones. The tentative dates for next year are September 19-21, 2014. Hope to see you there! and please enjoy the photos from Palmer Johnson.



Jeff Truemner's *Rookie* on landing.



Peter Doupnik's L-39 *Albatros* on maiden flight, taking off.



Beautiful *Hawk*, pilot unknown.

Canada District Report (cont'd)

Jeff Daly

Princeton Jets Spring and Fall, British Columbia
by Paul Dries, JPO Western Canada

Many of you who have read about the events we have held in Princeton will recall that there has always been a question of weather, and since it is a fair distance to travel for a lot of people, the attendance seems to be varied as they are "spooked" by the weather reports. Both events this year had questionable weather forecasts, but in true Princeton-style, they both ended up with phenomenal outcomes. The fall event had poor weather predicted for Sunday, right up until Saturday evening, so a lot of pilots left early with Sunday turning out to be one of the best days.

We did see some new pilots out this year, most with jets they had purchased second-hand from other modellers. This seems to be a good way to get started for a reasonable dollar and usually the airframe is well proven. We also saw the return of some jet modellers who we hadn't seen for years. It was good to see Wai Ming Leung, John VanDerHage and Jeremy Ferguson (LGM) back flying again.

We all have seen some phenomenal jets in various web forums and online, but this year was the first time we were treated to not just one, but two A-10s. One was Alan Blore's MIBO A-10 powered by twin JetCat 120s, and the other was Jack Price's Skymaster A-10 powered with Twin JC *Cheetahs*. Both aircraft were stunning in the air, and take-offs and landings were a breeze. It was interesting to see both airframes up close to each other to see the fairly minor size differences with the Skymaster one being slightly smaller.

We had a "YouTube" guy show up at the field. He is a travelling journalist who posts his experiences on YouTube under the name JCVdude. Here's a couple of links to videos taken from a layman's perspective which has a very different and interesting twist:

www.youtube.com/watch?v=EAqLJauj0ZU
www.youtube.com/watch?v=_wLOHU8UXDQ

Here are some pictures of the event:



Alan Blore with his excellent Mibo A10.



A close up of Alan's A10.



Wai Ming Leung with his F16.



Ming's F16.



Jeremy Ferguson joins the 2L club.



John VanDerHage about to take off with his *Reaction-54*.

Smoke System Update

by Paul Dries, JPO Western Canada

I have spent some time writing about various methods used to produce smoke systems for reasonable sums, and I have also been experimenting with various nozzles - homemade from Stainless tubing, to Tam's new smoke stick with the diffuser tab. Recently, I stumbled upon a new smoke pump based on a machined aluminum housing with a brushless motor set-up.

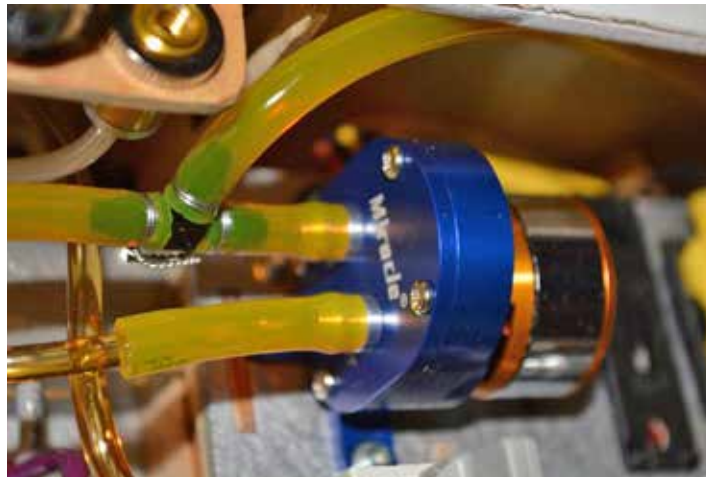
Since most of the problems I have had with previous pumps were associated with the speed controls and brushed motors, this seemed like a perfect solution.

The pump/motor/speed control unit feels well made and is available from: www.milehighrc.com/S_Pump.html.

Since it is based on a machined aluminum housing with plastic gears and a brushless outrunner-style motor, my assumption is that the slower turning motor with a larger pump will produce more consistent results - and so far this seems to be the case. I ordered the pump which came with the speed control as a separate unit and plugged in to the motor with the usual bullet connectors. Mile High R/C was great to deal with and shipped my order out within 24 hours.

I installed a servo type plug on the speed control and used a standard receiver switch to connect an 1100 mAh A123, 2-cell pack. From the testing I have done so far, the pump is very controllable, and the A123s provide good voltage with plenty of run time for the pump. Control was done with a multi-point throttle to aux curve, activated by a switch on the left-side of the receiver. I like the left side as I can control the switch during aerobatic maneuvers without interrupting the right stick.

Some pictures of the pump:



Front of pump showing connection nipples.



Pump, speed control, and switch installed on tray.



Smiley face skywriting.

Jet Fuels for Model Gas Turbines

by Jeff Daly, JPO Canada

I have noticed on RCU and RCC that there are a number of pilots who ask about fuels that are suitable for our jets, and the differences. The correct answer is always what is recommended by the engine manufacturer, but this is often the core fuels with no specified alternates. While I'm not an expert on jet fuels, I have had to investigate alternate fuels and approve them for certain aircraft in the RCAF. From that experience, I have summarized some good info related to the technical properties of kerosene, jet fuels, and diesel, as well as some info for ensuring your fuel is good to use. I hope you find this useful.

What are kerosene, jet fuel, and diesel?

During the petroleum-refining process, crude oil is processed and refined into various useful hydrocarbon products. Kerosene and diesel oil are the middle distillates from fractional distillation, with kerosene boiling off and condensing before diesel, which is a slightly heavier distillate. Aviation jet fuel is kerosene with some additives, depending on the type of jet fuel, and they are produced to specific standards and must be inspected for quality prior to use. Diesel is also produced to a standard, but not to the same physical properties. Kerosene, jet fuel, and diesel are hygroscopic, in that they absorb water and there is always water in suspension in the fuel. Aviation regulations require frequent inspections for water content, as water in fuel, fuel storage tanks, dispensing equipment, or fuel additive tanks is a great hazard. The following describes in more detail the types of fuels, their additives, and aviation fuel quality-control inspection requirements.

Commercial Jet Fuels

There are two main grades of turbine fuel in civilian-commercial aviation: Jet A and Jet-A-1, both of which are kerosene-type fuels produced to stringent standards. There is another grade of fuel, Jet B, (like JP-4) is a wide-cut fuel, which is a blend of gasoline and kerosene, but it is rarely used except in very cold climates. Jet A (which is more common in the US) and Jet-A-1 (more common in Canada) are the same, except Jet-A-1 has a slightly-lower freezing point. Additives in commercial fuels vary by country in terms of what is mandatory, and what is agreed upon between the air carrier and its fuel supplier. In Canada, anti-oxidants and corrosion inhibitors are mandatory, and it can be expected that these additives have been included in fuel in the US. Icing inhibitors are not mandatory, but available if requested, as most commercial aircraft have fuel pre-heaters that eliminate ice crystals contained in the fuel before entering the fuel-filtering system and engine pumps. Jet fuels are not low-sulphur fuels with approx 0.3% to 0.4% (3000 to 4000 ppm) sulphur content. The additives are explained in more detail below.

Military Jet Fuels

Following shortages of kerosene in the late 1930s, and

with the rapid arrival of gas-turbine engines, the US military required new fuels with low freezing points, so it introduced kerosene mixed with naphtha (gasoline), called wide-cut fuels. JP-4 was one of these fuels and became the predominate land-based jet fuel. In 1948, high flash-point kerosene (JP-5) was introduced to reduce the fire risk aboard aircraft carriers, which became the USN common fuel. To reduce the fire hazards associated with JP-4, a kerosene fuel very similar to Jet-A-1 (JP-8) was developed by the USAF. By 1995, JP-8 was the primary military fuel in use, followed by Canada several years later.

Switching was not easy, as not all gas-turbines burned as cleanly on JP-8, and JP-8 was approximately 4% heavier than JP-4. This caused aircraft fuel-load reductions to stay within max take-off weight limits, re-certification of higher take-off weights, and certification of a thermal stability improver-additive fuel (known as JP-8+100) to inhibit deposits in the high temperature areas of the fuel system/turbine. Military jet fuels, like commercial fuels, are not low sulphur fuels with approx 0.3% to 0.4% sulphur content. The main difference between military fuels and commercial fuels are the additives. All military fuels must contain anti-oxidants, static dissipators, corrosion inhibitors and fuel system icing-inhibitors.

Kerosene

Kerosene, known in the UK as paraffin, has been around for a long time, being trademarked back in 1854, and is the main component in aviation jet fuel. Except for Jet B and JP-4, kerosene has the same heat of combustion and combustion characteristics as Jet A, Jet-A-1, and JP-8. Additionally, kerosene is sometimes used as an additive in diesel fuel to prevent gelling or waxing in cold temperatures, and it does not normally contain additives, but might contain biocides for storage.

Since kerosene is also used for other purposes, such as home heating and lighting, it is readily available to consumers as Kerosene K-1, in 5 or 20L containers from hardware, home and garden stores, and available at some bulk fuel suppliers via the dispenser pump. K-1 is a low-sulphur kerosene with no more than approx 0.05% (500 ppm) sulphur, and has a clear or amber color, or even light-blue. In the US, home heating kerosene is available at some service stations at a cheaper price than diesel with a red dye added to identify it for IRS tax exemption purposes. Low odor and odorless kerosene have even lower sulphur content, or are blended with odorless mineral spirits. I have found that within specs, their physical and combustion properties can vary between manufacturers. These fuels are more oriented to home heating than transportation uses.

Diesel

Diesel has several grades, the most common being general purpose Diesel No. 2, which is available in the US as a low-sulphur diesel (0.05% or 500 ppm) and as an ultra-low sulphur diesel (0.0015 or 15 ppm). In Canada, only

ultra-low sulphur diesel is available, and is called Diesel Type A. In all cases, diesel has considerably less sulphur content than jet fuels, and is comparable to K-1 kerosene. Diesel is manufactured to different standards than jet fuels, with viscosity and lubricity being important properties for diesel engines and injector systems. Diesel No. 1 is a light diesel fuel designed for engines that operate at relatively uniform speeds, is less dense, has a lower flash-point and viscosity than No. 2, and is closer in properties to jet fuel/kerosene. Comparing diesel No. 2 to jet fuels, diesel offers 4% more specific energy for a given volume than kerosene/jet fuels, but weighs 3% more. Diesel fuel color can range from colorless to an amber or light-brownish color depending on the refining process, and can also be dyed red. Fuel in storage can darken due to oxidation, but this will not affect its performance - unless the darkening is accompanied by sediment or microbiological growth.

Additives

Additives to aviation jet fuels do not exceed 0.15% by volume in total, but have significant benefits:

- Anti-oxidants prevent the formation of gum deposits on fuel system components caused by oxidation of the fuel in storage, and provide protection from peroxides that are known to attack nitrile-rubber causing embrittlement.

- Static dissipators (SDA) eliminate the risk of charge generation and static discharges, especially during fuelling, as the fuel passes through lines and filters, or even movement of the fuel itself within the tanks.

- Corrosion inhibitors are added to protect fuel systems and aircraft engines from corrosion, but also act as lubricity improvers to lubricate moving parts in fuel pumps and other fuel system components.

- Fuel System Icing Inhibitors (FSII) provide protection against the formation of ice in the fuel which can clog filter elements and ultimately starve engines of fuel. FSII also serves to inhibit fungal and bacterial growth in fuel systems.

Quality Control Inspection Requirements for Aviation Jet Fuel (ref C)

Testing of aviation fuels is done upon receipt from the supplier, and daily on active storage tanks and fuelling tenders. Gradual accumulation of small amounts of water in storage tanks, pipelines, tank trucks, etc., is a natural phenomenon since water is actually soluble in fuel to the extent of approx 1L water per 10000L of fuel (0.264 US gal. per 264 US gal.) at 37.8 deg C (100 deg F). A drop in temperature reduces this solubility and water will settle out.

A water check is to be conducted daily for active tanks and refuelling tenders, weekly for inactive storage tanks, and prior to withdrawals from inactive tanks. The check for water content is to be made by applying water-finding paste to the bottom end of a dip stick (approx 15 to 20 cm (5 to 6 in.)), and inserting the dip stick into the bulk storage tank until it reaches the bottom. The measurement of the paste discoloration (red) will indicate the depth of the water in the tank. Refueling tenders will be checked using water finding

paste and Hydrokits®. It cannot be overemphasized that water in fuel, storage, or fuel additive tanks is a great hazard and will not be permitted to remain or be dispensed in any given aviation fuel storage system, or enter storage tanks through leaking lines.

Clear and Bright Test

The purpose of this test is to detect possible water or solid contaminants in aviation fuel by visual inspection. Using a transparent container that has a clear, undistorted bottom, the fuel is visually observed for a clear and bright condition. The procedure for testing a sample is as follows:

- a. Take the sample and let the sample settle for one minute to remove air bubbles;

- b. Observe the sample against a light-background for a clear and bright condition. Swirl the bottle to create a vortex. Free water and solids tend to collect beneath the vortex.

- c. NOTE: The term "clear and bright" has no relation to the natural fuel color. Turbine fuel color varies from water white to straw color to amber, depending on processing and/or crude source. Clear and bright fuel has no floating or suspended matter. Brightness is a quality independent of the sample color and refers to the lack of suspended or free water in the sample. Bright fuel tends to sparkle.

Odor Test

This test detects or determines the possible presence of contaminants in Aviation Turbine fuels by recognizing changes in odor. If the odor is unusual or unpleasant to your sense of smell, it is an indication of possible contaminants since:

- a. Uncontaminated turbine fuels should normally not be irritating to the sense of smell and uncharacteristic odors in the fuel can be detected by most individuals;

- b. Unusual odors are most easily detected during routine checks where fuel is collected in an open container, particularly sump samples where water may be present.

- c. Some of the contaminants that may be detected by odor are gasoline, ammonia, acid, stagnant water (microbiologic growth) and hydrogen sulfide (rotten egg smell).

Testing for Microbiological Contamination

A sample is drawn into a bucket or clear and bright bottle and examined visually since micro-organisms produce visual evidence, which can be easily identified. A small permanent magnet will be required for further evaluation.

- a. Allow the sample to settle for at least two minutes.

- b. Tip or swirl the bucket/bottle from side-to-side, looking for any evidence of dark colored solids, dark colored water, substances which cling to the side of the bucket/bottle or scummy mucus-like material.

- c. If suspect materials are observed, carefully pour off any clear fuel into an approved fuel disposal container and collect a sample of the suspect material in a clear glass sample bottle.

Canada District Report (cont'd)

Jeff Daly

d. Visually examine the contents of the sample bottle in an area providing strong background lighting.

e. If the sample is mostly solids, check for the possibility of the material being rust. This can be done by holding a small magnet against the side of the sample bottle and moving it around. Rust particles will collect and follow the magnet.

f. If the sample is discolored water, check for the possibility of fine suspended rust. This can be done by filtering some of the water through a clean white paper towel and allowing it to dry. After drying, visual and magnetic inspection can usually detect the rust.

g. If the sample is a dark-colored sludge-like substance, but does not respond to a magnet, fungi is a possibility. Other indicators of micro-organisms are a matted, lumpy, or stringy consistency, with a rank moldy odor; and;

h. If the sample is mostly water, especially dark brown or black in color, with a scummy, mucus-like interface or topping, microorganisms may be present. Another indicator is a noticeable foul odor.

What fuels are suitable for model turbine jets?

Rule number one is to follow the recommendations by the engine manufacturers, which all recommend kerosene and Jet A as a minimum.

Acceptable kerosenes include general purpose kerosene, K-1 and dyed kerosene. Technical data is very sparse for low odor and odorless kerosenes, but these fuels should be suitable. Just watch for ECU-setting differences with pre-heat, fuel ramp, acceleration delay, and engine operating temperatures. Kerosene does not contain any special additives that benefit model jet engines.

Civil aviation jet fuels (Jet A and Jet-A-1) are perfectly suitable and perform just like Kerosene K-1. These fuels were produced to stringent standards and the quality is periodically verified. Depending on the fuel supplier, they also likely contain additives, such as anti-oxidants, corrosion inhibitors, and static dissipators that are very beneficial to model jet engines and the fuel system. Concerning fuel smell, civil jet fuels have more sulphur than consumer kerosene and therefore smell more. Jet B should work fine, but because it has reduced energy density vs. Jet A/A-1, watch for needed changes to ECU settings, and changes in engine operating temperatures.

If you have access to military fuels, JP-8 is the same as Jet-A-1, and is perfectly acceptable. JP-4 is like Jet B as described above. If near a USN facility, high-flash JP-5 should be fine, but again watch out for needed changes to ECU settings. Military jet fuels offer the advantage of mandatory additives that greatly benefit model jet engines and the fuel system, as well as FSII which aids in curbing fungal/microbiological growth in your fuel jug.

It was difficult to find fuel densities and heating values (energy densities) for diesels as these are less important factors for diesel fuel oils. Diesels do have at least a 4% higher energy density than kerosene-based fuels. This will

improve fuel efficiency and a tank of fuel may last 30-seconds to a minute longer. However, diesel is heavier than kerosene-based fuels by approx 3%, so there is a weight penalty. I would also expect that manufacturers would recommend less turbine oil to be added to diesel, as it already has greater lubricity and viscosity than kerosene-based fuels. If one has a choice over Diesel No. 1 versus No. 2, jet fuel is more similar to No. 1. Diesels also contain considerably less sulphur than civilian and military jet fuels, but it still stinks. Suppliers of diesel normally add in additives that are beneficial to our jet engines. ECU settings should require changing for pre-heat, fuel ramp, and acceleration delay if using diesel. In research of a Taiwan-based model turbine manufacturer that permits diesel to be used, they did not specify in the manual the type of diesel, nor reduced the amount of oil to be added, but required changes to the ECU settings.

For me, I love the smell of jet fuel in the morning! So, if I can get JP-8, then that's perfect. Otherwise, Jet A/A-1 is the next best fuel, as it offers most of the beneficial additives of JP-8, plus it normally costs less than K-1 at Home Depot in Canada. When I'm in the US, I do stock up on dyed-home-heating kerosene at service stations as it's also reasonably priced. I do not own a turbine that permits diesel, so I can't make any assessment on performance or long-term effects of burning diesel fuel. With K-1, I have had one incident of microbiological contamination during winter storage in Florida. I had not checked my fuel jug and this contamination managed to get into my *Bandit's* fuel system and plugged 95% of the engine filter, causing significantly reduced power and the engine to roll back to just above idle no matter the throttle setting. I learned my lesson to check the fuel quality at the beginning of the flying season!

In all cases, in spite of where you obtain your fuel, beware of the storage conditions and if in doubt, you can do a simple clear and bright test to ensure neither free water content nor contamination. For storage, make sure your jugs are well sealed and avoid placing them directly on concrete (like garage floors), as concrete will cool and sweat whatever is on it. Just put some wood or cardboard underneath as insulation. Kero fuels and diesels do not go bad, even when mixed with turbine oils, but avoid moisture ingress to protect against microbiological growth. Over the winter, I add diesel fuel conditioner to the jugs, that I buy at a hardware store, as it contains additives to reduce microbiological growth. I also always do a clear and bright test on my stored fuel in the spring to visually verify that no free water, fungus/algae, or solid contaminant is present. And, always use a quality filter when fuelling up your jet.

On the smell topic, an old trick I learned years ago is to stick Bounce dryer sheets in the airplane's intake and tail pipe ... voila! no more Jet A smell in the house!

On the next page, you will find Table 1 that summarizes the relevant properties of the fuel-types discussed. This info is provided to assist you in your choices for fuel as recommended by the engine manufacture.

Table 1. Possible fuel types for Model Gas Turbines

Fuel Type (Spec)	Avg Density (15C, kg/L)	Weight 1 US gal (lb)	Volumetric Energy Density (MJ/L)	Volumetric Energy Density (Btu/USgal)	Mandatory Additives	Optional Additives	Comments
Kerosene K-1 (ASTM D3699)	0.808	6.74	34.56	123,987	None	-Biocides or biostats -Red dye	Can be K1, low odour, or dyed kerosene.
Jet A (ASTM D1655-07) (CAN/CGSB-3.24-2005)	0.808	6.74	34.56	123,987	-Antioxidant (Can) -Static Dissipator (Can)	-Antioxidant (US) -Static Dissipator (US) -Anti-icing -Corrosion Inhibitor	Jet A and Jet A-1 are identical in all properties except freezing point. Most common civil jet fuel in USA.
Jet A-1 NATO F-35 (ASTM D1655-07) (CAN/CGSB-3.24-2005)	0.808	6.74	34.56	123,987	-Antioxidant (Can) -Static Dissipator (Can)	-Antioxidant (US) -Static Dissipator (US) -Anti-icing -Corrosion Inhibitor	Most common civil jet fuel in Canada.
Mil JP-8 NATO F-34 Kerosene (MIL-DTL-83133E)	0.808	6.74	34.56	123,987	-Anti-icing -Corrosion Inhibitor -Antioxidant -Static Dissipator		Most common military jet fuel in North America.
Jet B (ASTM D1615-06)	0.777	6.48	33.23	119,227	None	-Antioxidant (US) -Static Dissipator (US) -Anti-icing -Corrosion Inhibitor	Contains naphtha.
Mil JP-4 NATO F-40 Wide Cut Kerosene (MIL-DTL-5642U)	0.777	6.48	33.23	119,227	-Anti-icing -Corrosion Inhibitor -Antioxidant -Static Dissipator		Contains naphtha.
Mil JP-5 NATO F-44 High Flash Kerosene (MIL-DTL-5624U)	0.817	6.81	34.78	124,783	-Anti-icing -Corrosion Inhibitor -Antioxidant	-Static Dissipator	
Diesel Low Sulphur No. 2 (ASTM-D975-13)	0.832	6.94	35.83	128,644	unk		-3% heavier than kerosene based fuels -4% more energy than kerosene based fuels
Diesel Ultra Low Sulphur No. 2 (ASTM-D975-13) (CAN/CGSB-3.517-2013)	0.880	7.34	37.93	136,066	unk	-Lubricity improver -Biocides or biostats -Conductivity additive -Antioxidants -Corrosion inhibitors	
Diesel Low Sulphur No. 1 (ASTM-D975-13) (CAN/CGSB-3.517-2013)	<0.832	<6.94	<35.83	<128,644	unk	-Red dye	

Additional references:

- A. Diesel Fuels Technical Review, Chevron Corporation, 2007
- B. World Jet Fuel Specifications with Avgas Supplement, 2012 Edition, Exxon Mobil
- C. C-82-010-007/TP-000: Procedures and Responsibilities for Aviation Fluids Handling

Composite Wing Repair

Greg Moore

Composite Wing Repair

By Greg Moore

It seems that regardless of the size of the airplane - composite wings are the rage. For years, Composite-ARF (now known as CARF) has utilized very strong composite wings and their prowess began the early offerings from BVM. Now, even small (90mm) EDF jets like some of HET's offerings are manufactured this way.

For years, we have made wings either with wooden ribs and spars covered with balsa sheeting, or foam core wings sheeted with balsa. Both have their advantages; however the stiffness that a well-made molded-composite wing imparts does improve flight stability - if done accurately - and does allow for a "live-hinge." That being said, we "know" how to repair both built-up and foam-sheeted wings, since the vast majority of the time we built them, but how do you fix a broken composite wing? Please follow my thought process, below.

When a pin-mounted main-gear strut comes loose on the takeoff roll, the airplane will do some weird and uncontrollable things, like veer sharply towards the steel posts supporting pilot safety-fencing. When that happened, this damage occurred to my CARF Flash wing.



A long discussion took place with several very experienced builders as to the best way to fix this, and options from inserting a series of Styrofoam™ blocks to fill the void, to fabricating several ribs and sheeting them, to buying a new wing were discussed. The foam-blocks option was eventually dismissed since it was felt that the difference in mass and thermal changes (hollow space vs. solid space) on such a large repair might affect the wing in hot summer temperatures.

A close look at the surviving piece of leading edge breakage showed that the wing skins were approximately 3/32 inch thick and composed of an inner-layer of fiberglass, the intermediate "strength" layer of "Airex"-type foam and an outer fiberglass/gel coat layer that were joined at the middle of the leading edge with a strip of balsa and a

bead of what appeared to be Hysol 9462. This made me think "simple," so away we go.



Close examination of the full length spar and end-plate showed them in good shape, so the edges of crushed and broken skin were trimmed to straight edges.



Since the other wing was not damaged, 3/32 inch balsa sheet was soaked with an ammonia/alcohol mix, wrapped around the leading edge, and allowed to dry. Four sheets were needed, with two each for the bottom and top. When they were dry and formed, the first layer (cut longer than the patch and deep enough to butt up to the spar), were epoxied into place.



When the inner-layer was cured, the outer skin-pieces were trimmed to the smooth and straight-edges of the break, and also epoxied into place using a thick layer of epoxy mixed with micro-balloons, to ensure all voids between the existing structure and the repaired structure were solidly joined.



Composite Wing Repair (cont'd)

Greg Moore

In this photo, it can be seen that both the top and bottom skins fit smoothly and well with the existing wing, and that the junction of the skins is offset to the bottom allowing a smooth continuation of the leading edge contour thanks to the molded balsa.



The joined balsa-wing skin-edges need to be sanded and filled with a light weight "Bondo" (I used Bondo's "Ultimate" material), the skin lightly sanded to give some "tooth" to the resin and a glass-layer applied for finishing. In this case, since my strength comes from the oversized inner layer of balsa sandwiched to the skins, a single layer of finishing glass is all that is needed.



The tip tanks now needed to be repaired, and since they are made of fiberglass, bits could be patched together with tape and CyA to create parts, which could then be fit together. Since both the front and rear extensions were broken off, and needed to be strong since the airplane is frequently picked up by the tips, the front "part" was tacked into place with CyA, then strips of 6-ounce fiberglass were placed from the rear, to wrap around the circumference of the tank creating a strong structure within a structure.



The aft portion of the broken tank now needed to be attached - but since access to the inside would not be possible after the edges were joined, strips of 1/32-inch plywood were soaked and formed to the inside curvature of the tank, then epoxied in place.



Now, the broken piece could be slid into place and secured with epoxy as well.



Following the usual feathering and filling, a layer of Plasticoat T-237 (lacquer based) white primer (which was almost a perfect color match with the underlying white gel coat) was sprayed and sanded, which allowed for a lightweight and easily-matched layer of yellow-base paint and a gloss clear coat to be applied.



This repair continues to be secure and work, since it is now almost 6 years old - and the airplane continues to be flown every chance I get.



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