Newsletter of the Jet Pilot's Organization

Contrails

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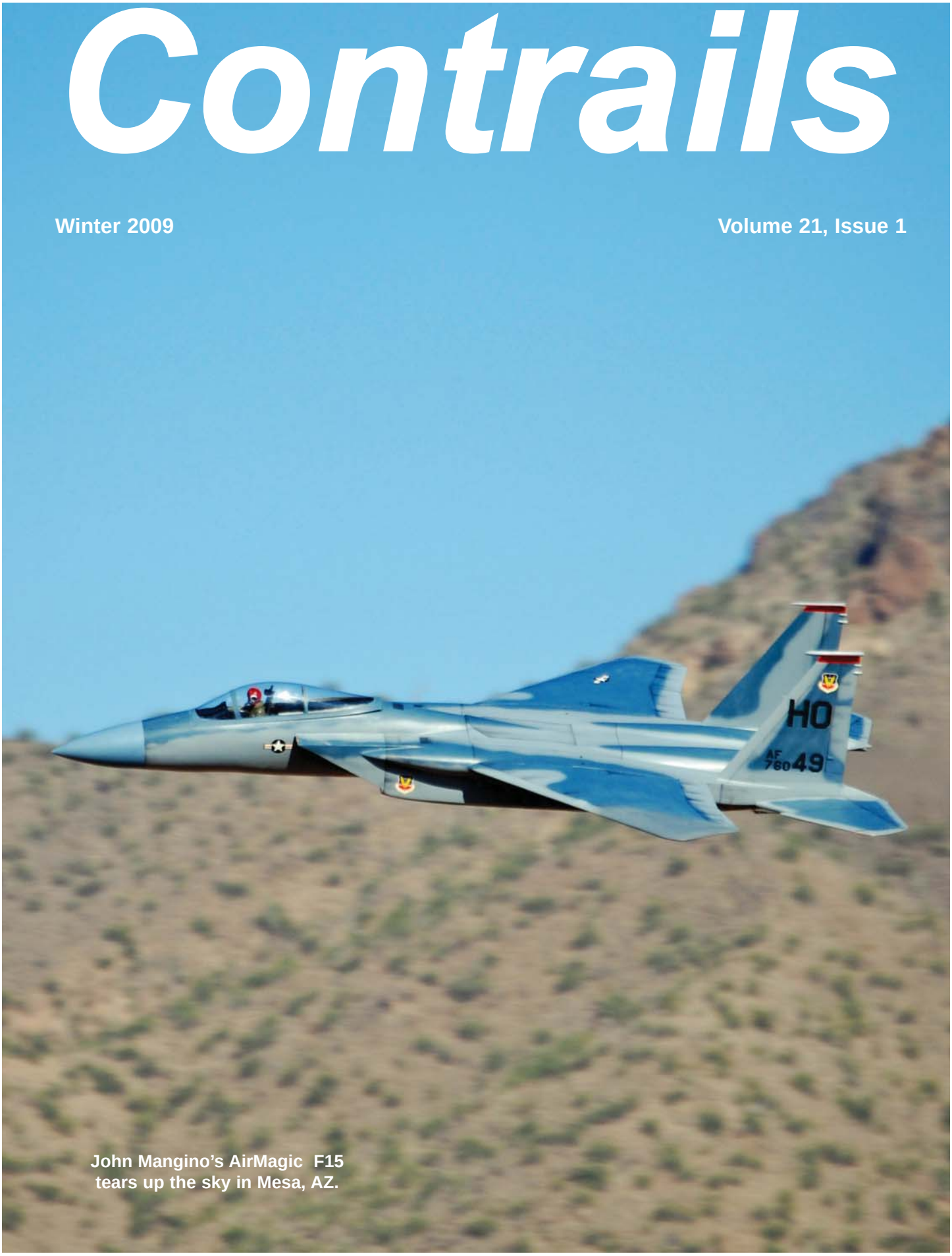


John Mangino's AirMagic F15 tears up the sky in Mesa, AZ.

President's Report — Keith Sievers

In the last issue of *Contrails*, I mentioned that the JPO was going to focus in on a couple of key areas. The first is working with the AMA, in a number of areas, to advance the interests of ***our*** membership and jet pilots in general. The second is to gradually build out a comprehensive resource and reference library as an aid for many different aspects of the hobby.

As to the first mission: I am pleased to announce that the AMA Executive Committee has approved a number of changes to the Experimental Regulations, and the JPO was represented on the subcommittee that completed the review. A full text of the changes may be found on the JPO website under "Proposals," but here is a summary of the items that specifically impacted turbine pilots:

1) For turbine planes classified as *Experimental* (those whose wet weight exceeds 55 pounds), the old interim "dry" limit of 55 pounds has been removed. The regulation now simply reads "75 pounds wet." For example, if you were building a Mibo A10 carrying 12 pounds of fuel prior to the changes, the dry weight was limited to 55 pounds plus the 12 pounds of fuel for a total of 67 pounds. Under the new regulation, your A10 may now be as heavy as 63 pounds, plus the fuel weight of 12 pounds to be at the max weight of 75 pounds wet.

2) The thrust limitation for experimental aircraft has been increased to 1:1 wet. The old limitation was 45 pounds for a single and 50 pounds combined for a twin. Back to the A10 example, it would now be acceptable to install a pair of 37 pound thrust engines, where you were previously limited to 25 pounds. This provides a safety margin for engine out situations. If your aircraft carries an Experimental permit, you may now legally install a P200 turned up to 50 pounds of thrust.

3) If your airplane is built from a kit, and you meet or exceed the manufacturer's torque specifications for servos without altering the airframe, you no longer need to complete the paperwork computing torque per control surface. This change also allows you to bypass the Experimental rule requiring two servos on surfaces controlling yaw, pitch and roll, if not specified by the kit manufacturer.

The Experimental regulations will receive closer scrutiny this year, and perhaps we will be able to see additional beneficial changes; though much of this will depend upon the rulemaking activities of the FAA for small UAVs. I will have an update on the FAA initiative in the next issue of *Contrails*, as their findings are expected by the end of the first quarter.

To our second mission, building out technical knowledge, we are working on several things, to include:

1) We have updated the weight and balance section with new aircraft and a full set of instructions for precise W&B calculation on large aircraft. The method described uses inexpensive digital scales and an Excel spreadsheet to mimic how W&B is done on full-scale aircraft. The spreadsheets on the website will provide data for you to compare to your aircraft. Another nice feature is the "what if" capability that allows you to experiment with battery or other equipment location on the spreadsheet before doing the actual install. The calculations will also tell you precisely how much weight is need to achieve the target CG once the plane is completed. Give it a try!

2) The JPO is about to launch another initiative to capture JR12X data files for a variety of aircraft.

3) In coming months, we will begin building out reference material on electric jets.

4) Finally, there will be a series of introductory articles for pilots wishing to make the transition to turbines.

New JPO District Reps

The JPO board has recently appointed two new District Reps to fill open district positions not up for election this year (odd districts).

Craig Gottschang will be taking over District V, the southeastern states. Craig is a well-respected modeler and member of the Georgia Jets crew. He is probably most well known for his beautiful Mibo A10 and his white BVM F4, which have both graced many jet meets throughout the midwest and southeast. Craig has recently begun the transition to the 12X, and has

President's Report (cont'd) — Keith Sievers

contributed an article to this issue of *Contrails* on the subject.

Bob Brusa has also joined the JPO officers group, stepping up, and into, the rep position in District XI, the northwest. Al Watson was our rep in this district, but has offered to step up and run for the VP slot I vacated, so Bob is backfilling for Al. Bob has agreed to take on the challenge of building out the "beginners" section of the knowledge bank, and I look forward to getting to know him better.

The even districts are up for election and we have a number of experienced candidates on the ballot that may be found in this issue of *Contrails*. They represent a much broader range of technical capabilities than we have had on the board in the past, but all share a common trait ... they have deep knowledge in their particular areas of expertise. I am excited about this group of folks and believe they are the right people to continue to move our JPO mission forwards.

Project Updates

I have continued to fly a couple of BVM aircraft, at opposite ends of the spectrum (*BobCat* and *Ultra Bandit*), putting an extensive number of flights on each over the last few months. The *BobCat* with its Jet Central *Rabbit* and the *Ultra Bandit* with the JetCat P180 are both a ton of fun to fly and continue to deliver a lot of performance with very low maintenance.

My principal construction project has been the Fei Bao SU-27, twin prototype, that I have built and test flown for the factory. The kit is a very legal twin ... with two *Rabbits,* dry weight is 38 pounds and fully fueled it tips the scales at just over 48 pounds. The Rabbits put out a combined thrust of 38 pounds, so the plane has a very comfortable 1:1 thrust to weight ratio. As this article is being written, I am working with the factory on a number of suggested changes for the kit, and am looking forward to seeing the upgraded model roll off the production line.

Last, but not least, I have been working with Dean, of Jersey Modeler fame (a heck of a nice guy and long time JPO supporter), on a new fueler concept. I buy Jet A from the airport, 15 gallons at a time, using three 5 gallon racing fuel jugs to transport the fuel in the trailer. I have been a JM fan for a while, but was growing tired of transferring fuel from the jugs to the JM container. I approached Dean with a suggestion that would allow me to move the pump from jug to jug in under a minute, and he responded quickly with a prototype. We experimented with a couple of different configurations, and settled on the product shown in the picture. I now add oil to the jugs just before my trip to the airport for fuel, and with the new JM pump accessory, getting new fuel on line is an easy process. This would work for smoke fluid as well, so give Dean a call if you are interested ... I'm sure he will make one up for you.

Please don't forget to renew your JPO membership for 2009, and fly safe this year!

Keith

Vice Presidents Report — Al Watson

MOVING ON

As Keith mentioned in the last issue of *Contrails,* we have several openings this year for District Reps in addition to the office of Vice President. I received a call from Keith asking me if I would be willing to run for the V.P. position, and after some consideration, I decided to accept the nomination and have recruited Bob Brusa to complete the remainder of my District XI term, which runs through the end of 2009. Bob is a C.D., AMA Leader member, and is one of the group that regularly flies turbines with us at Whidbey. He will do an excellent job representing District XI.

I am excited about the direction that the JPO is heading. Our goals have been clearly defined and we have new people representing some of the districts which will bring fresh ideas to the table. As a Special Interest Group, it is extremely important that we have a good rapport with the AMA. That relationship has been strengthened, and I feel that we are in a good position to represent the jet community. If you are reading this issue of *Contrails,* you are probably a JPO member already, so I would ask you to talk with your jet friends who are not members, and suggest that they consider joining the ranks. The more members we have, the better off we will be. As the saying goes: "There is strength in numbers"!

ORGANIZING AT THE GRASS ROOTS LEVEL

I have been a member of the Whidbey Island Radio Control Society (WIRCS) for many years. The club flies on the U.S. Navy Outlying Field (OLF) at Coupeville, WA and is blessed with a site that is second-to-none when it comes to flying turbine-powered models. As a consequence, WIRCS has become the club of choice for turbine flyers in the western part of WA. As more and more turbines started showing up, it became apparent that some organization needed to happen in order to ensure that the turbine members were doing their part to protect this valuable asset.

The first action that we took, was to build a roster containing all the turbine members. Information such as AMA number, waiver number, C.D. status (yes or no), e-mail address, home/cell phone number, WIRCS member status, and channels used was included. General information such as the OLF weather phone number and lock combination for the container holding the water extinguishers was added, as was the name, e-mail address, and phone number for the Club President and the District XI JPO Representative. Also, we prepared a set of Turbine Specific Rules for OLF, which were approved by the club's officers. The roster is kept up-to-date as changes are required and the rules are reviewed periodically.

A review of the completed roster revealed some interesting results. There are 18 turbine pilots on the roster and the club had a total membership of 123 in 2008. Of the 18 pilots, 17 have their waivers and one is in training. One of the most interesting facts is that eight of those guys are C.D.s and several are AMA Leader Members!

There are some clear benefits of being organized as a Special Interest Group within the Club. For the turbine flyers, the roster provides an easy means to communicate - most of us have a group e-mail set up on our computers, so with a single click of the mouse a message can be sent to all 18 guys. If I am planning to fly next week, I will inform the group and usually I will have three or four flyers join me. Also, it is a great way to get information or help. From the club's standpoint, they have a fast and easy way to get information to the turbine group if the need arises. Also, the roster provides the club with the current status of all turbine flyers. This level of organization has defined us as a responsible, cohesive group who understand and obey the rules.

Our unwritten code of ethics is that when other fliers are present, we make sure that they are able to fly with no turbines in the air to bother or distract them. In addition, we are always available to help, provide advice, or explain the intricacies of our models. This system is working well, and the WIRCS membership gets along as one big happy family.

That is all for now. Happy landings in 2009.

Al

District I Report

Bob Radford

Connecticut
Maine
Massachusetts
New Hampshire
Rhode Island
Vermont

Congratulations to Bob Michaud, who received his turbine waiver at the Hamburg Jet Rally in October!

With Spring just around the corner, it is time to make sure your equipment and aircraft are ready to go for the upcoming 2009 season. So far, I expect that we will have the New England Jet Rally and the Maine Jet Rally, as well as jet flying opportunities at Gardner airport throughout the season.

This month I will begin a series on aircraft repair. The subject aircraft is a BVM *KingCat,* that suffered damage a few years back at the Green Mountain Jet Rally. When we arrived at the crash site, just off of a country road that parallels the runway, we found that the nose cone had separated from the fuselage and was in good shape, but the top of the fuselage had been ripped off forward of the cockpit, at and just below the joining seam, and the right wing root leading edge was pushed in. The wings had some holes and leading edge breaks and the booms had some cracks. Although the pilot, and the owner, thought the airframe was a complete write-off, we picked up all the pieces we could find and did not tear any pieces apart. The airframe then sat off to the side for about a year and a half, since the pilot who had purchased the aircraft following its crash didn't have the time to fix it. He had taped the fuselage pieces together and had it hanging on his shop wall. Eventually, I asked him when he was going to repair it, and he said that it would probably be a while. As I had recently completed a couple of *BobCat* fuselage repairs, and he paints my jets for me, I offered to see what I could do with the fuselage; so into my car it went, and I now had a rebuild to do. I also have the wings and booms, but this segment will concentrate on the composite fuselage repair.

The most important part of accomplishing a successful rebuild begins at the crash site! You MUST:

1) Gather ALL the pieces. Take your time and find them, then put the small ones in a bag so you don't lose them.

2) Put your emotions aside, if you can, and not do any further damage by ripping pieces or stomping on parts. Yes you will feel bad, and may not want to even look at the aircraft for months.

If you do these steps at the crash site, or when you get it back to the pits, you will increase your chances of a successful rebuild with the least amount of fabrication.

Items typically needed for composite component repair are:

1) Thin CA for joining pieces together and repairing cracks.

2) Epoxy for laminating fiberglass cloth, to reinforce parts, and to fabricate parts. I use West Systems epoxy with a 1-hour working time.

3) Hysol 9462 or Aeropoxy

4) Fiberglass cloth in 5-ounce, 4-ounce and 2-ounce weights, and carbon fiber tape

Typical Tools that are needed are:

1) A heat gun which is used to soften the broken fiberglass before joining them together with CA.

2) A razor blade/knife which is used to scrape CA off outside seams (some modelers also trim the fibers off the edges of broken pieces before fitting them together).

3) Sandpaper for sanding parts prior to laminating and smoothing seams.

4) Scissors for cutting the fiberglass cloth.

5) A flat piece of plate glass to create flat sheets of fiberglass.

6) Clear packing tape to hold pieces together and back CA seams to prevent resin seepage when reinforcing the inside of the repair with cloth and resin

7) A Dremel tool with sanding drum is used to grind off any old glue and to lightly sand outside seams so the finishing filler will be even with the gel coat or adjacent part.

8) A roll of toilet paper to wick excess resin.

9) Paint brushes, acid brushes and mini rollers for applying Resin.

10) Straight Edges for aligning parts

KingCat Fuselage Rebuild:

General steps:

1) Inventory the pieces and determine what is missing by dry fitting them together like a puzzle. Tape

District I Report (cont'd) Bob Radford

may be required to hold some parts together.

2) Look at the damage and determine in what order you will need to permanently rejoin the pieces. I usually work from the undamaged area to the damaged areas so I can maintain alignment. You may have to join smaller pieces together to create a larger repaired section before joining it to yet another large section.

3) When fitting broken pieces together, it is sometimes necessary to use a heat gun to soften and fit the pieces to be joined. Apply thin CA to the joint and then apply kicker as necessary. If the pieces are not as smooth as you would like, you can use the heat gun after the CA sets, to heat the part and shape the fiberglass and seam to your liking. CAUTION: the pieces will be very hot, so use a glove to keep from burning your hands. I have also used a screwdriver shaft or other tool to depress and shape the hot fiberglass.

4) Once the larger pieces are joined, you can begin reinforcing with fiberglass and resin. The aircraft should now have most of its original shape, but without reinforcement, will most likely not be strong enough to withstand flight loads.

5) Apply either clear packing tape or scotch tape to the outside of all seams. This will prevent epoxy from running down the joint on the outside of the aircraft when you apply the reinforcing fiberglass and resin to the inside of the fuselage.

6) If you have missing pieces, you need to apply packing tape tightly across the opening, while maintaining the contour of the fuselage. Depending on the situation, I sometimes cut fiberglass to shape and put it in the opening against the tape, and then laminate over it with the larger reinforcing piece, on the inside of the fuselage. If you have holes, you can fill them with Epoxy injected though the tape with a needle and syringe.

7) Sand the inside of the fuselage where you will be applying the reinforcement. Now apply fiberglass cloth and resin to the inside of the fuselage. Wick away any excess with toilet paper, and allow it to cure. If more than one layer is required, place the second layer on a different bias from the first to give additional multi-directional strength.

8) Remove the tape, sand the seams and fill the imperfections in preparation for painting.

Okay, enough theory, now some photos of the process:

Broken upper Fuselage with missing flange pieces, the flange pieces were repaired with a cured, flat fiberglass and epoxy layup fabricated on a glass shelf, and cut into strips used as a backing for additional cloth and resin buildup.

Fuselage damage. Note missing carbon fiber in front of nose wheel opening

District I Report (cont'd) Bob Radford

Side View of damage

Damage and analyzing the fit

Repaired fuselage and carbon fiber fwd of nose gear using packing tape and a carbon fiber /epoxy resin layup.

Repaired left fuselage side, note in-aircraft fabrication of missing piece (gray area) in the photo above.

Repaired right fuselage side ready for sanding.

I hope that this small article was informative, and good luck in all your repairs.

Please feel free to contact me to discuss ideas you may have or assistance you might need in this exciting world of jets. Contributions of pictures, ideas or material for Contrails would also be appreciated.

See you around the circuit

Bob

District II Report

Art Arro

New Jersey
New York
Europe

District II is in the throes of a northeast winter with limited opportunities for jet flying, so this is our building and maintenance season, with many projects both large and small. It is also a prime time to perform major airframe inspections, and have your radio systems and turbines serviced, as many of those minor glitches and problems can be best, and most easily resolved during the winter non-flying season.

For example, I tracked down and fixed a pesky fuel leak in my turbine sport jet. This was a minor weep that appeared from a drain hole *only* during re-fueling. All the fuel lines were secure and safety wired, and the filters and fuel pump were satisfactory. Also, there were no air bubbles in my airtrap even after a long flight and subsequent turbine cool-down. I tore into the model and finally determined that the cause of the weeping leak was a slightly loose fuel tank stopper on the ventral/belly tank of this jet.

The rubber stopper is compressed by the fuel tank cap and internal washer, ie: a standard Sullivan setup. Sullivan uses a Phillips-head sheet-metal screw to compress the stopper, and if the screw can't be tightened enough, then a leak occurs. In my case, the leak only appeared during refueling as this was the first tank to fill, and the other tanks, plumbed in series downstream, provided enough flow resistance and increased pressure to cause the leak. The fix was to substitute a hex head/Allen screw to fully compress the stopper, and fuel the jet in several stages allowing the pressure buildup to dissipate through the other tanks and plumbing. I might add that I use large diameter Tygon and 5/32 brass tubing on each tank. The fuel tank cap was also sealed with Seal-All, an automotive product that is resistant to Jet A/Kero.

I continued the airframe inspection, concentrating on the landing gear, control linkages and radio installation including batteries. Both ECU and receiver batteries were cycled and found to be in good shape; also, the turbine was recently serviced by RTI and was in good running order. The recent run history was reviewed from the ECU and the EGT and spool-down values were both A-OK. This sport jet is now ready for flying.

I also repaired my little Alfa MiG edf, which crashed on takeoff. A bit of foam-safe CA and epoxy put this jet back together again, although it is now a bit battle scarred. I have a high-end edf to build along with the repair of a scale turbine jet, and both projects should keep me very busy this winter ... I'd like to hear what projects you are working on.

JPO elections are forthcoming and I've been asked to run for the District II Rep position again. The organization is undergoing several changes, all for the good, and I trust that my experience will help in this. Keith has assembled an excellent team to bring these changes about, and we look forward to your support. We also look forward to your vote and support in this important election.

Here in District II, the CG of jet activity is in the southern region, centered about the NYC Metro area. To represent these jet pilots, I plan to appoint an Associate District II VP to better serve this area. I have been approached by a prospective candidate and feel that he will provide a strong voice about the jet activities in the southern portion of our district. However, if you are at all interested in this AVP position, kindly contact me directly. I look forward to hearing from you. My contact information is on the last page of this newsletter. Best wishes and good building/flying for '09 and beyond.

Art

Batteries for R/C Jets

by Art ARRO

Batteries are an important component in R/C jets due to the critical requirements of turbine starting, running, cool down and the radio control functions. Most jets utilize multiple servos, many of which are digital with coreless motors. Also, the receiver's performance is tied to the voltage level, and any dips or brownouts may result in a failsafe event, or loss of the radio link.

This article aims to describe the various battery types and their application in our R/C jets. Personal preferences in the selection, maintenance and charging of R/C batteries is also discussed. Finally, I have

District II Report (cont'd) Art Arro

included several useful websites for further information on these subjects.

I'll start with a bit of history and science to begin this article. The first known batteries were discovered in Sumerian ruins dating back to the year 25 BC, near Baghdad, Iraq. A clay jar with a copper cylinder was found to produce about 1.1 volts when filled with an electrolytic solution of vinegar or even grape juice. This reaction produces an electrochemical reaction with both a voltage and current flow. During the 1800's, Alessandro Volta, using discs of copper and zinc in a glass tube filled with a suitable electrolyte, made a battery. These batteries were used to electroplate objects, mostly jewelry, and for scientific experiments.

Basically, a battery consists of two dissimilar conductive materials (the electrodes), separated and immersed in a suitable electrolyte. Differences in the electrodes and electrolyte produce different voltage outputs and capacities. The batteries may be *primary*, as in the case of carbon-zinc with an ammonium hydroxide electrolyte packaged in a cylindrical shape, which is the common, non-rechargeable flashlight battery. *Secondary* batteries can be recharged, with the most common being lead-acid (PbS) batteries, which are used to start and maintain our automobiles.

For R/C use, nickel-cadmium cells are the most popular, due to their ruggedness and ability to deliver high current values at a wide range of operating temperatures. The downside of nickel-cadmium is the environmental problem caused by the disposal of their heavy metals, notably cadmium. Nickel-metal-hydride (NiMH) chemistry is now replacing the standard NiCads that were in near universal use for R/C applications.

Recently, the demand for portable laptop computers, cell phones and cordless tools has resulted in the development of more modern battery types, such as: Lithium-Polymer (LiPO), Lithium-Ion (LiIon) and Lithium-Nano-Phosphate (LiNP). Several of these battery types have excellent applicability for R/C in general and jets in particular, though they also require special charging and handling procedures to prevent fire and/or injury. These battery types and procedures will be discussed in this article.

NiCads have been around for decades and they have a good history of reliability in R/C applications. These are generally sealed cells of various sizes denoted by alphabet letters: AA, A, sub-C, C, D and F sizes. The capacity, or electrical energy output, is a function of the internal construction of each cell. An AA-sized cell may have a capacity (C) ranging from 500 to 1600 milliampere hours (maH) depending on its plate construction and separator thickness. The cell impedance, or resistance to electrical flow, varies with capacity.

That is, a high capacity AA-size NiCad will generally have a high internal resistance and may not be able to deliver the high currents demanded by multiple coreless-digital servos. What happens is that their voltage output becomes depressed, which may result in a receiver failsafe or brownout condition. The solution is to use larger capacity batteries, with lower impedance for airborne applications.

Another solution is to use a dedicated battery for the receiver power and a separate low impedance battery for operating the servos. There are several devices on the market (power boxes and power backers) that do just that, but they add cost and complexity to the airborne installation. On the other hand, the current demand of most R/C transmitters is relatively low and constant, so high impedance and capacity NiCads can be used in this application to extend their run time.

NiCads, and their NiMh cousins, can be charged using the C/10 chargers (wall warts) that come with the R/C system. A problem develops when high capacity batteries are used, and these chargers are unable to charge the batteries, or the charge process takes an inordinately long time - measured in days. A high output variable rate charger is the answer and various suppliers offer them to the modeler.

I've had good results with the Dual Metered Vari-Charger and Heavy Duty Vari-Charger HD-500 sold by Ace R/C, and there are newer versions of these chargers available from Hobbico and Ace R/C. Just set the charge rate at 1/10 the rated battery capacity, ie: 140 ma for the 1400 maH battery typically used in R/C jets (which is the minimum capacity that I recommend). The charge time for a totally depleted battery is 14-16 hours at this rate.

District II Report (cont'd) Art Arro

Please note that these chargers are a constant current type, which provides a steady current during the entire charge process.

NiCads and NiMh batteries can also be fast charged at a 3C rate (or 3 X 1400 ma = 4.2 amperes), which is about the limit for standard R/C connectors and charge receptacles. This type of charger should have peak detection circuitry to sense when the battery is fully charged, and taper back the charge rate or cut it off entirely.

NiMh batteries exhibit a softer peak than many fast chargers can detect, resulting in excessive heat and pressure, followed by safety venting of the battery. This venting of electrolyte is a safety hazard and also shortens the overall life of the battery. I do not fast charge NiMh batteries and limit my charge rate to 1C or less with NiCads. This yields the longest cycle, and calendar-life of these batteries.

The initial charge cycle of NiCad and NiMh batteries should be at the C/10 rate to "form" the chemistry within the battery. I form-charge and discharge every battery several times before installation in my jets to ensure reliability. The discharge rates are set at 500mA or 0.5A to simulate the high load that can be experienced in a typical R/C jet, and I record the initial discharge capacities on an Avery-type sticky label attached to the battery pack, though some battery suppliers offer a log sheet to record this information for future use.

The best method of determining when NiCad or NiMH batteries are fully charged is to measure their temperature, since after the charge state reaches 100%, additional current only serves to raise the battery temperature. It should feel warm, not hot, to the touch. Some chargers even employ a temperature probe and reduce the charge rate when it senses this rise in temperature. I personally don't feel the need for trickle-charging NiCads or NiMH batteries.

The newer LiPo, LiIon or LiNP batteries are also suitable for R/C jet applications due to their low impedance for high current draw, long charge retention and relatively light weight. However, their charging process and the use of these batteries require different procedures. LiPos have a narrow operating voltage range where severe over-charging, or severe over-discharging, can result in a fire or conflagration.

Their charging technique uses a constant current/ constant voltage method, which requires a special charger. The charge current is at the C-rate up to certain voltage and is then reduced to maintain a critical voltage until the current drops to zero. Because of their sensitivity to over-voltage, for maximum longevity of the pack, and longer discharge times at the correct voltage, LiPo batteries require that each individual cell be balanced in voltage to the other cells in the battery pack. During the charge process, if one cell is lagging in charge, then the overall pack voltage will be low and the sensing point for switchover to the constant current mode will be affected. The charger will continue charging, looking for that point and drive the already charged cells into heat, venting and possible fire.

The safest chargers for lithium-based battery chemistries charge through the balancing plug to equalize the charge across all cells in the battery. It is possible to use a simple balancer, such as the Astro *Blinky*, to balance lithium batteries prior to use and during charging. If the *Blinky* or similar balancer indicates an imbalance condition, then the LiPo should be slow charged at the C/10 rate; or 210 mA for a 2100 MaH LiPo battery.

Lithium batteries should not be depleted to more than 80% of their rated capacity for the best performance and cycle life. The best way of checking this is to discharge the battery at some known rate and recharge it, noting the number of maH to fully charge it. For example, a 2100 MaH pack could be discharged at some safe level, and if the charge amount is 1680 maH, this then equates to 80%, which is an acceptable value.

LiPo batteries also like a short break-in, where the first discharge is about 50% of capacity, or, about 1050 maH for the 2100 maH battery under discussion, and increasing the depletion by 10% increments until you reach the 80% level for maximum performance and cycle life. This procedure is primarily of concern to edf pilots with an expensive set of LiPo batteries to care for.

Battery temperature is another parameter with which to judge how hard you've used your LiPos. A

District II Report (cont'd) — Art Arro

comfortable level is 125-degrees-F with a maximum temp of 140-degrees-F measured immediately after a flight or discharge cycle. Please note that the greatest temperature rise occurs in the last few percent of available capacity.

Another factor with lithium chemistry is that the charge voltage is 4.235 V per cell, and a fully charged 2S, as in series, battery yields over 8.4 volts which is hard on the servos, gyros and gear sequencers used in most R/C jets. A voltage regulator can be used to reduce this voltage to a safe operating level of between 5.0-5.9 volts. Again, these regulators add complexity and cost to the radio installation, and they may also have a maximum wattage dissipation in order to prevent thermal runaway and shutdown.

I don't use LiPos for receiver or servo power. However, those with kero-start turbines may require them as ECU batteries due to the high current draw of the fuel igniters. *(Editor's note: Those of us flying smaller airframes do find them very useful due to their lighter weight.)* Check with your turbine manufacturer to see if LiPos and/or LiIons can be used for ECU batteries, and if the ECU requires an upgrade for these battery types.

LiIon and LiNp batteries are somewhat safer, as they have a metal shell with safety vents. These batteries also require the constant voltage/constant current charging method, but at different voltage/ current transition levels.

For long-term storage, LiPo and LiIon batteries should be stored at 50% capacity in a cool place. Do not freeze this chemistry, but 40-degrees-F is acceptable. Be sure to bring them up to room temperature before use or charging.

The latest technology is lithium nano phosphate (LiNP), which is also known as A123 or M1, and these appear to have the greatest applicability to our R/C and turbine ECU systems.

Their nominal voltage is 3.3 volts per cell, so a 2S battery yields 6.6 volts, which is about the same as a 5-cell NiCad or NiMh battery. These batteries have long charge retention, measured in months, with a high (up to 30A) discharge current and are very safe, due to their construction. Their downside is a limited cell size, but they can be mated together in series and parallel arrangement for most R/C applications. I've heard of good results with A123 batteries and will equip my scale and sport jets with these batteries for the coming season.

For chargers, I've already mentioned the ACE DMVC and HD-500 for NiCad and NiMh charging and I'm satisfied with the Multiplex LN-5014 Digital Charger/ Cycler for my low-end LiPo batteries. This charger operates off 12V-DC for field use, and measures the MaH used to peak the batteries. It does not have a balancing feature, so I use the Astro *Blinky* for this purpose with my LiPos.

For large LiPo pack charging, up to 10S, I have a TME *Extrema* with all their balancers and attachments. The *Extrema* is a dedicated Lithium charger, and I've had it upgraded for free, to handle the new A123 batteries. Most recently, I've bought the FMA Cellpro balancing charger for dedicated A123 batteries-up to 4S. The Cellpro handles LiPo, LiMn and LiION chemistries as well; it is an auto-type charger for ease of field use.

I've had the best results and battery life by purchasing my batteries from reputable sources such as Hangtimes Hobbies (NoBS Batteries) and SR Batteries. Batteries purchased in hobby shops exhibit low shelf life, as they have been sitting for some time after manufacture and distribution, so I have my receiver and ECU batteries custom-made to my requirements. The receiver batteries all have dual leads, which are connected to two JR Deluxe Heavy Duty Switches, and inserted into two open ports on the receiver. I try to avoid voltage regulators, power boxes, etc., whenever possible.

I perform voltage checks after charging and before every flight using an Ace Voltmaster II at the 500 mA setting. I check the no-load voltage initially, then apply the 500 mA load for about 10 seconds, and assess the bounce back to a resting voltage. If everything is fine, then I fly. Otherwise, I'll quick charge and check again. I do not fast charge my transmitter batteries, but always carry a spare, fully-charged battery in my transmitter carrying case.

Concluded on Page 17

District III Report

Mark Mccracken

Ohio
Pennsylvania
West Virginia

By the time this issue of *Contrails* gets into your hands, the holidays will have come and gone, and a new year will have started. My new project, a *Boomerang XL,* will be powered with a JetCat P-120. My last project, the newly-designed *Facet 1700RG,* sits awaiting its next flight. In my last article, I wrote a little about the *1700RG*, and now I can state that the performance of this little jet is amazing.

When Kerry Sterner asked me to finish the build, I never expected the *1700RG* to react as she did. After inspecting the *Facet* one last time and double-checking every nut and bolt, we set it on the taxiway and began the start-up of the P-80. After a few minor adjustments on the ground, I took a deep breath and added power. The *Facet,* with her nose pointed straight down the runway, accelerated and rotated in a very short distance. Once the wheels left the asphalt, I climbed to about 300 feet, adjusted two clicks of elevator trim and flew the pattern.

After two passes around the pattern, I retracted the gear and she flew great. She is very smooth on the sticks and very stable in any attitude she is given. Soon, I was coming up on time to land, so I lowered the gear, reduced power to just above idle, lowered the flaps and turned base to final. On final approach the *Facet* seems to slow to almost a crawl, then when the wheels touched the runway, she rolled about 100 feet before coming to a stop. The *Facet 1700RG* weighs about 16-pounds, and is powered with an 18-pound thrust turbine, so I never had the throttle at more than half stick. As for the *Facet 1700RG*, it builds and flies just like its siblings, the 1200 and 2300, but with retracts.

Over the years, I have attended many jet rallies. The first couple of years I would walk the row of jets, look at the different models and see how they were built to get ideas for my future projects. Well, years later, I still walk the row of jets but now I walk from tent to tent to catch up with friends I have made over the years. The stories and the jokes that are told could be written into a book. The best story I can remember is from a buddy of mine, Scott, telling me how he left the Fentress Jet Rally in Virginia one year, looking for a hotel, and did not realize he had crossed the state line into North Carolina many miles away. He still blames it on his wife for not telling him to put the antenna up on the GPS that weekend. He tells me next time he will just camp out, and maybe get a few games of Othello in....

Speaking of jet rallies, The Hamburg Jet Jamboree, hosted by the Farview Flyers has made the big time as jet rallies go. October, 2008 was a big year for the guys at Farview, with about 60 pilots, great weather and the Bob Violet Models factory team showing what grass field flying is all about. Located in the mountains of eastern PA, you can't ask for a better site.

Aerial view of the fantastic flying site.

Many spectators, who had never seen model aircraft before, were amazed as the talented pilots put on a show for their entertainment.

The putting-green smooth grass flying site.

District III Report (cont'd) — Mark Mccracken

Bob Violet lands his edf F86 as his *Ultra Bandit* waits its turn in the sky.

After the three days were over, awards were given to the following pilots:

Best in show - Bob Violet and his BVM-edf *Phantom*.
Best in scale - Kerry Sterner and his De Havilland *Vampire.*
Best Electric - Matt Fehling and his BVM *Electra*.
Best sport jet - Dustin Buescher and his BVM *Ultra Bandit*

I would like to welcome a few new members to the jet community who also took advantage of the great sale Patricia had on the *Boomerand XL's*. First to George Gayle, who is training with a *Baby Boomerang,* and should have his waiver any day now. Larry and I have been working with him the past few months, and as soon as the weather gives us a break, I am hoping to get out and give George his waiver test. Walter, who is our local hobby dealer has also made the leap to turbines with a *Boomerang XL*. For his first jet, his install workmanship is a work of art, and I am sure Dan is looking over Walter's shoulder watching every step he does in hopes of having a quality install in his *Boomerang XL*. So, in closing I would like to welcome George, Walter and Dan to the jet community!

Mark

Treasurer's Report

Beginning Balance - 9/30/08		***$12,066.54***
Income		
Membership Dues - Cash/Checks		$150.00
Membership Dues - Paypal		383.52
Bank Interest		24.37
November Expenses		
Summer *Contrails*	1384.99	
Conference Calls	125.69	
Website Expenses	111.90	
Postage & Supplies	23.43	
Ending Balance - 12/31/08		***$9418.90***
Savings Account		$8360.05
Checking Account		795.18
Paypal Account		263.67
Ending Balance - 12/31/08		***$9418.90***

Respectfully Submitted,

Susan M. Moore

District V Report

Craig Gottschang

Alabama
Florida
Georgia
Mississippi
Puerto Rico
South Carolina
Tennessee

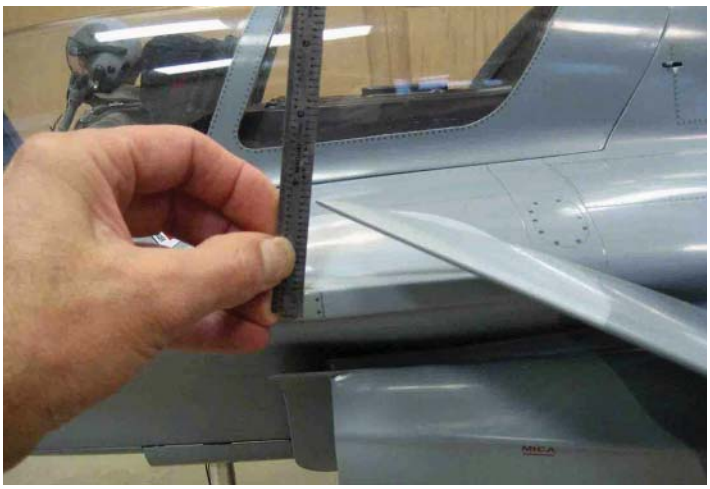
Greetings from your new District V rep! I'm honored to have been asked by Keith Sievers and the board to fill this position, and I share and support Keith's vision for the role of the JPO going forward. I appreciate the work and achievements of the previous JPO presidents, officers and reps, and I believe we are now well -positioned to have positive input and influence with the AMA regarding turbine rules and regulations. A key element to our future success is for a significant percentage of the jet community to belong to and support the JPO! To that end I am encouraging everyone in District V to become a member of JPO, and since most non-members will not be reading this article, for each of you to encourage your fellow jet modelers to join up! We are the official Special Interest Group to the AMA for jets, and as such, we are the best opportunity to make our voices heard and our concerns addressed.

By way of introduction, I am a long-time modeler and have been flying turbines for the last 10 years. I know a lot of the jet flyers in District V and hope to meet others at the 4 or 5 district events I plan to attend this year. I welcome comments or suggestions from everyone, so please call or email me if you have ideas on improvements for the jet community.

Florida Jets has come and gone, but Mississippi Afterburner and Jets Over the Swamp are right around the corner. I'll try to get some coverage of these events in the next edition of *Contrails*. In accordance with Keith's desire for the JPO to offer more technical information to assist jet flyers, I also plan to include articles on various jet topics in my quarterly *Contrails* report. I don't claim to be an expert in any particular area, but I do build and fly my own jets and have gained some knowledge and experience over the years that I'm willing to share.

Are you a 72mhz holdout? I was. No doubt cost is an issue for many of us, but also the prospect of switching to a new technology and having to reprogram our jets is also a major deterrent. Let's face it, it's a complicated process to get our jets set up just right, and who wants to take a perfectly good airplane and start over? I recently bit the bullet and started switching my JR10X equipped jets over to the 2.4GHz JR12X radio. Along the way, I gained some experience, and developed a sequence of events that, at least to me, makes some sense and the process manageable. I have written a complete article on switching from the JR 10X to the JR 12X and it is available on the JPO website at: www.jetpilots.org in the Knowledge Bank, located in the Members section. It is not so much an article on how to program the 12X, but rather a practical guide for switching a jet already set up for the 10X to the 12X. The following is a short version of that article:

Start by recording all the settings from your 10X transmitter. Most of these values can later be entered into the 12X. Unfortunately, you can't just data-transfer the information, as the two transmitter programs are incompatible. Also, record all the physical throws of the control surfaces, and make a note of their exact neutral positions. Next, make parallel lists of the 10 channel assignments on your 10X and the 12 channels of the 12X. Once you decide how to take advantage of the extra two channels, record them all on the 12X list. Now is the time to decide what function to assign to each switch, knob and slider and what mixes you will need. It's best to have all this setup information decided and recorded before you start programming the new radio.



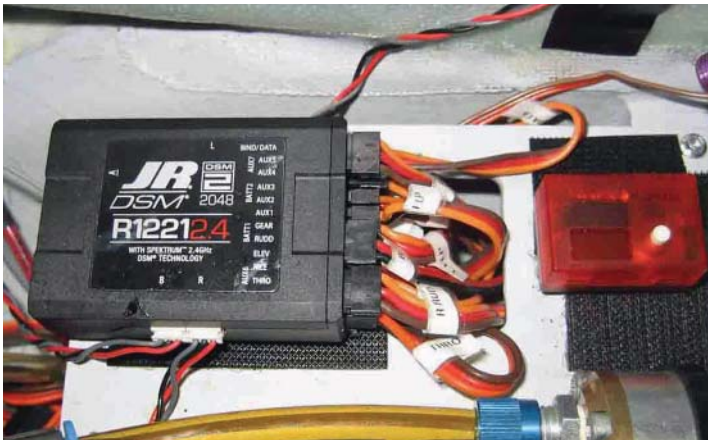
Measure and record throws and neutral positions for all control surfaces. Carefully check them again before first 12X flight.

Begin programming your 12X with the *System Menu*. Here you will enter the model name, wing type

District V Report (cont'd) Craig Gottschang

(and activate or inhibit the gear), flaps and all 7 aux channels in the *Device Select function*. This is also where you can assign channels to the various switches, knobs and sliders on the 12X transmitter. Move on to the *Function Mode* list, and using your recorded values, program the reverse switches, travel adjust, dual rate, expo, and sub trim values exactly as they were on your 10X. You will quickly get the hang of the 12X's displays, and the speed and versatility of the "rolling selector." Continue by programming your mixes with the values from your 10X. For new mixes, just get the appropriate channels programmed to each other and wait until later to set the direction and fine tune throws. Lastly, program your miscellaneous functions such as servo speeds, gyro-sensitivity and timers, once again starting with your 10X values.

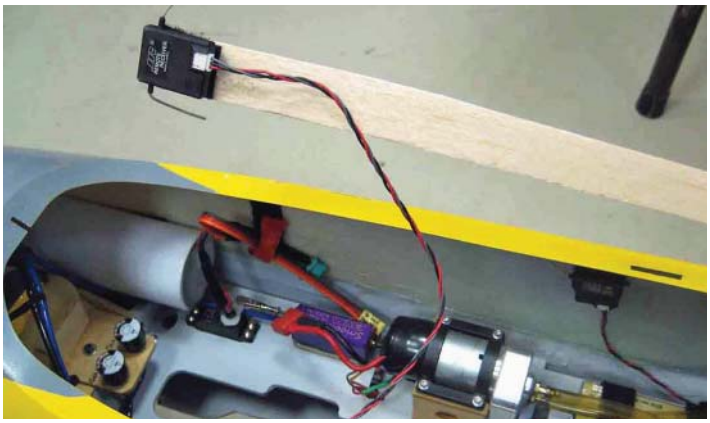
Now is the time to swap out your old receiver with the new R1221 or R1222. Many of the servo leads can be swapped one-for-one into their new locations, but since some will be different, I suggest labeling each lead as it is removed from the old receiver. Install your remote antennas, remembering to keep them as far apart as possible, and vary the horizontal and vertical orientations.



Same size 1221 Rx replaces old R955 perfectly. Note labels on servo leads and red Data Logger located to the right.

Follow the "bind" process in your 12X manual *exactly* and you will be able to begin testing your installation. For this, you will need to completely assemble and air up your jet, then physically check the neutral position and direction and throws for all control surfaces. Check the operation of landing gear, brakes, nose wheel steering, gyro and all other programmed channels, and adjust as necessary so everything functions correctly. Finally, program your throttle settings as necessary, for failsafe operation. This procedure varies with different turbine brands, but it is critically important that your failsafe setup will cause the engine to shut down within 2 seconds of loss of radio signal!

The final step before flying is to accomplish a range check following the procedure described in the 12X manual. A JR Data Logger is essential for this step, and the first few flights to confirm you have located your antennas properly and have a solid signal link.



Mounting longest lead remote antenna on balsa stick allows placement well forward in the nose area.

That's it! You are ready to fly. You might want to review your switch functions and mixes, particularly if any have changed from your previous setup. If you have followed the process carefully I think you will find that your first 12X flight will be very similar to your last one with the 10X.

For some additional general information on the 12X, receivers, batteries and installation; take a look at the "General Tips and Info" section at the end of the online version of this article.

Finally, for you JR users, there is a new and very informative website sponsored by Horizon and found at www.team-horizon.com. The site has a wealth of information on JR radio products including articles and an interactive forum with JR reps. Give it a try!

That's it for this issue. See you at the next jet event!

Craig

District XI Report

Bob Brusa

Alaska
Idaho
Montana
Oregon
Washington

As you can see from the above, there is a new Dist. XI rep. Al Watson, the previous rep, has taken over the position of Vice President. Al did a great job writing articles and showing pictures of events in our district, and I'm sure he will be a big asset to JPO as Vice President.

As for me, I have been an AMA member for 31 years. I have been a CD for over 20 years and am also a leader member and intro pilot instructor. I've been strictly a radio control flier, concentrating on pattern flying in my early years, and sport scale now that I am retired. I have been flying turbine-powered jets for the past three summers, with a little float flying thrown in once in awhile.

The Wenatchee Red Apple Flyers in Wenatchee, WA, have a new home. Shown are a few pictures of their beautiful new field. The first weekend in May is their Apple Blossom Festival, which is a fly-in open to any kind of model.

I would like to continue showcasing jet events in our district by publishing pictures and articles of the events. Any other jet-related information would also be welcome. Feel free to send me pictures, articles, event write-ups, and any other pertinent info you would like to see published in *Contrails* each quarter.

I would also like to invite anyone who is interested in contacting me to please do so. I can be reached at home at: 360-874-1517, or by e-mail at: bhaven2@earthlink.net.

Bob

Florida Jets: March 5-8, 2009
Lakeland-Linder Airport, Lakeland, FL
CD: Frank Tiano 863-607-6611
www.franktiano.com

Tucson Jet Rally: March 6-8, 2009
TIMPA Field, Tucson, AZ
www.tucsonwarbirds.com (Reg)
www.timpa.org (map)

California Jets: April 2-5, 2009
Bakersfield, CA
www.ca-jets.com

18th Annual Mississippi Afterburner Jet Rally:
April 30-May 2, 2009
John Bell Williams Airport
Raymond, MI (suburb of Jackson, MI)
www.mississippijets.com

Top Gun: May 6-10, 2009
Lakeland-Linder Airport, Lakeland, FL
CD: Frank Tiano 863-607-6611
www.franktiano.com

20th Central Texas Jet Rally: May 22-24, 2009
ARCA Club Field, Austin, TX
www.austinrc.org
CD: Ken White 512-352-2294

Mid-Atlantic Jet Rally: May 23-24, 2009
NALF Fentress; Chesapeake, VA
CD: Frank Rega 757-479-4905
frankflyboy1@cs.com

Love-Air R/C Club Jet Fun Fly: May 29-31, 2009
Drake Field, Loveland, CO
CD: Dan St. John (970-231-01252)

Central Plains Jet Rally: June 4-7, 2009
Wellington, KS
www.clearviewfield.com

Blue Grass Jet Jam: June 4-7, 2009
SKYMAC Club Field
Bowling Green, KY
www.skymacrc.com

3rd Annual Gateway Jet Rally: June 11-14, 2009
St. Louis, MO
www.gateway-jets.com

Mount Pleasant, TX Jet Rally: June 12-13, 2009
Mt. Pleasant, TX
CD: Gus Hudson
www.mtpleasantrc.com

Jets over the Heartland: June 20-2908, 2009
Winamac, IN

Jets over Kentucky: July 5-12,2009

Cincinnati Jets: July 24-26, 2009
Hook Field in Middletown, OH
CD: Gary Jefferson

Michigan Jets Annual Charity Event
Grosse Ile, MI
August 7-9, 2009
CD: Burt Eisenberg

Minnesota Jet Rally: August 13-16, 2009
Rushford, MN
CD: Dave Dennison
ddennison@yahoo.com

Windy City Jets: August 21-23, 2009
Fox Valley Aero Club Field
www.foxvalleyaero.com/

Jets over Whidbey: August 28-30, 2009
Whidbey Island, WA
www.jetsoverwhidbey.com
CDs: Al Watson and Bob Brusa

Route 66 Jets: September10-13, 2009
Litchfield, IL Municipal Airport
CDs: Roger Shipley and Jim Allen

Florida International Jet Rally
November 5-8,2009
Lake Wales Airport
Lake Wakes, FL
info@floridajetflyers.com
www.floridajetflyers.com

Batteries for RC Jets
(Cont'd from Page 11)

I cycle NiCad and NiMh batteries periodically during the flying season, usually, at monthly intervals. During our 5-6 month winter season, I cycle bi-monthly or at least 3 times before flying commences. These batteries are removed from the model and are stored in my cool workshop.

LiPos are stored at 50% of charge, and though I haven't had enough experience with the A123 batteries to "know," I've heard conflicting storage charge values at 50% and 100% for these batteries.

In closing, I've listed several websites for more information on R/C batteries, and I trust this article was useful in the selection and use batteries for your R/C jet applications.

www.rcbatteryclinic.com www.hangtimes.com,
www.electrodynam.com www.bvmjets.com.

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CANADA
Vacant

Membership / Renewal Application

Please add me to the JPO roster!

Name: _____AMA Number*: _____

Address: _____

City: _____ State: _____ Zip: _____

Email Address: _____

Home Phone: _____ Cell Phone: _____

*AMA membership required for U.S. Residents, JPO Annual Membership Fee is $25.
Send with check or money order made out to "The Jet Pilot's Organization" to:
Susan Moore, JPO Secretary/Treasurer, 790 Royal Crown Lane, Colorado Springs, CO 80906

Or renew online at:www.jetpilots.org

2009 Election Ballot

Must be received by March 1, 2009

Vice President ___ **Al Watson** ___ **Other** _____

Only vote for a representative in the district in which you live:

District II:	___ **Art Arro**	___ **Other** _____
District IV:	___ **Lee Reightler**	___ **Other** _____
District VI:	___ **Lance Campbell**	___ **Other** _____
District VIII:	___ **Ron Schwartzkopf**	___ **Other** _____
District X:	___ **David Reynolds**	___ **Other** _____

Members Name:_____ **Your District:** _____

Nomination to fill the vacancy in District VII or IX: _____

Please mail to: **Susan Moore, JPO Secretary/Treasurer**
790 Royal Crown Lane, Colorado Springs, CO 80906

Member Feedback: What are the issues that you desire to be addressed?: _____

Ron Long's Skymaster F4 taxi's back from another sorti.

JPO
JET PILOTS ORGANIZATION

Greg Moore
790 Royal Crown Lane
Colorado Springs, CO 80906