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PRESIDENT TO PRESIDENT

It's Up to Us

by Dave Brown, AMA President

By now most of you have seen the press articles about the Federal Aviation Administration (FAA) stepping in and stopping the California police units from using this new Mini Unmanned Aerial Vehicle (UAV).

Based upon the E-mail I have received, there seems to be much concern among modelers that this will result in our "right" to fly RC models being taken away. Right now, there is no indication that the FAA wants to curtail our "normal" RC model-airplane activity.

That noted, when one of these situations comes up where a device that looks like a model airplane is used in a "commercial" manner or activity, it brings attention to the fine line we must walk between our "normal" RC modeling activity and the type of activity that the government has an interest in controlling.

While the FAA's concern right now is commercial use of unmanned aircraft, other government agencies have an interest in activities that are "unusual" in the sense that they do not represent the mainstream sport/hobby of model aviation. Each of these situations which brings attention to these "unique" uses for RC devices seems to bring a new twist to the puzzle.

In the latest instance, the American Civil Liberties Union (ACLU) has questioned the use of these drones by the police to invade people's privacy. While these devices would have no more capability than a normal police helicopter, the assertion adds another complexity to the issue.

I suspect most of us have heard the old fables about the RC model equipped with a camera and flown over a nudist colony. It was a great tale and conjured up much imagination, but in today's world, such fables would have a negative effect on our "right" to continue enjoying our hobby.

It's a different world than it was 40 years ago. Technology has made many more things possible, and at the same time, society has become more sensitive to the issues that those capabilities bring to the forefront. The survival of our hobby will depend on our ability to walk the fine line between reason and capability in an ever-changing world.

The FAA's concern is the commercial application of this technology, but there are governmental and nongovernmental agencies with other areas of concern. Obviously, the homeland security people have their focus, as does the US Customs Service, the police, the military, and now the ACLU.

I'm sure there are many other agencies out there with concerns. Even the Environmental Protection Agency (EPA) and the US Fish & Wildlife Service have voiced some interest. It's a crazy world out there, and we need to be smart in how we conduct our activities in order to avoid the pitfalls that could put our sport/hobby in jeopardy.

I do not believe that the FAA has any intention to take over direct regulation of model airplane flying in this country, but they do have a job to do and they will do it. Part of that task seems to be regulating the commercial use of unmanned aircraft—including those that bear an uncanny resemblance to model airplanes.

How can we help ourselves avoid becoming involved in the FAA's regulatory net? It's actually fairly simple. We need to steer clear of doing anything that has the appearance of being a commercial activity.

I realize that some see using a model airplane to tow advertising banners as a neat opportunity to support their hobby, but that activity could put our sport/hobby in jeopardy. Equipping a model airplane with a camera, and taking aerial photographs may be fun, and may not be a problem if it doesn't raise any privacy-invasion issues, but the temptation to sell photographs made in this manner could bring about unwanted attention and possible regulation.

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TIPS FOR CLUBS

Don't do Dumb Stuff: A Discussion on Regulations and NAS

by Jay Mealy, Director of Programs

Winds of change are blowing in the direction of aviation and will rustle the leaves of the "aero tree" as we have come to know it. There may appear a modified flying environment once the dust settles and we should prepare ourselves now for such changes.

The possible changes are indefinable at the moment and there is no telling whether they will be major or minor, immediate or gradual, restrictive or negligible. None of these questions can be answered now except when asked, "…will there be changes?" The answer to that question is yes.

"Why?"

Because of the proliferation of Unmanned Aerial Vehicle (UAV) development, the federal government is being barraged with requests for space in the National Airspace System (NAS) in which UAV flights can take place, a daunting challenge, to say the least, but inevitable.

UAVs have been flying military missions successfully for years so it was a matter of time before that technology would end up in the civilian world, assigned tasks such as traffic surveillance, air-quality monitoring, communication, border patrol, or photography—the list goes on forever. The problem is that the NAS and Federal Aviation Regulations (FARs) were never structured for utilization by vehicles without human operators on board.

That may not sound like a big deal but take

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this into consideration: the air is full of all types of manned vehicles that fit into the system by following rules from simple to complex, depending on the purpose and nature of their flight.

Adherence to these rules and procedures is totally the responsibility of the pilot-in-command (PIC) who, in the current way of thinking, is occupying the best seat from which to conduct flight safely in the vehicle. Pilots of aircraft operating under visual flight rules (VFR) are operating among pilots operating under instrument flight rules (IFR) and everyone knows what everyone else is doing, and should be doing, in a comfortable operating environment.

Now suddenly along comes technology that removes the PIC from the vehicle, operating in the same space as all these manned vehicles, and questions start being asked regarding safety. How will that craft be able to see "us?" How will the vehicle communicate with others? What if a system fails? What if, how, and so on … You can see the potential volume of such questions and the concerns that must be addressed.

To make a long story short; regulations for the operation of UAVs are in the works.

Why should that concern us as modelers? Well, the most obvious reasons are the similarities between model aircraft and UAVs as seen by the public. This image could influence the rule-makers into including model aircraft in the UAV category, which in turn could make us susceptible to regulation created for the UAVs.

We don't want that to happen and that is why the Academy of Model Aeronautics is working diligently to represent our members and activity to the regulatory agencies.

We are fortunate that our long history—more than 70 years of self-regulation and self-policing—has established us as a responsible and effective organization with members who truly cherish their privilege to operate in the NAS and will work tirelessly at preserving that privilege.

Now to the point of all this rambling … As our sport evolves and our equipment and skills improve, we tend to become complacent. We become accustomed to going to the flying field and just letting it all hang out, have fun, and partake in all types of challenging flying—higher, faster, further. But we must be careful so as not to get too far over the edge.

Model airplanes are different from full-scale airplanes in many ways but one of the most important differences we must all be aware of is their social acceptance. There is no real need for model airplanes except as a hobby, no real purpose except as recreation. In most cases, the public perception is that "they are dangerous."

Full-scale aircraft "serve a purpose." They provide transportation of goods and people. When a full-scale aircraft crashes, the event is publicized as a tragedy and rightly so, but it is socially accepted as a necessary risk and we move on.

Models, on the other hand, involved in the same type of incident, are not so fortunate socially. God forbid a model should be the cause of injury—or worse, death. This is an event that may generate the same type headlines but the social response is much more negative and the image of model flying takes a giant minus image hit.

These types of incidents and this type of publicity at this time in our history are the kinds of things that can have devastating effects on our continued use of the NAS.

As stated previously, there are many unknowns ahead of us. The only resource the rule-makers have upon which to base their regulatory decisions is our history and image. We, as participants, have our image and history to get us through these challenging times and we must diligently protect that resource. Everyone must strive to operate as responsibly and safely as possible and every club member should be fully briefed on the negative impact that careless, reckless, negligent, irresponsible, immature behavior in flight operations can cause.

Don't do dumb stuff! ♦

ON THE SAFE SIDE

Children at Flying Sites

by Carl Maroney, Director of Special Services

While each club can regulate how it will operate and what, if any, rules concern children while at the field, we would like to offer some food for thought.

You have heard the saying "kids will be kids," but is it reasonable to let them run wild at the field? Of course not. Children should always be under adult supervision; the amount will depend on their age, maturity level, and the child's cooperation with authority. So let the kids come, but they should not be unruly.

Clubs that have a large number of families might find it valuable to have a designated playground area. It will be the club's responsibility to check periodically to see that play equipment is working properly. Look for any damage, sharp edges on surfaces and if there are any bolts, that they are secure. Replacing worn components is important.

Yes, having a playground does require some extra work but it is well worth it for all attendees to have a good time at the club site. And yes, the AMA Liability Insurance will cover any club negligence.

The National Recreation and Park Association offers these additional playground safety tips:

- Inspect the playground before play.
- Supervise children while they play.
- Make sure playgrounds are well maintained.
- Be sure children use playground equipment appropriate for their age.
- Be sure children use the playground equipment for its intended purpose only. Check that all elevated surfaces have chest-high guardrails. Watch for potential trip hazards such as rocks, tree stumps, and concrete footings.
- Be sure that all openings are less than three-and-one-half inches wide or greater than nine inches wide to prevent head entrapment.
- Check that each piece of equipment is surrounded by a minimum six-foot fall zone covered with an appropriate amount of resilient surfacing such as sand, pea gravel, or hardwood fiber/mulch.
- Report any problems.

Playgrounds provide an important social and physical environment for the development of children and burn up some of their energy. Since youth are the future of aeromodeling, does your club have an activity program for flight instruction for them? AMA has just made a major change to the Introductory Pilot Program available to AMA-chartered clubs. Why not take a look and implement a new effort toward interesting youngsters. ♦

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We need to be smart and avoid any activity which could bring about unwanted questions. If we do so, we should have no problem, and if we do become a challenged activity, we will have a track record to use as evidence in the ensuing battle(s) we might need to wage.

On the other hand, we can be foolish and invite those challenges by allowing those unusual activities to pick a fight in which we might not prevail since it will involve an adversary that is much more powerful than ourselves. It's up to us. Do we really want to pick that fight?

Sometimes the best battle you ever waged was the one you avoided.

Save that stamp!

If your club newsletter is sent to AMA electronically there is no need to send a hard copy. E-mail your newsletter to lhelms@modelaircraft.org

From the Hi Sky RC Club, Midland TX

Flexible Mounts for CD-ROM Motors

by Dennis Robbins

Many modelers these days are building and flying electric planes. This new movement in the RC world took a giant step forward when CD-ROM motors were removed from computers and rewound for model airplane use. This allows for a custom brushless motor that can supply plenty of power and costs very little to build.

I was a late comer, but soon saw the potential these little, home built motors have. They were perfect for my requirements, supplying the power necessary to hover a 4-5 oz. foam airplane.

One of the weaknesses I had to overcome was how to mount these motors to the airframe. The CD-ROM motor is usually constructed with a bearing tube, which extends from the back of the stator about 1-1½ inches. First, I mounted the motor by wrapping it in masking tape and gluing it directly to my model. The caused several problems: the motor could not be replaced easily and, if I had a less than desirable impact with the ground, usually the nose of the airplane suffered.

After many sessions of reattaching my motor and even having to rebuild the nose of the airplane, I was determined to come up with a better mounting method for my CD-ROM motor.

I needed a mounting method that was not permanent and would be forgiving during a crash. After discussing my problems with a fellow pilot, the following method for mounting a motor was suggested. What you will see in the photos is my adaptation of the idea for my personal use.

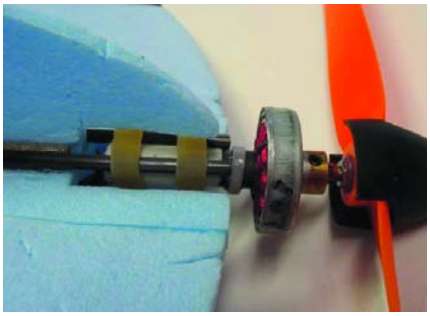
This is how it's done:

1) I glued two 5-inch pieces of 3mm carbon-fiber tubing underneath the wing, in the groove where the fuselage contacts the wing.

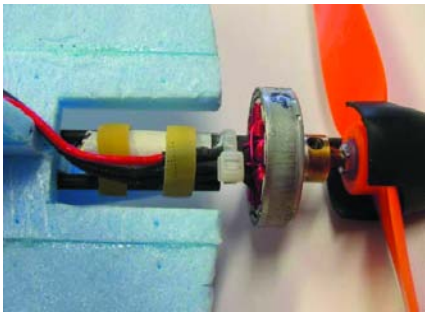
2) I cut Latex tubing—¼-inch inner diameter, 3/8-inch outer diameter—into bands.

3) Next I slid the bands onto the motor and over the carbon tubes (this is the most difficult part of the procedure).

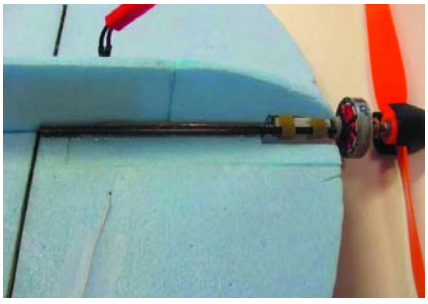
4) To complete the mount, a small balsa-or-hard wood block can be glued between the carbon tubes near the fuselage. This prevents the foam from crushing after the Latex bands are in place. ♦



Bottom view, Latex bands loop over motor and carbon tube.



Top view of motor.



Carbon tubing in proper placement.

From the Thermal Thumbers of Metro Atlanta, Atlanta GA

Free Flighters: Use Hair Spray as Cheap Lacquer

by David Miller

Modelers are always on the lookout for mainstream products with FF applications. Here's one worth passing along.

Go to your nearest discount store and buy a big can of Aquanet hair spray. It won't cost much, and there's nothing like it for preparing a balsa surface for Mylar, tissue, or paint.

Why, you ask? Well, it turns out Aquanet is nothing but high-grade lacquer with some smellum mixed in. The big-hair crowd puts tough demands on the product, so the good people at Aquanet pack in a ton of propellant to lay it on thick for just the right effect.

The scent dissipates in short order, and you're left with a fine coat of sludge that both fills pores like spackle and raises errant fuzz like Viagra. A few quick strokes of 600 wet/dry sand paper and you're done.

For really smooth painted finishes, like Design Master and Krylon, repeat the process as required, using multiple coats and higher grades of W/D. But not to worry, Aquanet is cheap! ♦

From the Miniature Aircraft Association, Waconia MN

Philosophy of Combat

by Neil Simpson

I would like to talk about Combat philosophy, that is to say, what represents a good philosophical approach to a Combat match or competition and what doesn't. I suppose when I'm done more folks than usual will suspect I'm full of it; however, for those who will "drink the grape juice," perhaps some of this can be helpful. I will discuss practice techniques, airplane trim, a philosophical approach to conditioning, and equipment preparation.

Remember that for almost all of us, flying Combat model airplanes is an avocation, a hobby, something we should have fun doing. A veteran Combat pilot recently told me that most of us set our goals too high. If your goal is to win every contest, you may have the bar set too high. Unless your name is Stubblefield, Wilcox, or Mears, a goal of winning every time out is not achievable.

This veteran pilot suggested that a more realistic goal would be to fly to your maximum level of ability, and when that is accomplished be satisfied with the outcome regardless if it lands you a spot on the trophy stand. I agree with this. More Combat matches are lost by trying too hard than for any other reason. I see people who should know better, close their eyes (at least figuratively), aim for the noise, and hope for a good outcome. The Combat gods are spiteful; they will let you succeed with this technique once in a while just to encourage more of it.

On your circuit, when you draw certain people for a match do you feel an inevitable mid-air collision is on the horizon? Try looking at that match as a challenge, not as bad luck. Challenge yourself to use a different approach or flying style that might change the outcome. Assume at least part of the responsibility when the outcome is bad. Mr. Stubblefield or Mr. Wilcox would have found a way to avoid that collision that you keep blaming on the other pilot.

"Neil," you say, "I can't fly both airplanes." Maybe not but, you can challenge yourself to always know where the other model is. The most common physical—not philosophical—mistake I see is one or both pilots not knowing where the other's airplane is. That is where the subjects of practice techniques, airplane trim, equipment, and (believe it or not) physical conditioning come into play. If we need to watch the other pilot's airplane, we need to be able to fly our airplane without looking at it.

Practice Techniques

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From Tampa Bay Line Flyers Control Line Model Airplane Club, Tampa FL

Glow Plugs, Fuel, Tanks and CL Stunt Engines

by Randy Smith

I have been asked many times to help explain why we have so many things that can affect the run quality of Stunt engines. I will touch on a few of them, and hopefully help to eliminate some of these problems. Among them are tanks and fuel systems, glow plugs, fuel, and overheating.

What are things that make for a good or bad engine run? We see these things most every weekend, and it is a point of frustration to many modelers. We all want our engines to run properly, and it is nice when it goes through the pattern smoothly, coming on and off exactly when and where you want it. Unfortunately much of times they growl, belch, shut off, seem to have a mind of their own, and are a total pain to deal with.

One of the biggest causes of this that I have seen is improper fuel. Fuel is one of the most critical aspects in running model engines. Use the right fuel and you will probably notice nothing; the wrong fuel will have you grumbling, or worse, will have your engine screaming, belching, and running with absolutely no consistency whatsoever.

Most fuels on the market today use a synthetic base and are blended for the RC sport flier. These are typically very low on oil content, usually in the 12 to 15% range.

This is never acceptable for use in CL Stunt. There are many reasons but the most important is the fact that we normally do not run our engines in a peaked two-cycle, but rather a broad range of four-cycle and rich two-cycling.

Any time you run with the engine set to come on and off in the maneuvers (like a typical 4-2 break) you are not only asking the fuel to lubricate the engine, it also has to cool the engine. The only way you can run in a 4-2 is to heat and cool the parts in the combustion chamber very rapidly. This makes the oil content critical because it's the unburned oil that helps carry away the heat.

Years ago, most fuels only had one oil: castor. This is still a good oil with many good but some bad points. Some of its good points: it carries heat out of the engine and gives a good plating action on all surfaces especially when they're hot. It also has tendencies to move toward hot surfaces, helping to protect them. A few of its bad points: it burns and sticks to the piston sides and the ring groove and all other parts that are hot enough, and will carbonize the chamber. It will stick rings in their grooves, freeze wrist pins, and build up ridges on sleeves. This causes excess friction and heat and will ruin your engine in time.

The alternative to castor is synthetic oil and almost all fuels make use of them; the vast majority are all synthetic. Virtually all fuel manufacturers sell polyalkylene glycol-based oils. They are mostly made up of alcohol-started linear polymers of oxypropylene groups.

These are made by several companies and are available in a large range of molecular weights and viscosities. This group of oils is the modern version of the old Ucon oils, and also has good and bad points. Some of the goods points: they are very good lubricants and do not contain any wax. They have outstanding load carrying capacity, film strength, anti-wear properties, are resistant to sludge formation, and will help keep your engine clean. The bad points: they offer no rust protection by themselves, they don't plate hot surfaces as well as castor, and they burn at high heats.

As you can see, both oils have advantages and disadvantages to them for this reason they work much better blended together than they could ever work alone. Many years of flying, testing, and other research has proven this to me beyond any doubt, plus you can see this for yourself.

A friend of mine had an engine that would go into the pattern and then lean out; it acted very inconsistently. Then we substituted a tank of his fuel for my fuel; the results were drastically different. With my fuel, the engine ran smoothly; going into a two-cycle instantly when the nose was raised and back into a four-cycle instantly when the airplane was leveled. We tried this back and forth with both fuels—his and then mine. The results were the same every time.

Fliers often blame fuel problems on cooling, cowlings, engines or fuel filters, and unfortunately some don't have a clue how to recognize or solve this problem. I wish I could tell you that there is one stunt fuel formula to run in all engines but I can't because of the wide range of engines and running styles. What I can tell you is a good formula for the most common types of engines.

Make sure you pick a fuel supplier who will give you consistent fuel day to day, and will blend fuel for your engine needs or has fuel to match your needs. Stay away from any supplier who will not tell you the oil percentage, or who says one type of oil works for all engines.

It is unfortunate, but many fuel manufactures will try to fool you about the oil and nitro percentage. One trick is to measure the oil by weight and all other ingredients by volume. Doing so, they can claim that the fuel is, for example, 18% oil when it is only 14.9%. Using weight for one ingredient and volume on the others does not equal 100%.

So what percentage do you try? For engines like Fox .35s, O.S. Max 35s or the old McCoys and K&Bs, use a fuel with 26% to 28% oil content; preferably half castor and half synthetic—up to 75% castor is okay. These engines have very small bearing surfaces, and are subject to a great deal of wear and heat. Most are all plain bushing engines and most have unbushed rods. They need plenty of oil to help cool the engines. Since they run hot, they need extra oil to keep them lubricated, clean, and to carry out heat. If you have one of these that is in very good shape but is starting to get some brown or black varnish plating on it, the synthetic mix will clean it up for you resulting in increased life.

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When you're testing airplanes and engine setups or just plain practice flying, don't waste time with a bunch of figure eights; practice flying your airplane without looking at it. Practice flying inverted so that you don't think of it as upright versus inverted—simply turning one way or the other with equal ease. Fly all of your level laps inverted changing altitude constantly to simulate inverted passes at your opponent's streamer.

Airplane Trim

Don't confuse a touchy trim setup with an airplane that is trimmed to be responsive. If an airplane's center of gravity is correct, you have maximized its ability to turn. From there, adjust your handle spacing to change how much handle movement you need to make it turn. We want the airplane to turn tight and feel responsive, while still be able to be flown eyes off. This needs to match your personal taste and ability, but if you can't fly it without looking at it, you need to slow up the controls.

Another indication that your trim is too touchy for your ability is if, in the heat of competition, you turn a three-foot loop when you were trying for a six footer, or you do three quarters of a loop when you were trying for a switchback or half loop.

Conditioning

We don't have to be trained athletes to fly model airplanes; however, a little conditioning doesn't hurt. After all, we may need to run around in a tight little circle while looking up for several minutes at a time. Swiveling your neck like an owl is sometimes a requirement, so a little prematch stretching is good for us older guys. I'm not a proponent of hats either. They're fine between matches to keep balding heads from getting sunburned, but lose them during the match; they restrict your overhead vision.

Equipment

No one wins with unreliable equipment. Keep your setup as simple and as bulletproof as possible. This is where your philosophical approach to a match or a competition ties back to your equipment. If you truly fly to your level of ability, without exceeding it, you won't be pounding the ground all day. If you stay out of the ground, tanks and fuel lines won't get punctured and develop leaks, needle valves won't get bent, engines won't fill with dirt, and airplanes won't weaken (only to fail in subsequent matches).

See how much more fun your day can be with the right philosophical approach. It sure was easy to say, a little tougher to actually accomplish; however, it's a goal much more achievable than winning every contest. ♦

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Do not use a synthetic blend in an old engine that was mostly used with all castor fuels; the synthetic oil will remove the castor varnish from the piston and sleeve and will, in some cases, leave you with the same worn-out engine that you had to start with.

Try not to use propeller shaft extensions with these engines. They add wear on the crankshaft bearing.

For engines with larger bushings and bushed rods like O.S. FP, Magnum GP series, Tower, and Brodaks, a 22-25% half-and-half oil mixture works the best. For S.T. .46 .51, and .60s, and most ball bearing Stunt engines, a 23% half blend works best. Again the Synthetic blend will help keep the engine clean and insure long life. If you use all castor in these types, it can stick the ring in the groove, resulting in poor compression and shortened engine life. If you have a ringed engine that castor has gummed up badly, most of the time running the synthetic blend will free the stuck ring, and the engine will return compression and power for you.

The tuned-pipe engines like a little more synthetic, I recommend a 15% synthetic, 7% castor blend or a 20% half and half with 1oz of Aero-1 fuel supplement—although many use half and half with great success. This works very well in the Precision Aero, OPS and Max VF engines, Super Tigre, Thunder Tiger, AERO TIGER, and most of these type engines.

Four-stroke engines also like this blend, I have found that a 15% synthetic, 3% castor blend works well for them. Normal oil percentage is 18-20%. This will vary some from engine to engine, but is a good starting point. Most like 10-20% nitro, going up to 25-30% in the warmer weather. Aero-1 Fuel additive can help four strokes tremendously, as these engines are lubricated mostly by blow by and can run very hot.

Fuel and tanks are also very critical for a four-stroke operation. Make sure you have a tank that delivers fuel easily to the engine, as four-strokes don't seem to like having to pull fuel from the tank. Use as short a fuel tank as possible and keep it close to the engine. Many people use muffler pressure or pumps to help feed four stroke engines. I have used O.S. VF pumps, Perry vibration pumps, and Perry pressure pumps with my tests on four strokes. I would suggest, as done with two strokes, to use a Sullivan fuel filter. They hold a lot of junk, and have a double-cone design, that pushes debris to the sides and almost never stops up.

If you get a stopped-up filter on a four stroke (or two stroke for that matter) you can burn the engine up in one flight. When you use engines for the first time, you should also make sure you have it properly broken in. This will range from six tanks of fuel for one engine to almost two gallons for others. O.S. says two hours running time for its product.

A good break-in procedure is to use the same fuel that you will use for your stunt run, and try to do your break-in on a bench; this is a lot better and an easier way to do a proper break-in. A diameter, one inch smaller than you plan to run at, at a three or four pitch, should be the propeller to use. This will allow the engine to turn many revolutions more per engine run time. Start out in a sloppy four-cycle for cast-iron-lapped piston and most ringed engines; slowly progressing to the fastest it will run in a four-cycle. Then put it in a short two-cycle burst for short times. After the correct amount of time, it should be able to run in a two-cycle without heating up and going lean. Use 3-6 oz. per run with 5-10 minutes cool-down time in between.

For ABC, AAC, ABL, ABC-R, and ABN engines, start out in a very fast four-cycle and about every 45 seconds pinch the fuel tube to kick it into a momentary two-cycle. These types of engines normally take more break-in time than their iron-lapped-piston cousins. If you can run the engine in a fast four-cycle and without touching the needle, pinch the tubing to lean the engine into a two-cycle for 20 seconds or so, then it should go right back to a four.

After breaking in the engine with a few tanks of fuel, you can start using the needle to cycle back and forth from two-to four-cycle. When it is broken in you should be able to hold a two cycle for 30 seconds or so, and come back to a four quickly by turning the needle richer. If not, it probably needs more running time.

Plugs can also be a major cause of trouble and poor runs. Notice, when you first crank the airplane, if the goes rich and sags slightly when the battery is removed. If this happens, the plug is normally too cold. This is critical to getting a proper stunt run. Most plugs are designed to provide a colder range than we want in CL aerobatic engines, and you should try to get the right range for the engine. Many days of testing and much time and expense buying almost every plug on the market has yielded the following plugs as some of the best for our use:

- Thunderbolt RC long
- T Bolt #3
- T Bolt 4 stroke
- Glo Devil RC #300 long
- Enya 3 & 4
- Fireball RC long
- Hobby Shack RC long
- SIC RC long

In almost all instances, use a long plug. They will be substantially hotter than the shorts, plus they are deeper in the combustion chamber and this tends to keep things hotter and keeps the plug elements cleaner.

A lot of times the plug problems show up as rich inside maneuvers and leaner outsides. This happens because gravity and inertial forces move the oil fuel charge down on the element's insides, thus cooling the coil and pulls it away on the outside maneuvers-letting it naturally go leaner.

I have seen this problem instantly cured by simply changing plugs. All of this assumes you have your tank height perfect (you did adjust your tank height, didn't you?). This is important; don't skip this step. If you're using a profile sometimes you will need to have the tank center higher than the engine center.

The $^{3}/_{16}$ to $^{3}/_{8}$ range will do for most Fox 35s. Others will run on center line, or just off of it. Another cause of run problems are tanks or fuel delivery systems, which includes the tank, fuel tubing, fuel filter, and anything else connected to the fuel system.

When these problems arise, in most cases, the engine changes speeds in flight and is generally inconsistent in the needle setting. This is almost always deemed an engine problem, when in fact; it almost always turns out to be a tank problem or a fuel delivery problem. Almost every time I see this, one of the following components of the fuel system is at fault: a hole in the fuel tubing, junk in the filter, a hole in the tank, a tank with an internal crack in the pick up, or the feed line.

The next most common problem is water in the fuel. Water will give a very inconsistent needle setting and will cause it to change at random from lean to rich. I have seen a lot of fuel with water in it (methanol absorbs water) and this will cause erratic runs and needle settings. Always use fresh fuel and don't be afraid to try another fuel if you think this is the problem.

There are a few other things that cause problems with fuel delivery. Muffler or pipe pressure will magnify any leak or problem you have, and make things much worse than they were. If your plane goes lean in maneuvers and comes back to a four-cycle slowly, it can be running too hot and you most likely need more oil, or less back pressure from the muffler.

A few other causes are an engine with a leaking backplate gasket or an improperly cooled engine. A basic rule of thumb is to have a good intake area, with the exhaust area double the size of of the intake. Make sure your model (if fully cowled) has the air blowing all the way across and past the engine before the air flow exits the cowling.

Never try to put a brand new engine in a model and try to break it in, trim, and fly at the same time. I have seen this too many times with disastrous results. It is very hard to richen a lean needle when the airplane goes lean in flight. Take good care of your equipment and it will usually take care of you; abuse it and it will most times let you down. ♦

After-run oil

Use after-run oil between sessions and when you store your engines. This is another must-do because of the nature of the fuel we use. When nitromethane or any nitroparaffins burn they leave acid and water behind in your engine along with the water carried in partly by the alcohol. When these things get together they eat your bearings and other parts.

Good quality after-run oil is easy to get. If you can't find a good after-run at your local hobby shop, try air tool oil. Marvel makes an excellent air tool oil called Marvel Air Tool oil. Air tool oils can be used as an after-run oil because they are designed to fight corrosion in metal air tools and this is exactly what we are looking for. Look for them in home-supply stores where they carry air compressor and paint guns.

From the Albuquerque Radio Control Club, Albuquerque NM

Learning the Transmitter

by Glen Bontly

There are many modern radio systems from to choose from—simple four-channel radios ($100-$150) to advanced state-of-the-art computerized mega-channel systems (Big $'s). Buyers are limited only by their budgets. Before purchasing any equipment, you should ask yourself, "Is this a hobby I just want to see if I like it, or is it a hobby I am going to remain involved in for years to come?" If you think it may be a long-term commitment, you might consider buying an entry-level six-channel computer radio system (approximately $150-$200).

All radio systems consist of four basic components:

Transmitter - The unit that takes the input from the pilot, through control of the gimbals or sticks, encodes it, and sends it to the receiver in the airplane Technical note on transmitter mode: While transmitter mode is an individual choice, it's best for beginners to use the same mode that their fellow club members use.

Receiver - The unit that receives the signal from the transmitter, decodes it, and sends commands to the servos

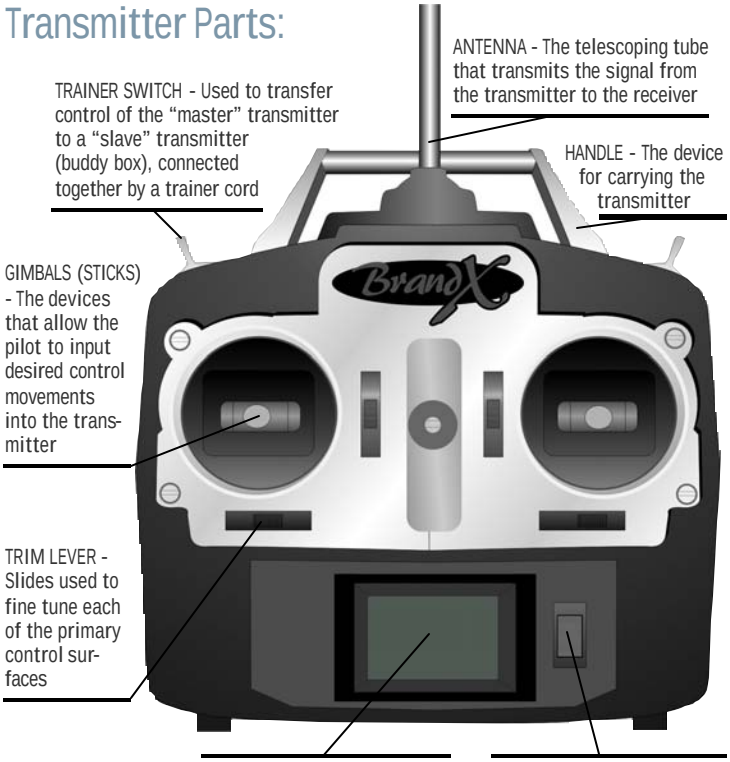
Servos - The devices that convert the decoded signal from the receiver into mechanical forces that operate the control surfaces

Batteries - The devices that provide power to the transmitter (transmitter battery), and the receiver and servos (flight battery)

There are approximately 50 radio channels assigned by the Federal Communications Commission (FCC) for use with airborne RC models (72.xxx MHz). If you are purchasing a radio by itself, make sure you tell the hobby shop personnel that you will be using the radio in an airplane.

Regardless of the brand, the number of channels, or the price, all transmitters have the same basic components. Higher-end transmitters may have additional switches, slides, and displays for various other functions, but the basic components remain the same. ♦

Transmitter Parts:



Additional Radio Terminology

Trim Controls - An airplane that is not trimmed properly can be very difficult to fly, even for an experienced pilot. It is nearly impossible to perfectly set up each servo and control surface mechanically. To compensate for this, all radios come with electronic trim controls for the four basic channels.

The goal is to trim the airplane for hands off straight and level flight. For example, if the airplane climbs when you release the right stick, you can give it a few clicks of down elevator trim.

Servo Reversing - It is sometimes inconvenient, if not impossible, to mount the servos so that they always provide the correct directional input to all control surfaces. For example, when you pull back on the right control stick, the elevator might go down. In this situation, you can electronically reverse the direction of the servo using your radio. Servo reversing is a standard feature on almost all radios sold today.

Dual Rates - Usually only available on the mid and high-end computer radio systems. This feature allows you to change the degree of movement of some or all of the control surfaces during flight with the flip of a switch on the transmitter. On high rates, the servos (and control surfaces) will move full travel and the plane will be very responsive. On low rates, the servos will move only a fraction (as set by the operator), and the airplane will be more tame. Most pilots use low rates for takeoff and landing, and high rates for aerobatic maneuvers.

Mixing - Usually only available on the mid-and high-end computer radio systems. This feature allows you to have the movement of one control surface automatically invoke the movement of a second control surface. For example, as left aileron is applied, the radio can be programmed to automatically apply some left rudder to make a more coordinated turn.

Model Memory - Usually only available on the mid-and high-end computer radio systems. This feature allows you to program several different airplanes (servo direction, dual rates, trim settings, mixing, etc.) and save the specific settings for each airplane in the transmitter.

Radio Signal Types - Most of today's radios are either frequency modulation (FM) or pulse coded modulation (PCM). FM sets are less expensive and by far the most common in use today. PCM is more resistant to interference, but at a significantly higher price.

Trainer System - Usually available on all modern radios, this feature allows two transmitters (a "master" and a "slave") to be connected together via an electronic cable. Using the master transmitter, the instructor can instantaneously transfer control to and from the slave transmitter (also called a buddy box) at the flip of a switch on the master transmitter.

Academy of Model Aeronautics
5161 East Memorial Drive
Muncie, Indiana 47302

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CONTACT US

We welcome your comments and suggestions about the AMA *INSIDER* Please send them to:

Newsletter Editor:
Jessica Booth, jessicab@modelaircraft.org
(765) 287-1256, ext. 228

Technical Editor:
Ed McCollough, vpxi@pacifier.com

Senior Graphic Designer:
Liz Helms, lhelms@modelaircraft.org
(765) 287-1256, ext. 213

Director of Publications:
Rob Kurek, rkurek@modelaircraft.org
(765) 287-1256, ext. 220

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jessicab@modelaircraft.org

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AMA Newsletter Editor
5161 East Memorial Drive
Muncie IN 47302

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www.modelaircraft.org
Tel.: (765) 287-1256 | Fax: (765) 289-4248