

Issue
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BIMONTHLY NEWSLETTER FOR CLUB
OFFICERS AND LEADER MEMBERS

AMA INSIDER



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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.

AMA Vision

We, the members of the Academy of Model Aeronautics, are the pathway to the future of modeling 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.

President to President

ELECTIONS AND THE HOLIDAY SEASON

Bob Brown, AMA President, bobb@modelaircraft.org

Elections ... by now I am sure you have enjoyed all the political activity within our great country. However, have you remembered to vote in the AMA elections? If you live in Districts II, III, IV, VI, VIII, and X and are eligible to vote, please do so. Campaign statements were in *Model Aviation* (October 2012), September's *AMA Insider* and are available on our website at: www.modelaircraft.org/aboutama/Organization/ec/campaignstatements.aspx. All of the candidates are well qualified. Please vote for the candidate of your choice.

The holiday season is just around the corner. A great gift for the teenager in your family might be a trip to Camp AMA next summer. Last year

several young men had a positive experience at the camp. This coming summer additional topics will be covered providing more enjoyment. If you are personally interested, or if your club would like to sponsor someone, please contact Jessy Symmes: (jessys@modelaircraft.org) at AMA Headquarters.

The indoor season is just beginning. New offerings this year should make flying very interesting. Small quadcopters will probably be the new craze for the season. While you are enjoying the indoor activity please be extremely careful of the fire hazards of LiPo batteries. No matter what size, the batteries can be dangerous if you do not handle them with respect. →

Club Corner

WHY DID I GET INTO THIS HOBBY?

Jim Wallen, Club Corner author, sjwallen@tde.com

Think about all the reasons today's modelers got into this hobby in the first place. The answers are numerous, varied, and wide ranging.

Perhaps decades ago you were at your father's or grandfather's workbench watching the magic taking place before your very eyes. Perhaps you were just driving by a flying site and stopped in to see what that buzzing up in the air was all about. Maybe you saw an advertisement for some AMA club meeting and decided to stop by and check it out.

You could have been fascinated with the remote control aspect and the feeling it gives you in dominating a small machine up in the sky. You might have been bored with your other

recreational activities and just wanted to "change things up" a little bit. Many of us got our "juices jangling" when we stopped in to our local hobby shop and looked at some fascinating toys that were not really toys. The list of reasons is really endless.

What do all of these varied ways of getting introduced to our hobby have in common? They all center on having genuine *fun*. In one way or another satisfaction and fun is the hub of it all. Sometimes we tend to forget about the fact that we are all kids at heart and receive a great deal of satisfaction creating and flying our little toy planes.

Let's all try to remember this on those days we take ourselves a little too seriously. →

SEE AND AVOID

Jim Tiller, jtiller@hotmail.com

In response to my last safety article on 3-D vision and depth perception, Jim Rice, retiring District VIII vice president and Safety Committee Chairman, sent me some good information that I will pass on to you. Jim commented on the thoughts I had about keeping “blue sky” between you and other airplanes in your flying space. He pointed out that this same advice has just been added to an AMA document concerning RC airplanes and full-scale aircraft.

His message:

“Ironic that you would describe a way to keep separation between aircraft in the same week that we added a paragraph to PDF 540-D that tells them the same thing ... only with different words.

The FAA work group has been using the term ‘Blue Sky’ for about three years and the FAA seemed to like the concept.”

AMA document 540-D provides guidelines for RC operations in the NAS (National Airspace System). As Jim pointed out, there is a new advisory in that document that recommends using “Blue Sky” between you and full-scale aircraft to avoid depth perception mistakes. Here’s an excerpt:

“Blue Sky” is a term used to explain the method used to increase separation between a model and a manned aircraft in the same vicinity. The modeler should maneuver the aircraft in such a way as to increase the amount of *blue sky* perceived between the model and the manned aircraft. By increasing the blue sky separation, the question about depth perception is taken out of the equation and the modeler need not worry whether the model is closer to him than the manned aircraft or further away. Increasing the blue sky between the model and the manned aircraft automatically increases separation between them.

Thanks Jim, for that great follow up to my last article.

When I pulled up the document and read it in its entirety, I thought that the

rest of the information should be brought to your attention as well.

These guidelines are great safety rules to follow, not only for operations with full-scale aircraft in the vicinity, but for flying in general. You might want to bring the document along to your next meeting or post it on your website. Here’s a link: www.modelaircraft.org/files/540-D.pdf

Skin Cancer

Jim Rice also told me a little bit about his recent bout with skin cancer. Jim related his diagnosis of a malignant melanoma last January and the ensuing surgery and recovery over the next six months. He has made a full recovery but cut back on his AMA activities, including resigning from his position as District VIII Vice President.

If there is a more compelling statement than his about the dangers of skin cancer I don’t know where you would find it. Our hobby puts us high on the list of those susceptible to this disease. If you have not already read the full article in the September issue of *Model Aviation*, do yourself a favor. Pull it out and read it. Here’s a link if you can’t find the paper issue: <https://library.modelaviation.com/ma/2012/9/1?page=48>

Thanks, Jim, for volunteering that personal information and all you have done for the hobby.

Welcome and Warning

The title of this article concerns visitors to your field. Obviously, we should welcome other fliers and spectators to our field. Sharing is what our hobby is all about. In many cases, site visitors receive little or no focus when on our fields. Unfortunately, many clubs have learned the hard way that the risk of injury to visitors (and the subsequent insurance claims) should not be neglected. Many substantial AMA insurance claims are for injury to non-modelers on AMA club sites.

An old adage advises: “A danger foreseen is a danger avoided.” That’s why some guidelines for keeping visitors informed and aware of safety risks are

critical to reducing your club’s liability. For many of us, the major flying season is over and it might just be this time of year that you discuss these issues at your club meeting as you plan your events for next year.

Start by discussing rules and procedures for handling visitors to your site. The safety rules should be clear and obvious to any first-timer to your grounds.

Your safety rules should be clear to any visitors. It should also be understood that it is each member’s responsibility to communicate those rules in the first lines of communication.

A second activity is to review your safety rules in general from the viewpoint of a visitor—things that your members take for granted. Are there any specific site hazards that they should know about. Things like poisonous snakes or cacti come to mind.

Are there any trip-and-fall hazards on your flying site? If there are, children will find them. A walk through your field trying to see things from a child’s point of view might help. Clean up or fix any potential hazards.

Does your field need any signs to help those who are there for the first time? Your pits and flying boxes should be clearly marked and spectators should know where they can and cannot safely go.

In my part of the country, drought has made the land adjoining the field tinder dry. Does your club have fire extinguishers and a contingency plan for contacting fire services in the event a fire starts on or near your site? You might also consider an evacuation plan—grass fires can move at amazing speeds.

Thanks again for all your emails and advice. They make this job much easier. It’s coming on winter up here in the outback of the US, so I guess I’ll have to think about this year’s winter adventure into aeromodeling. I learned long ago that I should not use the words “winter project.” My wife has a completely different concept of what a project is. She tends to think of finishing up that kitchen remodel I started in 2008. ➔

ONE CLUB, ONE LEADER MEMBER

Rusty Kennedy, Chairman Leader Member Program, rustylm@verizon.net

The 2013 Leader Member Committee challenge will be to have “One Club, One Leader Member.”

The goal is to have at least one active Leader Member (LM) in each AMA chartered club. This is much easier said than done, but it can be done. AMA needs active LMs who will assist vice presidents and associate vice presidents with their day-to-day district functions.

Are you such a LM or potential LM? Are you willing to keep up to date with AMA programs and benefits offered to AMA members? Are you willing to go to your club’s meetings and functions

and keep the members informed of all AMA has to offer? It’s a challenge but not difficult. Everything needed is available online or in *Model Aviation*.

There are LMs throughout the AMA who have taken up the challenge and are seeing positive results. Clubs and members are learning more about AMA than ever before.

If you want to volunteer as an active Leader Member and want to know more contact me directly at rustylm@verizon.net. Meet the challenge. →

Editor’s Picks

IS EPOXY RESIN OR POLYESTER BETTER FOR GLASSING?

Jim Cook, Shakoppe MN, printed in *Replica*, newsletter of the National Association of Scale Aeromodelers

Both produce sufficiently hard surfaces, but polyester is softer. This makes polyester sandable. Epoxy is harder; therefore, it is more difficult to sand. Wet sanding works best for both types. There is no difference in weight.

Polyester can be spread a little thinner, however, and it is sandable, so less of it tends to remain on the model. But polyester stinks. It takes weeks for the smell to go away. Epoxy is nearly odor-free. Epoxy favors peace at home.

Polyester cures with a slightly sticky surface. Primer adheres well. Epoxy requires a light scuffing. Epoxy resin

must be mixed exactly.

Try this experiment. Mix some epoxy resin precisely and pour it on waxed paper. Now mix some epoxy at 45:55. Pour it out and let both batches cure. Note that the mismatched batch is softer and has a waxy surface—it didn’t cure completely. Polyester is not fussy about proportions. A variance in the amount of catalyst affects only the setting time. The catalyst of polyester resin has a short shelf life. Don’t use old stuff—it won’t cure.

Polyester catalyst is more toxic because it is more concentrated. Always wear

latex gloves when working with any kind of resin. For large jobs, wear a respirator and use a window fan.

Don’t thin either. Try this experiment. Mix some resin (either one) and pour half of it on a sheet of waxed paper. Dilute the remaining 10% with alcohol or a thinner of your choice. Pour it on waxed paper and let both cure. Observe that the thinned resin is soft, flexible, and it has an oily surface. Thinner resin prevents complete curing.

Epoxy resin seems to adhere to balsa slightly better, but that might vary with conditions. →

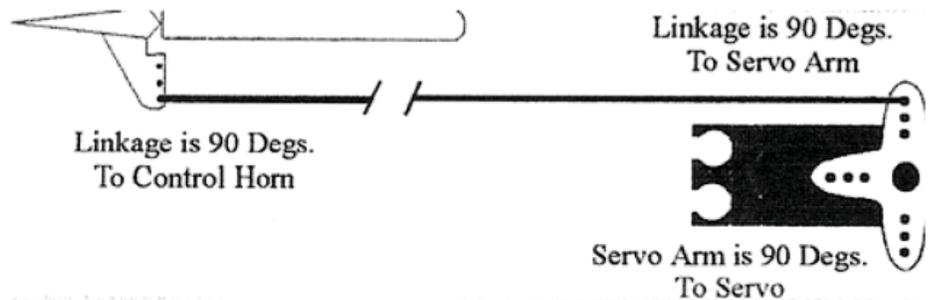
SUB TRIM AND LINKAGE SETUP

Richard Lindberg, Rocky Mountain Flying Machine club, Albuquerque NM

Sub trims are intended for minor adjustments to servos linkages. Since excessive sub trim values (percentages) can cause servos to be over-driven where they try to move past their internal stops. This can cause servo damage.

The diagram to the right illustrates an ideal servo/linkage setup when the servo is at neutral. Notice that the servo arm is positioned at a 90° or perpendicular to the servo. Also note that the linkage or rod is attached at 90° to both the servo arm and the control surface horn. This setup will result in the same amount of throw in both directions (0 differential throw).

Follow these steps to help ensure the



SUB TRIM AND LINKAGE SETUP

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LEARNIN' (OR RELEARNIN') TURNIN' FLIGHT FOR RC

Ben Owen, Milwaukee Area Radio Kontrol Society, Wisconsin

I will admit that I am not the greatest model flier. I like designing and building and spend a lot of time doing it. This means I must keep relearning how to fly, much like most of you have to do some each spring due to not flying during the winter.

But, I read *a lot*. Any RC flying article by Dave Scott, chief and only instructor at his Shawano, Wisconsin-based 1st U.S. R/C Flight School, catches my eye. Dave Scott really knows his stuff. Here are some of his and my ideas comingled.

When an airplane banks, geometry comes into play when the wings tilt. At 30° of bank, you lose about $\frac{1}{8}$ of your lift. At 60° of bank, your effective wingspan and lift shrinks to half of what it is when you are straight and level. You can see the amount of added lift needed increases as the angle of bank increases. More bank means more lift is needed.

Where does the extra lift needed to maintain banked level flight turns come from? It has to come from increased lift on the wings. That can only come from a higher angle of attack (nose up). After you are established in the bank you want,

release the aileron and keep the nose from dropping by giving your transmitter “back stick.” More elevator is necessary—much more in the case of 60° of higher bank.

If you bank your model in flight and the nose drops after you have a fairly well established turn, you forgot the elevator and have to play catch up with plenty of elevator. Remember, it takes a lot of elevator to turn a model properly, especially if you are set up nose-heavy like many stable trainers.

It is better to add too much elevator initially and climb a little than to dive into the ground. The slower the model and the more nose-heavy, the more elevator needed. In a turn, all airplanes generate added lift causing added drag, causing a slowdown in speed and a slight nose drop if you let it.

What would David Scott say? His thoughts come from training thousands of students. He has more flight time on models than most of us will ever see. Dave used coupled aileron and rudder on his basic trainers. You can easily recognize most trainer aircraft because they have fairly flat lower wing sections.

Coupled means the rudder turns in the

direction of the bank. He sets them up with equal deflection. For example: aileron at 10° and rudder at 10°.

With aileron alone and no rudder application during the start of the turn, you get adverse yaw. This kicks in as the lifting wing causes drag due to the ailerons on that side going down. The wing tipped down with up aileron has less drag. The nose swings opposite of the bank for a while, so Dave uses a coupled aileron and rudder on his trainers.

You can set that up electronically on your computer radio, or mechanically if you have a less complex radio. Mechanically connect the aileron and the rudder servos to the same port on the receiver with a “Y” harness so that you always get rudder with aileron. Match right with right and left with left. This ensures a proper turn entry. The nose always goes in the direction of the bank.

Dave wrote that every basic student he has trained learned faster with rudder coupling with ailerons.

When turning, we put in aileron/rudder until approximately the angle of bank and then neutralize the stick. You can let it go for a second if you like because inertia will keep it level for a while. So, now we are banking and turning. What do we do next?

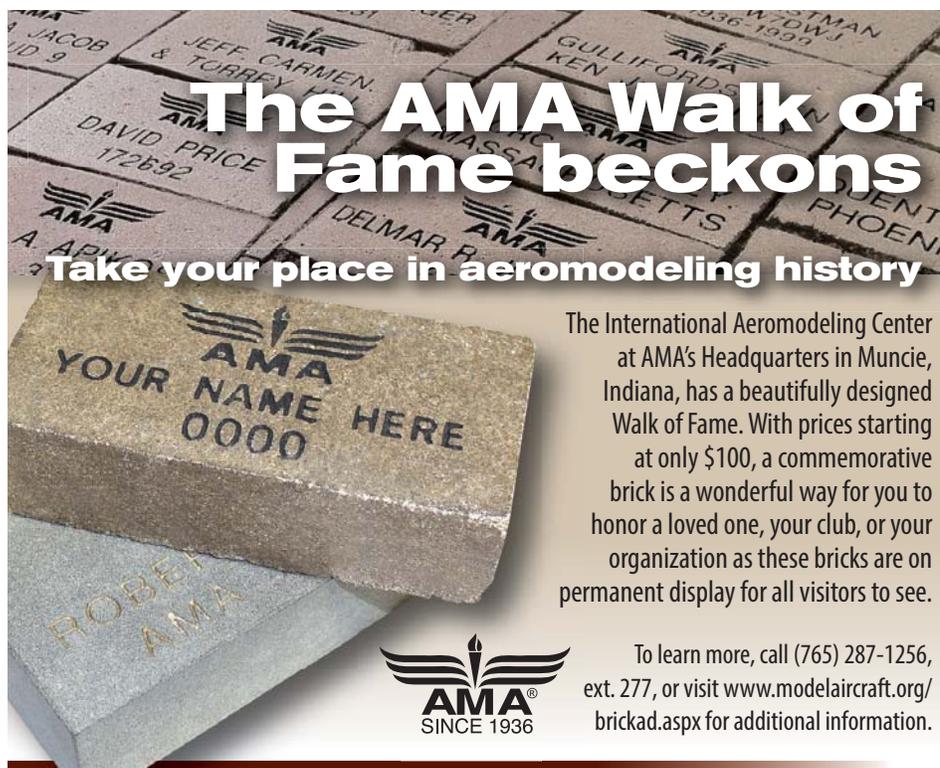
Do not keep the aileron/rudder stick deflected or you will continue to steepen the bank. After releasing the aileron/rudder, you must bring in up-elevator and hold it in (without aileron) all around the turn to make it level. (You have a few minutes to do this.)

Adding elevator while turning does two things:

1. It gives the wing the power (added lift) it needs to keep the model in level flight without dropping the nose and losing altitude.
2. It causes the airplane to turn, keeping that nose sweeping around in the turn.

LEARNIN' (OR RELEARNIN')
TURNING' FLIGHT FOR RC

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The AMA Walk of Fame beckons
Take your place in aeromodeling history

The International Aeromodeling Center at AMA's Headquarters in Muncie, Indiana, has a beautifully designed Walk of Fame. With prices starting at only \$100, a commemorative brick is a wonderful way for you to honor a loved one, your club, or your organization as these bricks are on permanent display for all visitors to see.

To learn more, call (765) 287-1256, ext. 277, or visit www.modelaircraft.org/brickad.aspx for additional information.



STORAGE OF YOUR NiCAD RC PACKS

Red Scholefield, printed in the newsletter for the Anoka County Radio Control Club, Inc.

How should I store my batteries at the end of the season? What should I do to them when I put them back in operation?

The batteries should be removed from the transmitter and airplane for long-term storage. Here in the South where a lot of us work out of our garage workshops, I recommend putting them in the refrigerator (not the freezer) during the off season. While not so important where your workshop rarely gets above 23°C (74°F), the refrigerator is still a good bet. Why? The failure mode of NiCads is separator failure; this is the material that keeps the plates from touching each other. When it fails, the cell shorts. At higher temperatures it oxidizes faster. In fact, the rate doubles for every 10 degrees Celsius increase.

Should I store my batteries charged or discharged?

It doesn't really matter, they will self discharge in a few months stored at room temperature. If you are going to store them in the refrigerator, the charge

will remain for a lot longer. I would discharge them first to 4.4 volts then put them away. Good cells will just set there in the discharged condition (the voltage can vary considerably, but is usually above 1 volt). In a battery with damaged, worn out separators in the cells, the cells are apt to short if left in a discharged condition. This is actually good since it is the first indication of a cell that's going bad and it is best to replace the pack. Batteries left on trickle charge will seldom short out since it is in the charged condition and any short that tries to develop will be zapped by the charge in the cell. Partial shorts, those having fairly high resistance, can be developing that can cause the cells to self discharge at a higher rate than normal and possibly leave you short in the middle of a flight after you just measured the cell when it came off charge with your ESV and everything looked okay.

Now when your batteries are coming out of storage, before charging, check the voltage without a load on the battery. It

should read well more than 4.0 even if it has not been charged all winter. They should be essentially fully discharged; or flat as we say in the business. In this condition if the battery is going bad, it will probably have shorted and you will read zero volts on that cell. It may be a soft short, one that could be blown away merely by the simple action of slow charging. Don't do it! It is just lying there waiting to bite you. Replace the pack. Cut out the "good" cells if you want and use them in something less critical than your model. If you have access to a cyclor, running through a couple of charge/discharge cycles is a good idea just to make sure you are getting the capacity you are supposed to. Anything less than 80% of rated is suspect. Once at the field, preflight battery checks are in order, particularly at the beginning of the season. Since those who religiously check their flight packs with an expanded scale voltmeter seem to crash less (due to battery failure) one must assume that the ritual is smiled upon by the RC gods. →

NO ONE FLIES ALONE

Ben Owen, Safety Officer, Milwaukee Area Radio Kontrol Society, Wisconsin

I once lost a big and expensive model on a test flight—a model that took many, many hours to build—sort of like the big and expensive 1/3-scale Extra 330L I am finally painting. On that day I was trying to get the engine to run right, put the antenna up, then down, etc. I made the mistake of taking off with it down. Still the receiver was working when a friend called that the antenna was not out; he could have been closer nearby to help prior to takeoff but I don't blame him. Looking down to pull it out took too long and the model stalled and spun. My point here: it was way too soon for me after my first wife's funeral to even be out there. I should have asked for help? Yeah I know; it's a guy thing. We never ask for help right?

If you are in a situation without the full use of you facilities—maybe it is a personal loss, or the day was just too hot and you feel like crap, or one is not thinking clearly—ask for help, or just take the model apart and go home to think about it. Make things move a little slower, give yourself time. Use situational awareness; when it is hot, the sun is too high, you are physically or mentally down, you know what I mean.

We have clubs so we can be friends and help each other. Two minds are truly better than one. There has always been a competitive spirit in modeling but don't let it get to the point of jealousy or back stabbing, we all lose when that happens. It helps no one.

We do have losses in this hobby; let's just try to minimize

them. A friend recently lost his model, in a vertical climb; he lost it in the sun. He *did* throttle back before it hit. Maybe those expensive sunglasses they advertise would help. Or maybe, one of us standing idly by but not helping, including me, should have been out there standing by him and maybe we could have seen something he didn't and helped. That's what a club is for. The excuses: it was the end of the day, it was hot, we were all tired, etc. I'm as guilty as anyone.

I can't always be on hand when someone flies and obviously, my so called "Safety Officer" brain was not working then. Let's make it a club rule: no one should fly without another pilot standing with him, watching for traffic, etc. Let's stop the senseless losses.

If you see someone flying alone, walk out to be that pilot's caller at the flightline to tell him where the other models are in the sky, etc. Even if unasked, it always helps. We guys, we never ask for help right? There is no sin in just helping, unasked. It is what friends do.

And when someone comes out to be your observer, accept it for what it is. In the past, I've had a pilot move away when I walked out to be his observer. He actually walked away—he wanted to fly alone. Then I called out the model traffic he was about to roll and loop into and he thanked me. Accept a friend's help, because we all need it.

Make it a rule: no one flies alone! →

LEARNIN' (OR RELEARNIN') continued from page 4

Dave says, "You put the bank in with the aileron/rudder, but you turn with the elevator."

I believe the reason he says you turn with elevator is that the aileron/rudder input both at the start of the turn, and at the end of the turn are transient events. The use of the elevator is constant throughout the turn.

But you all know that, right? Perhaps some of us who are learning or relearning forgot.

How do you get out of the turn? Release the up-elevator stick to keep from climbing and put in the same aileron/rudder in the opposite direction as you did when you entered the turn for the same length of time.

Now you are back in level flight. If you lose orientation in a turn, release elevator and use the opposite aileron stick as you did to get into the turn, for the same length of time and let the stick go again. You should be straight and level.

You might try practicing these moves on your transmitter at home until it becomes automatic. If you have a flight simulator, it is even better. Practice on that and get an immediate visual response. This will be good to practice on when a blizzard hits.

Dihedral plays into this. If you have high dihedral (such as in a FF model), some RC models may slowly return to level flight in the turn. By the time the turn

ends, however, it won't matter because you won't need aileron!

Most trainer airplanes with reasonable dihedral will maintain the back angle. If you make a mistake and keep the aileron/rudder stick into the turn, you will continue to steepen the bank until you are in a steep spiral dive, and the speed starts kicking up. The only thing to do then is to return the wings to level flight with opposite aileron, retard the throttle, pull up, and do it correctly the next time. Practice turns at high altitude until it's automatic, and then begin practicing low approaches to landing.

Keep on turnin'. Don't let it get a mile away. In strong winds, keep it upwind more than downwind to make landing easier if it quits.

Some Tips

Note 1: Watching an exhibitionist pilot do a steep climbout in a full-scale airplane scares me because airplanes are often overloaded on takeoff. One can see the slowdown and impending stall coming. There are entire many fatal takeoff stalls. I learned a trick in full-scale airplanes that also works in models.

When breaking ground and climbing out of ground effect, add a little down-elevator to let the aircraft build speed. If you do it correctly, no one will notice.

Climb speed can give you more control and ease your mind, and help you safely

ascend. It works well, especially in Wisconsin's high winds when you are trying to penetrate upwind gusts in a climb. It keeps the gusts from stalling you out (and down). It also looks more scalelike because our lightweight models tend to leap off the ground.

Ground Effect

When an airplane is within one wingspan height from the ground, this has the same effect as if the wing was much longer. You get wing efficiency and added lift, which is why our aircraft tend to float when landing. You also get extra range in ground effect.

World War II Navy pilots knew that flying in ground effect stretched their range when running low on fuel returning to the carrier. They flew down to just about the waves, coming home. They occasionally climbed in an attempt to see where the ship was. This task required concentration to stay out of the water and good navigation to find the carrier.

Note 2: Dave Scott tried to get his students to use both thumb and forefinger on the sticks because he believes it gives more precise control. Simply using your thumbs is a 'no-no' for him, so he tries to get all his students to use both when flying. He is equally convinced that transmitter trays are not a good idea and unnecessary. →

SUB TRIM AND LINKAGE SETUP continued from page 3

proper use of sub trims and to achieve an optimum servo/linkage setup:

1. Access the Sub Trim function on your radio and make sure sub trim settings are set to zero (0).
2. Access the Trim Offset function (another name for Trim Memory) and clear any offsets. Also make sure that the mechanical trim levers on the transmitter (TX) are centered in their center dents.
3. Plug the servo in the appropriate channel of the receiver (RX). Turn on both the TX and the RX. The servo should now be at its electronic center position.
4. Test the fit of the servo arm to the

servo, trying to get the servo arm to be at 90° to the servo as shown in the illustration. Try different positions if necessary, removing the arm, rotating it 90°, and inserting it back onto the servo output shaft. Use the position that is closest to 90°.

5. If the servo arm is not at 90° or perpendicular to the servo, use the Sub Trim function to adjust the arm so that it is at 90° to the servo.
6. Position the control surface so that it is in its neutral position. Now make and adjust the linkage. Adjust the linkage so that the control surface is at neutral when the servo is in its neutral position.
7. If the mechanical linkage cannot be

adjusted precisely enough, get it as close as you can and then use the Sub Trim function to make the final adjustments.

8. Now use the Travel function (or ATV or EPA depending on your radio) to adjust total travel in both directions.

Fly the aircraft and use the time levers for trimming. Now use the Trim Offset function (or Trim Memory—your radio should have a similar feature) to store the trims, allowing the trim levels to be returned to their center positions. If excessive amounts of trim are required, it is best to mechanically adjust the linkages and try to keep the servo as close to its electronic center as possible. →

FLIGHT FORMATION

Keith Davis, from the Pike Peaks Radio Control Club, Colorado Springs CO

Has there ever been a time when you looked up in the sky to see a bunch of airplanes flying in formation and wondered what type of formation it is and why that particular formation? Well, believe it or not, there are names for these formations and the airplanes are not just flying in some random pattern that looks cool (in most cases). Hopefully I will be able to explain some of the major types of formations used and some of the advantages and disadvantages of them.

Straight Trail Formation: Aircraft fly in a straight line, nose-to-tail. Usually each aircraft flies slightly higher than the one in front of it to avoid turbulence. This is the least desirable formation to fly in because it is difficult for the formation to determine what the lead aircraft is doing. Also in a combat situation, the entire flight may fly directly over ground, anti-

aircraft weapons and no one can cover the trail aircraft. In addition, this setup is the leading cause of most formation mid-air collisions.

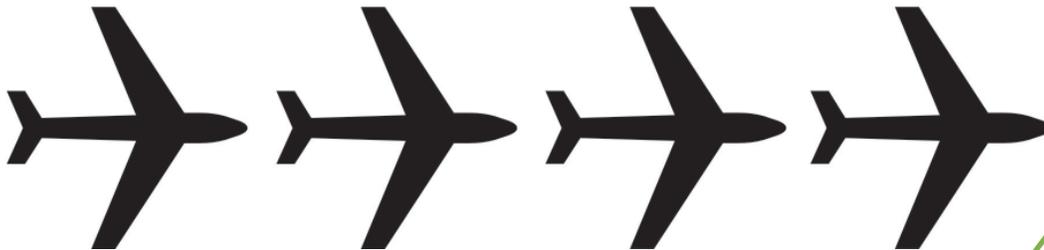
Staggered Right or Left Formation: The first aircraft leads formation. The second aircraft flies 30° to 60° off of the lead's wing. The third aircraft flies behind the first aircraft and 30° to 60° off of the second aircraft. The fourth aircraft flies behind the second aircraft 30° to 60° off of the third aircraft. This formation allows everyone to anticipate what the lead is about to do. This is a common formation for US combat transport helicopters. Many helicopters can fit into a small landing zone at one time and adequate fire cover can be provided for each other.

Echelon Right or Left Formation: The first aircraft leads formation. The second

aircraft flies 30° to 60° off of the first aircraft. The third aircraft flies 30° to 60° off of the second aircraft. The fourth aircraft flies off of the third aircraft. All aircraft will stay on the same side of each other. This is a common combat formation used by US ground-attack pilots. The lead aircraft would roll onto target and the flight would follow in, one at a time.

That just about covers the major formations used by most military and civilian aircraft. Of course there are many other types of formations out there, such as the "Vee" formation, diamond formation, and the box formation. You can see most of the fancy ones performed at air shows.

So now that you studied these formations, find a few of your flying buddies that you can really trust, and go out and practice a few of these. →



Straight Tail Formation.



Staggered Right or Left Formation.

Echelon Right or Left Formation.

TIPS & TRICKS

The Right Tool for the Job!

Here is a tip for those of us who have had the frustrating experience of ruining the head of one of those little Phillips head screws in an engine, or when assembling an ARF airplane or helicopter. It might not have been entirely your fault. You just may have been using the wrong type of screwdriver.

Since most ARFs, helicopters, and even engines are built in the Far East, many manufacturers use what are called "JIS" crosshead screws; JIS meaning Japanese Industrial Standard. The screws look almost identical to Phillips, but they are just different enough to make you a little crazy. Of course just like metric screws and bolts, the manufacturers may include both JIS and Philips screws in your kit.

The JIS can be identified by a tiny dimple on the head, or by the fact that you can only get them out by using vice grips! You won't find JIS screwdrivers for a dollar at Harbor

Freight, but they are available online in a wide range of prices. Just do a Google search for JIS screwdrivers. Try them; you will be happy you did!

—by Gerry Roedel, from the Tri-County R.C. Club,
New Jersey



Image from www.instructables.com.



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HEY SANTA, WANNA RACE?

**UNIQUE GIFTS FROM
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BEAT SANTA TO THE
FINISH THIS YEAR.**

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