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for Newsletter Editors and Club Officers

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PRESIDENT TO PRESIDENT

AMA Embraces the Online Future

by Dave Mathewson, AMA President

AMA launched its Members Only online forum early in June in a notice to our Leader Members. Our intent was to start slowly to try to identify any bugs in the system that may have been overlooked during the internal testing phase. The launch went almost flawlessly and we're now beginning to promote the forum and encourage member participation.

I've written in the past that communication is the key to success in any membership organization and AMA is no different. Our new forum will give us the ability to communicate in a quick and cost effective way with our members, and vice versa.

This forum is not intended to compete with the other popular, more traditional model aviation related forums. These forums play an important role in the modeling community and are a good resource for model aviation-related information. Our AMA forum will be dedicated to an exchange of AMA-related information. If you haven't had a chance to visit yet you can get to the forum from a link on AMA's Web site at www.modelaircraft.org. Over the next several months new topics and sections will be added based on member input. Posting is limited to members but the ability to read posts is open to all.

AMA plans to take greater advantage of the Internet and the resources and opportunities it provides. By the time this issue of the *AMA Insider* reaches you, AMA should be accepting PayPal as a method of payment to join or renew a membership. As we get farther into the year, this option will also be made available for purchases from our Plans Department and Merchandising.

Club charter renewals and applying for event sanctions are areas that take significant time and effort for club officers and contest directors to manage. Beginning in 2010 our plans are to have in place the option to process both club charters and sanction applications online. There are several advantages in doing this. First, of course, the ability to submit an electronic charter online will eliminate the tedious task of entering all of

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TIPS FOR CLUBS

Club Corner

by Jim Wallen, *Insider* Club Column Editor

Here we are again, with a cafeteria of ideas you may be able to use to make your club more enjoyable and productive. Pick and choose the ideas that make sense for your club and try them out.

Make a conscious effort to create a comfortable atmosphere at your club meetings. Coffee and snacks are a welcome addition before the meeting starts. Chatting is always facilitated by a good supply of drinks and donuts dripping with those dreaded calories!

It's amazing how many times I hear about club meetings where the audience can not hear! After all, we are generally a group of older folks I am sorry to say. Encourage speakers to "speak up" or invest in a simple PA system if you can. Encourage visitors and make them feel welcome. Ask them how they learned about the club and invite them to visit the flying field and get a free ride on a buddy box.

Take some "straw votes" at the meeting on potential issues with the club to make them feel included in the decision making processes. By the way, having a swap table is always a hit. Ideas go on and on.

Have you noticed that your club membership roles have been showing a decline? People drop out of clubs for multitudes of reasons. Some move away, health issues become a problem, or perhaps members just lose interest. You will find that the

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101 Ways Part Deux

Don Nix, *Insider* Safety Column Editor

Gee, when I agreed to write this bi-monthly column, I didn't realize some of you readers would practically write it for me. The column in the last issue, "101 Ways to Stop a Spinning Propeller," generated more e-mail than any other to date, nearly all contributing brain lapses of their own, which they gave permission to pass on to readers.

Before I do that, though, I must apologize for the way I described an incident I had witnessed nearly 20 years ago involving John Brodbeck, the "B" of K&B engines. I told of flying in the pit next to John when he reached to tune the needle from the front and ended up with a nasty gash requiring stitches.

An acquaintance of mine and a friend of John's for decades felt I might have done John a disservice by the way the example was written. Since John died some years ago and was also a friend of mine, I must assure everyone no such negative connotation was intended. My purpose was simply to point out how a momentary lapse in safe practices could reach out and grab a person who had probably been flying since he got out of diapers, but made his living in the industry as well.

My sincere apologies to any who saw my intent in a different light.

Now for a few of the incidents sent in by readers, who gave permission to use their names. Member D. Mock writes:

"Accidentally reversed the throttle servo on a 52cc Brison. Started with a heavily gloved hand. Realized the transmitter is directly below the now roaring engine. Notice the tail restraint is giving up under the intense pressure. Freak out and grab the prop with the gloved hand.

"If it weren't for the glove, I wouldn't have a hand (like my friend in a neighboring club). It shattered all my fingers. I wore a cast for five months and missed the whole season. Bummer. BTW, the hand is fine now. Thank God for great medicine."

From J. Low: "I really enjoyed your article about propeller accidents. I was safety officer for a large model club for several years. Every thing you mentioned did happen and will happen again and again.

"I'll bet you could take a safety article written many years ago and print it today and it would be just a current as it was when made up. As new people join our hobby and old ones forget what they have learned, there are the ingredients for the problems.

"Anyway, wanted to tell you I could relate to the article because been there, done that. Fly like you wish everyone else would: 'Safely.'"

Les from Florida sent a very detailed story (with a photo) of an incident that almost cost him a finger. Here's part of his note:

"I am a safety fanatic, and am to the point of being anal about safety stakes, not flying alone, and cringe when I see someone start any size plane without safety stakes, or a person holding the plane.

"That being who I am, I decided to run the fuel out of the engine, and pack it up for the day. I went to a low idle, glow starter on, flipped the prop (with Chicken Stick). As it leaned out because of running dry, the RPMs came up, and the plane started to move forward. Yes, I reached thru the prop to stop it. I had NOT put my safety stakes in!"

The preceding are a just a few examples of propeller injuries that probably happen dozens of times every week among our members. Read 'em and take heed.

My next column will be entitled "An Attitude of Gratitude," and relates courteous flying to safe flying. Ya'll come back, ya' hear? flyerdon@aol.com. ✈

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more dynamic clubs in AMA are aggressively taking on this issue. You will always be losing members but you need to be proactive in finding new ones to take their place.

Become visible to the public by participating in community events. Ask your club members to bring a friend to the meeting or flying field. Put out some flyers at your local hobby store. Visit some schools and put on a simple flying exhibition or air show. Put on a mall show to show the public what we are all about. Take the time to think about what approach is best for your club and then go make it work!

Have you ever wondered what was going on with some of the other clubs in your area? Perhaps you were looking for a schedule of events from one of them. Maybe you heard a rumor about some issues they were having and wondered if it was true. You might have been looking for a fresh perspective on the proposed regulations that FAA was putting forth.

Back in 1979, a small group of proactive modelers in the Denver area, Travis McGinnis, Jim Shaw, Judy Gerkin, Nat Lancaster, and Jim Roucis, rounded up representatives from the other area clubs and talked about issues they had in common. First and foremost on their agenda was to discuss potential flying sites. Some things never change!

The Denver Metro Area Council is still active today and conducts a meeting twice each year. The last breakfast meeting attracted 20 representatives from 15 clubs in the Denver area. Maybe a get-together of some local clubs in your area could have some benefit. You would be surprised at how much our clubs have in common, not to mention the opportunity to chat and tell our "war stories."

'Till then, Jim. ✈

From the Mid Atlantic Radio Kontrol Society, Snow Hill, Maryland

Learning to 3-D and 3-D Well: A building blocks approach.

by Jeremy Chinn

Part 1 of 5

Radio Controlled Aerobatics has always been one of the most exciting elements of the RC airplane hobby. This discipline combines the challenge of coordinating all the available inputs of your airplane correctly and precisely to ensure that it does exactly what you want at exactly the correct time. Get one of those inputs wrong or out of order and the result is ugly, and often disastrous.

As the hobby progressed through the years, so did the complexity of the aerobatic maneuvers. Modelers spent countless hours attempting to emulate their full-size counterparts and their movements through the air. IMAC competition even goes so far as to require that you fly a model of a full-sized aerobatic competition airplane. Modelers were always trying to get their models to perform at the same level as their full-scale counterparts—most of the time they were short of success.

Then at one of the final installments of the Tournament of Championships, QuiQue Somenzini pushed RC Aerobatics to another level entirely. QuiQue flew a model that greatly outperformed its full-sized counterpart and flew maneuvers that full-scale pilots could only dream of. With that, the seed for 3-D aerobatics had been planted and nothing would hold it back.

3-D aerobatics is now the most popular form of flying in the RC hobby. Manufacturers frequently throw the moniker "3-D" at any and every airplane they sell. Competitions just for 3-D have cropped up around the country and many specialists have popped up that spend all their time flying 3-D aerobatics. Videos flood the internet on a weekly basis of some pilot flying 3-D with his new "uber-wonder-plane."

With all that interest, the hobby has a very large number of people trying to learn to fly 3-D. These students of 3-D are trying very hard to learn to fly one or more of the cool new maneuvers they've seen some sponsored pilot fly at a competition or on a YouTube video.

Unfortunately, many of these pilots are finding limited or no success. Broken airframes are common and heading home from the field with a multicolored bag of broken airplane parts is often the name of the game for the new 3-D pilot.

So what are the keys to success for the aspiring 3-D pilot? What is needed to ensure that a pilot can find success in learning to fly 3-D and do so without breaking the hobby-money bank? In no particular order, they are:

1. Strong knowledge of basic aerobatics.
2. Use of a structured approach to learning each of the 3-D maneuvers.
3. Use of a simulator to help speed the learning process.
4. Proper 3-D "trainer" to learn each of the maneuvers.

Why is a strong knowledge of basic aerobatic maneuvers necessary? So many times when I get asked by a friend at the field or at an event how to do a rolling harrier, I quickly find out that the person asking cannot fly a proper slow roll or even a four-point roll. It's this basic aerobatic knowledge that helps to provide the right understanding and muscle memory to handle unusual flight attitudes and situations. In many ways, it is similar to wanting to learn to run before you learn to walk.

I won't spend a lot of time trying to describe how to learn basic aerobatics—there are many more qualified pilots out there to do that, but here are a few good tips:

1. Participate in a local AMA Pattern or IMAC competition. The skills you build while practicing even the basic or sportsman routines will be invaluable to your future aerobatic and 3-D efforts.
2. Learn to fly all the basic maneuvers such as four-point rolls, rolling circles, and loops in both directions. Even the best pilots have a bias toward rolling one direction or the other, however, they have practiced until that bias is invisible to the spectator. Always practice your worse side more.

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President to President

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this information manually. For club charters, officers will have the ability not only to submit their initial yearly charter online but they will also be able to manage club rosters and other club information throughout the year.

The time needed to process a sanction application today includes a significant amount of time when the paperwork is "in transit." Applications are first sent to the district contest coordinator then, if approved, forwarded onto AMA Headquarters for processing and then mailed back to the CD.

Being able to submit an application online will virtually eliminate nearly all of the transit time. Contest coordinators will still authorize and approve sanction requests but will do so electronically. The "system" will take the information provided in the sanction application and automatically process it once the contest coordinator gives his or her okay.

Finally, the option will be available to return the processed sanction certificate to the CD in electronic form instead of sending hard copies though the mail. What now takes several weeks to accomplish could realistically be done in a matter of days. Supporting paperwork would still be sent through the postal system.

These are just a couple of the new electronic options that we hope to be implementing in the next year or so. However, for those who wish to handle these tasks as we have in the past, that option will still be available as well.

See you next time… ✈

From RCMdirect.co.uk

Electronic Speed Controllers (ESC) Explained

In electric if you need throttle control you will need an Electronic Speed Control (usually called an ESC).

These devices are controlled from the throttle channel of the radio and operate the motor much like an I/C engine throttle, from tick-over to full throttle, and all points between. Modern ESCs cover a wide range of applications and offer a sometimes-bewildering range of features and facilities including BEC, brakes, and various startup safety features (more on these later).

An ESC will generally have three sets of wiring. On one side you would have two wires, one black and one red, which go to the battery (Red +ve /Black –ve).

On the same side you would normally have your servo or receiver cable, which goes into the throttle channel of your receiver. The other side would have three wires, which could be the same colors, or three different colors, depending on manufacturer and convention used, which normally go to the motor.

Note that this is always plugged into the throttle channel even if the speed controller has the BEC feature and so is providing the power to the radio receiver.

If the three cables on the ESC are black, red, and white, then connect the three wires to the motor in matching colors. Check the direction of the motor and, if it requires reversing, swap the black and white cables over.

In modern speed controllers where the three wires for the ESC are the same color, attach any three wires and, to turn the motor direction around, swap the black and yellow motor cables around.

ESC Ratings

The major things to look for when buying a speed control are the current rating, voltage rating, and features. The various features are individually covered below so let's have a look at the two main ratings.

First on the list is the maximum current rating. Typically this will be given as two figures e.g.18/22A, the first is the current, which the ESC will take continuously, and the second is the short term current allowed normally for no more than 10-30 seconds. So in the example, you could run at 18A forever and use up to 22A for short periods, e.g. at takeoff. We recommend when selecting a speed controller allowing 20% margin so if you have a motor that draws 15 amps, I would select an ESC, which would have a minimum rating of 18 amps, based on the following simple calculation: 15 amps x 1.20 (20%) = 18 amps.

The other main ESC rating is the maximum voltage, more commonly expressed as a number of cells both Lithium Polymer and NiMH/NiCad. This is pretty straightforward. If you try to use the ESC with more cells it will break. It's also worth noting that many speed controls also give a minimum voltage or number of cells.

ESC features BEC

BEC stands for Battery Elimination Circuit. It is a facility, which allows the radio receiver and servos to run off the main motor battery (within certain conditions) so that you do not need a separate receiver battery. There are certain limits associated with BEC circuits that you need to keep in mind. BEC works by reducing the motor battery voltage to down to the 5V needed by the receiver. Doing this creates heat. Because of this it will only work with a main battery of up to some specified number of cells, often 10 cells (or 12V), and also with a specified load often 1 or 1.5A. The load is sometimes expressed as a number of servos and may reduce as the number of main battery cells goes up. For example it may allow three servos up to two Li-Poly cells and only two servos for a three-cell Li-Poly pack, with no BEC over four Li-Poly cells.

Motor cut off

This feature is always associated with BEC. It cuts power to the motor before the battery is completely exhausted so that you still have power to the radio to get to a safe landing. Motor cut-off voltages nowadays are programmed into the speed controller and can auto detect the number of cells used once a power source is initially plugged in.

Brake

Just as it sounds. When the throttle is at zero it applies a braking effort to the motor to stop it turning. This is to allow folding propellers to fold neatly rather than wind milling around creating lots of drag. Most are used on gliders and old-timers, which typically use the motor to get them up and then thermal around, sometimes for ages.

Opto-isolation (OPTO)

This feature electrically isolates the signal from the radio throttle channel from the ESC. Doing this can dramatically reduce the level of radio interference, which can be created especially with very high currents. You cannot have both opto-isolation and BEC working at once in an ESC, though quite a few allow you to select at installation which of the two features you want to use.

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From the Anoka County Radio Control Club, Inc., Coon Rapids, Minnesota

Better Performance with Less Noise

by Brian Dorff

With the ongoing debate about the noise our little engines produce, much is being done to preserve our way of life while respecting the rights of others. At first, noise reduction sounds bad for pilots. We think that reduced noise means reduced power, and conventional wisdom supports this. It is not until you fully understand how engines and propellers operate that you will realize the gains that benefit not only our neighbors but our airplanes as well!

There are four contributors to the noise made by models (in no specific order): muffler type, engine speed (rpm), tip speed of the propeller, and vibration.

Muffler

The mufflers provided with today's engines are quite good for the rpm range in which they are designed to run. Mufflers that come with internal baffles should keep the baffles in. Removing them does nothing to boost power, it increases noise, and makes the engine idle poorly because of lack of back pressure. Pitts-style mufflers shouldn't have more exit area than the stock muffler does, and if it does, one of the ports may have to be partially or completely blocked. Again, this will help idle.

Engine speed

A large contributor of noise made by airplanes is an over-revving engine. Most modelers try to make their engines run as fast as possible, trying to obtain the rpm at which the manufacturer claims the largest brake-horsepower (BHP) number. What they don't realize is the peak efficiency for the engine occurs at peak torque, which is usually about 65%-75% of the peak BHP rpm.

Example 1: A manufacturer of a .46 engine claims 1.5 BHP at 16,000 rpm. After break-in you find that you can turn a 10 x 5 propeller at 15,500 rpm—very close to the peak BHP, but the airplane's performance is mediocre, it is loud, and consumes way too much fuel.

Now you find the engine's peak torque is about 70% of the peak BHP rpm (.70 x 16,000 rpm = 11,200 rpm). You switch to an 11 x 7 propeller and find that the rpm is 11,500. You are much closer to peak torque now, and the airplane flies better and is quieter because the frequency of the engine firing has reduced dramatically. The fuel also lasts longer, and the engine will last longer as well since it is not working as hard. A slower engine also helps in achieving the next goal …

Propeller Tip Speed

The tip speed of the propeller is critical in quieting the airplane. The point where things get noisy is 560-feet per second or about 380 mph. Going more than 400 mph is a big no-no. Even in an airplane that is built for speed, you should be able to choose a quiet propeller.

Example 2: Same setup as the last example, the 10 x 5 propeller is at 15,500 rpm and the 11 x 7 propeller is at 11,500

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Electronic Speed Contollers (ESC) Explained continued from page 4

PWM (Pulse Width Modulation / High rate control)

The control of motor speed is obtained by switching the power to the motor on and off in various ratios, e.g. maximum throttle is permanently on, half throttle is on half time, off half time, etc. This switching on and off is done many times a second. The speed at which the switching takes place has a large effect on overall efficiency. Early speed controls used what is known as "frame rate" switching, which means that they switched approximately 50 times a second, the same rate frames of information are delivered over the radio. Most modern ESCs switch at a much higher rate, which makes them much more efficient, i.e. they lose less power as heat in the controller. Switching rates around 3000 Hz (times a second) are about optimum. Anywhere between 1000 Hz and 5000 Hz is acceptable.

Timing Mode

Timing mode is similar to PWM and controls the on/off switching in the motor. There are two types:

- Soft timing: for two-, four-, six-pole motors (Mini AC, Kontronik, Hacker).
- Hard timing; six or more pole motors (Jeti Phasor, Mega, Plettenberg).

Hard timing increases both the motor revolutions and the current (up to 20%) with the same propeller and battery pack when compared to soft timing. Hard timing is more suitable for fast flying models.

Always use soft timing initially and after a few flights if the temperature of the batteries, speed controller, and motor are below 50° Celsius, then it is possible to test the system using the hard timing mode.

Note: Hard timing should not be used with any two-pole motors (Mini AC, Kontronik, Hacker).

Turning the speed controller on/off

Brushless speed controllers do not normally come with an on/off switch, so to enable an ESC you need to plug the battery into the ESC. Prior to that you do need to ensure your throttle is set to idle/low and it is switched on. Normally a set of beeps or tones will donate it being armed.

To turn off or disarm an ESC just unplug the battery source.

Disabling BEC

To disable BEC on speed controllers where a separate receiver pack will be used is done by removing the middle cable from the servo, receiver cable which goes from the speed controller to the receiver. In OPTO speed controllers this is not required. ✈

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rpm. The formula for tip speed in miles per hour is: (Diameter in inches)(3.1416)(rpm)/1056. The number 1056 is a constant that converts inches per minute to miles per hour. A 10 x 5 has a tip-speed of 461 mph (a no-no). (10)(3.416)(15500)/1056 = 461.

We want our tip speeds no faster than 400 mph and it should be less than 380 mph if you want to keep your flying site. The 11 x 7 at 11,500 rpm has a tip-speed of 376 mph. (11)(3.1416)(11500)/ 1056 = 376. The tip speed is now down to a moderate level. But how do these propellers compare in performance? You can calculate airspeed by using the propeller pitch and the rpm of the propeller. The pitch of a propeller is the second number in the propeller designation. This is the distance in inches that the propeller will travel through the air in one revolution.

Multiplying the pitch by the rpm and dividing by 1056 will give the calculated speed of the model. 5 x 15,500/1056 = 73 mph; 7 x 11,500/1056 = 76 mph.

So your airplane will actually be traveling slightly faster with the 11 x 7 than with the 10 x 5, while turning 4,000 rpm slower. This reduces engine noise, propeller noise, fuel consumption, wear and tear on the engine, etc., without compromising performance.

Propeller Loading Factor (PLF)

How do you know what to expect switching propellers? Being able to compare propellers before you run them is the key to optimizing your airplane's performance and getting rid of the noise. Say you are happy with the rpm that your engine is turning with the 11 x 7 propeller, but you want to try other propellers to see what you like best for flight performance.

Right now you are at the middle of the road, slightly fast and passable vertical performance, but what if you want more vertical? First we solve the PLF of our existing propeller, and then we compare it to others. PLF=D x D x P (D=diameter, P=pitch)

The 11 x 7s PLF would be 11 x 11 x 7= 847 PFL (compared with the 10 x 5s or l0 x l0 x 5=500 PLF). Now let's see what else is out there. To increase vertical you should either increase diameter, decrease pitch, or both.

To keep a PLF close to the same you will have to do both. If you are trying to raise the rpm, decrease pitch—and if you are trying to slow the motor, increase diameter. I would try the 12 x 6 first and then the 13 x 5. They have close PLFs. This is for comparison only. Switching propeller brands or not balancing a propeller, among other things, can vary your results.

Vibration

How does the vibration of your model relate to the sound it makes in the air? Well, sound is vibration. Imagine your beautiful model—a nice wooden structure covered in drum-tight plastic covering. Think of it as a percussion instrument. The piston is traveling up and down like a drumstick pounding away at your model. And your model echoes every stroke it makes. The same thing happens with an out-of-balance propeller. Noise. It's everywhere! Your new mission: get rid of all vibration.

Start at the Propeller

It moves 300+ mph at the tip—balance it! It will remove noise because all that vibration won't exist in your airframe. Our neighbors will thank you and your receiver crystal, your servo pots, fuel tank, and NiCds will thank you as well. You will be rewarded with much greater reliability and a longer airframe life span. Also consider a high-quality spinner. They are better balanced and look nicer.

Back to the other cause of vibration—the engine. It is not possible to balance an engine dynamically at all speeds, so some vibration will forever be present, especially with four-strokes. The only thing that you can do about it is to isolate the vibration from the aircraft, making less noise in the process. Iso-mounts vary in type and price; from rubber grommets between the firewall and the mount, to specialized mounts for specific engines and airplanes that cost $100 or more. A popular one is made by Dubro and is for any 40-90-size 2c or 4c engine. It sells for $20-$30. Well worth the investment!

While it may not be feasible to make every one of these criteria work on your aircraft, it is important to keep these points in mind when getting your airplane ready to fly. If we all do a little, we can make a big difference. Remember, a 3 dBA difference in sound and the intensity doubles. If you can make your airplane even 3 dBA quieter, you have made a huge cut in the noise that everyone around us has to hear. (Although the sound energy is halved for every 3 dBA drop, it takes a 10 dBA drop for the human ear to perceive the sound being half as loud. A 10 dBA drop results in one-tenth the original sound energy.) ✈

How to Receive $300 for Public Relations About Your Club

by Erin Dobbs

AMA launched the Club Recognition and Reward Program in 2008. This program is to reward clubs monetarily who receive positive media coverage either by print (newspaper or magazine), radio, and television. It was a complete success for the clubs who participated.

During 2008, AMA's budget for this program was depleted and AMA is proud of the clubs that received the funds for their positive contributions to charities and their communities.

We would like to see this FREE money given away to more clubs this year. Time is running out! If your club participates in a charity event or donates its time to benefit the community, you will receive $100, $200, or $300 respectively if the event receives media coverage.

The application can be downloaded from our website at the following address www.modelaircraft.org/files/716.pdf.

If you have any questions about the program please contact Erin Dobbs at erind@modelaircraft.org.

Thanks and we look forward to rewarding your club! ✈

Learning to Fly 3-D and 3-D Well continued from page 3

3. Learn to trim the airplane properly as part of your basic aerobatic learning. A properly trimmed airplane is easier to fly while doing aerobatic maneuvers from the most basic to the most complex. This same reasoning applies to flying 3-D as well.
4. The book *Learning to Fly Basic Aerobatics* by Scott Stoops is an excellent read on the subject.

A structured approach is the next item on the list. Again, this is similar to learning to walk before learning to run. By learning each fundamental maneuver, you will have a better chance at finding quick success as you learn to fly 3-D. The next article in this series will begin to cover the details of an excellent "building block" approach to learning to fly 3-D.

Simulators are one of the most underrated tools and developments in the RC hobby during the past 10 years. Quality and reality of simulators has increased with the same quantum leaps that computers have undergone. There are many simulators out there, and each has its own pluses and minuses. To try and discuss that subject would be many articles in and of themselves. Rather than try to cover that, I'll try to suggest some tips to help you get the most out of your simulator and a training method that can be used with most any simulator to learn quickly and efficiently.

Some basic tips that will help you get the most out of your simulator:

1. Don't obsess over flying a particular airplane in the simulator. Instead, try to get an airplane that flies well in the simulator and tune it to your liking. Don't decide you're going to learn to fly 3-D in the simulator with an F-14, but at the other end of the spectrum, don't worry if the Extra 300 in your simulator flies better than the Yak 54; fly what works!
2. In general, larger simulator models fly more realistically in the simulator than smaller models do. This is a generalization, but has proven true with every simulator I've experienced.
3. Learn how to "tune" your models in the simulator to fly more like your real models. Almost all simulators allow you to edit the characteristics of the models included in the simulator package to suit your needs and to make them fly more like real life. Do not select an airplane in the simulator that is too easy to fly. It is supposed to be a challenge.
4. Learn to use the "time" functionality in your simulator to slow things down. This ability to slow down simulator life when compared to real life is one of the best features of flying in a simulator.
5. Fly your model in the simulator just like you would fly your real model. Go through your same take off routine and landing procedures just as you would in real life.

As mentioned earlier, the ability to "slow time down" is one of the most valuable features of the simulator. Slowing down the time function in the simulator allows you to fly maneuvers at a slower pace. Flying at a slower pace allows you to think through each of the required stick movements and corrections as you learn the maneuver. More time to react to incorrect movements is always a good thing as well.

When you decide to learn a maneuver on the simulator, start by turning down the time function to approximately 50% of real time. Practice the maneuver over and over until you feel comfortable with it. Once you feel comfortable at that speed, bump the speed up in the simulator by 10% and practice more. Continue this cycle until you are actually flying the maneuver 10% faster than normal speed. By the time you have accomplished this, you will have built the muscle memory necessary to ensure you provide the correct inputs at the correct time to fly your model. You are now ready to try it out in the real world!

Another key to 3-D success is getting the right airplane to learn with. If you've followed along so far with this article, then you've practiced up on the simulator and you are ready to try out the maneuvers in real life. Unfortunately, having the wrong airframe will mean many will fail at this point and won't progress any further.

The right airframe has to do many things. It must be tough for the unintentional mishaps that will happen, it must be simple to repair, and above all, it must fly 3-D very well. The two airplane types that fit this bill very well are foamies and .40-size profiles. Both types of airplane have a relatively low cost to build and, as a result, a relatively low cost to repair. Those factors alone mean you'll spend more time in the air than repairing at the workbench. Finally, there are countless examples of both type of airplane which fly exceptionally well. If you are put off by the appearance of a profile, get over that issue and use one to learn to fly 3-D, then sell it to a buddy so he can do the same.

A few types of airplane to avoid for learning to fly 3-D:

1. Giant Scale airplanes are very bad 3-D trainers. Most Giant Scale airplanes are easier to see and fly somewhat slower than smaller airplanes. However their higher cost and higher complexity adds significantly to the fear that many pilots will have when flying them. It is difficult or impossible to learn a new skill when you are faced with constant fear of hurting the airplane.
2. .40-size full fuselage airplanes also make poor 3-D trainers. Most examples in this category have cost and complexity induced fear similar to giant scale airplanes mentioned above. Additionally, they typically have very high wing loadings when compared to a same sized profile airplane. The result is an airplane that flies poorly and is difficult to repair when damaged. Again, a bad combination for someone who wants to learn to fly 3-D.
3. Small, full fuselage electric airplanes. This category of airplane has become extremely popular with the increased availability of good quality electric gear, motors and batteries. Unfortunately, the comments for the two airplane types mentioned above apply very strongly to this category as well.

So that is our starting point. Get the right gear and get ready for the next section. ✈

AMA Vision

We, the members of the Academy of Model Aeronautics, are the pathway to the future of aeromodeling and are committed to making modeling the foremost sport/hobby in the world.

This vision is accomplished through:

- Affiliation with its valued associates, the modeling industry and governments.
- A process of continuous improvement.
- A commitment to leadership, quality, education and scientific/technical development.
- A safe, secure, enjoyable modeling environment.

AMA Mission

The Academy of Model Aeronautics is a world-class association of modelers organized for the purpose of promotion, development, education, advancement, and safeguarding of modeling activities. The Academy provides leadership, organization, competition, communication, protection, representation, recognition, education and scientific/technical development to modelers.

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