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Radio set up is extremely important to excel in both sequence and 3D flying. There are many schools of thought on setting up a radio to fly a giant scale bird. If you are relatively new to competitive sequence flying and are looking for a better way to set up your radio to be more competitive, we offer the following suggestions. Tailor them to your needs as each pilot has his or her own comfort level developed over their years of flying. I (Gene Payson) started flying "Basic" following guidelines I picked up from several top pilots, most notably Dave von Linsowe. The following guidelines will give you a good starting point.

We hope that you have a good airplane. The better the airplane the better you look as a pilot. TOC pilots don't fly 40% aerobatic airplanes because they are hard to fly. It's because they are the easiest to fly. The contest is how well the plane is flown, not which pilot overcomes the poor flying tendencies of their airplane the best. A pilot will score better with an Extra 260 than with a Cub. It's harder to score well with a plane which exhibits roll or pitch coupling, pulls out on vertical uplines or downlines, has a high wing loading, or has little vertical acceleration. A better plane will make you a better pilot faster.

NOTE: When using 2 receivers on one airplane, have one receiver operate the left aileron, left elevator and throttle (and smoke), and have the second receiver operate the rest. This way if you lose a receiver, you should have enough control to bring the plane in safely.

Theory of radio setup

1) Different flight modes are a MUST.

When you fly in a contest you are not allowed to practice before your first round. When you do a snap, roll or loop if you need to hold the sticks in exactly the right spots, you won't find those spots exactly on the first flight of the day in competition. You won't because your fingers are stiff, your brain is racing, you're at a new field, you're hoping you pre-flew your plane correctly though you were interrupted several times during assembly, the sun is in your eyes, you're not sure of the line, there's someone else flying at the same time right on line with your plane, and you aren't warmed up at all. The trick is to flip a switch to get you into a flight mode and the flight mode is set up so that moving the sticks to full travel gives the desired effect. For instance, what you want to have happen is that you flip the switch to snap mode and simply push the sticks to the stops and release for the perfect snap. If you could set up your radio so that for each maneuver you just bury the appropriate sticks to the stops for a perfect maneuver, then you would get all 10's. If you have 8 maneuvers to do, each one would have it's ideal setup for the perfect maneuver. If you could set up your radio for each of the 8 maneuvers, you could proceed through the sequence very easily. But wait, it's even easier than that! Fortunately there are only 3 different set ups required which cover virtually all

sequence maneuvers. Perfect scores are now just a switch away! (However, flying 3D requires more modes.)

2) Keep flipping of switches to a bare minimum.

Flipping a switch requires a 2 step process: flip it on, then flip it off. This may sound simple right now, but not when you're in competition!! Believe it or not, it's easy to forget one or the other, or to forget what mode you're in and then how to get to the mode you want next based on what mode you are in currently especially if you aren't in your "standard" mode at the time. If that sounds confusing now, what about when you're heading straight down after a hammer and the next maneuver is a snap on the horizontal and you have a switch to flip?? Think fast because the ground is coming up in a hurry and the ground is unforgiving.

3) You will need fewer different modes in lower classes vs. upper classes.

The Basic sequence has fewer maneuvers, no unknown program, no snaps, and no inverted maneuvers. Take advantage of this by setting up your radio to fly the Basic maneuvers most easily and don't worry about other maneuvers yet. If you set your radio up with all the modes to fly Unlimited maneuvers and 3D flight right off the bat, you will find it very difficult to set up your radio because you won't know what you need, and there will be so many conditions that you'll become confused easily and make many mistakes. If you can get away with one mode, then do it. If you really need another, then add it, but only add a mode if you must. In Basic you only need two modes, a spin mode (if you have a spin) and a hammer mode. Otherwise, you only need a hammer mode to do all your flying.

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Setting up your radio:

1) Decide if you want to do 3D and Sequence flying with the same airplane:

If you also want to do 3D you will need digital servos for good resolution at small deflections and high holding torque to avoid flutter when at neutral. Set up the servo arms and control surface horns for as much deflection as you dare to fly with. There will be much more stress on the airframe from 3D flying so use the strongest set up you can obtain. Sequence flying will be done with 10 degrees of elevator, 12 degrees of aileron and 45 degrees of rudder. 3D flying needs up to 70 degrees of

elevator, up to 45 degrees of aileron and up to 50 degrees of rudder (or simply as much as you dare to have).

2) Getting a radio:

I use a JR 10X while many top pilots use Futaba. Hitec, Multiplex and Airtronics are not widely used though there are good models available. Servos are interchangeable for the most part, but receivers are not. You will eventually need a high level computer radio because to fly at a high level you need to tailor a computer program to your plane to fly best. Flight modes, flap switches, programmable mixing curves and independent control of control surface motion are required. Some of these features are only available on high level radios. While you may feel better about your skills because you fly knife edge without mixing by holding some up elevator and a little opposite aileron because of pitch and roll coupling to rudder, you are not going to compete with someone who has a plane which trimmed out using computer mixing. You will have to practice a lot more to be competitive. Put that practice time to better use by practicing higher level maneuvers. You don't need the challenge of flying without computer mixing, you'll have enough of a challenge flying a rolling circle with one roll per 90 degrees with alternating roll directions in front of thousands of spectators at TOC knowing you have to nail it perfectly because Chip Hyde just got a 9 on his in the last round without adding the challenge of flying the plane without computer mixing too. There are no extra points for flying a badly designed, overweight, out of trim plane with a non-computer radio. Get a good radio with all the bells and whistles because you are now going to need it.

3) Trimming your plane:

First and foremost, go to the NSRCA website and get their trimming chart and trim out your plane. Go to <http://www.nsrca.org> then go to the "Technical" menu, then to "Airplane Trimming". This will take 70 flights or so. This is extremely important to complete in it's entirety. During these 70 flights you should start to program your radio. These items should be done simultaneously or you will waste time. You will be setting up the maximum throws on the control surfaces when setting up your radio, and you will be setting the mixing and incidences using the trimming chart. Doing either the trimming or the radio set up first will require that it be done again (though it's always much easier the second time). The TBM planes are designed to fly on course no matter what heading, speed, or attitude. You will fight less with a good plane than with a poor plane even after proper trimming. The reason is that trimming is often only good for a certain speed or attitude, so the less trimming required due to the design of the plane and the weight of the plane, the wider the range of conditions the mixing will be good for. An example: Mixing a little down elevator at low throttle may keep the plane headed straight down if it has a tendency to pull out of vertical down maneuvers but when doing a hammerhead the down elevator is automatically applied at the top with unwanted results. Of course if the mixing is low or none is required, that is the best scenario. You can't do anything about that once you have a plane and it's built as straight as you can build it. Just trim it out the best you can and be aware of and manually correct the unwanted characteristics.

4) Level flight:

You want to pull a little in level flight and push a little in inverted flight. As you progress up through the classes you will find yourself inverted more and more often. You want the same feel upright and inverted.

5) Throttle set up:

Program a throttle curve so that the movement of the throttle stick is coordinated with engine rpm. This usually requires a steep curve at low throttle followed by a plateau to broaden the power band followed by a steep curve at the end. A curve is especially necessary when using canister mufflers.

6) Elevator Deflection:

At full deflection of the elevator the elevator throw will be greater when pushing than pulling. Also the expo when pushing should be slightly less when pushing than when pulling. Adjust so that the size of an inside and an outside loop at full elevator deflection is similar and the feel is the same around center. You'll need an advanced radio to accomplish this.

7) Switches for Sequence Flying:

Have three conditions for sequence flying (and use the flap switch for landing). One for snaps, one or spins and one for hammerheads. After time you will decide which mode you prefer for most flying and you will adjust your flying for that. I usually fly in snap mode, Dave usually flies in hammer mode. We both use a three position switch for the three setups. The mode we both fly in most often is in the center position so we don't have to flip through one condition to another which may cause the control surfaces to jump unnecessarily. Avoid using the rate switches individually for the rudder, aileron and elevators or you will be flipping way too many switches into too many positions too often. Use flight modes. If you don't have flight modes, simplify the changes to minimize flipping switches. The key is to set the ATV limits so that you can push the sticks to the stops and get the desired effect.

a) Snap Mode: At the more advanced levels, more and more snaps are introduced and are very important to do well for high scores. Set the throws up so that the plane just barely snaps at the throttle level that you are going to snap at which is usually about normal straight and level flight speed which is about 70% of full throttle or so. The slower and less "buried" the snap is, the easier it is to stop it on time. A plane with lighter wings will stop more quickly. A plane with fast and powerful servos will stop more quickly. Generally the ailerons move more than normal flying while the elevator and rudder move less. This will keep the plane on track. The speed at which the plane is flying changes the amount of throw required. It is best to use elevator to start the snap to pitch a

little, then introduce the aileron and rudder while simultaneously relaxing the elevator to unload the snap, and then ending the snap by releasing the rudder just before releasing the ailerons. Vertical up snaps are the most difficult while vertical down snaps are the easiest. Vertical up snaps use less or no elevator to break or to snap. Keeping up the speed on vertical up maneuvers is important so the less speed lost during the maneuver the better. Setting a plane up to snap in any attitude and over a variety of speeds is difficult and needs lots of persistence and practice to do correctly. A more forward CG helps the plane to stop the snap cleanly.

b) Hammer Mode: This can be for normal flying with medium rate ailerons, high rate rudder with expo about 70%, and elevator relatively low. Hammer by going vertical at full throttle, then cutting the throttle to idle, and just a second before the plane stops, move the throttle up 4 clicks above idle and give full rudder. As the plane has safely rotated, release the rudder to a smaller amount and bring the throttle to idle.

c) Spin Mode: There aren't many spins in a routine so this mode isn't used often though I like it for flying rolling circles. This mode should have lower rate ailerons, medium rate rudder and medium rate elevator. More elevator is needed to get the airplane to break cleanly. A more forward CG helps to get the plane to break and to stop the spin cleanly. Again, you want to have the plane just barely spin so you can stop the rotation on time. No flat spins!! That's a 3D maneuver.

d) Landing Mode: I use the landing mode switch to raise (not lower) the ailerons (spoilerons) 8 degrees to decrease lift so that the plane will drop during landing. The TBM planes are so light that they can easily overshoot the runway, so the spoilerons help the plane to land. Land in Spin mode to have more elevator throw.

8) Switches for 3D Flying:

You may need to have a separate plane called out for 3D effects as you may not have enough modes to fly all the maneuvers. When sequence flying use the "vonExtra 260" program; for 3D flying use the "3D vonExtra 260" program. Try to put some 3D modes into the sequence program to be able to practice both types of flying without landing. In your "3D" program, one mode should be for normal flying. This should be the same set up as your favorite sequence flying mode.

a) Normal 3D Mode: Have high rates on all surfaces with the right amount of expo so that at small stick movements the surfaces move the same amount whether in 3D mode or the standard sequence flying mode. This will allow you to fly in 3D mode somewhat smoothly.

b) Torque Roll Mode: This has high rates on all surfaces with little expo. Only put it in this mode when already in the TR position as it's hard to fly on the wing in this mode. This gives lots of control surface travel with little stick movement to help stay pointing upwards.

c) Flip Mode: Have flaperons which act as flaps (not spoilers) for flips, tight loops, walls, parachutes which stop abruptly and other maneuvers needing high lift.

d) Harrier Mode: Have spoilerons which act as spoilers (not flaps) for parachutes and elevators where you want to drop straight down like a rock with wings level, to stabilize harriers, or for other maneuvers requiring decreased lift.

9) Throttle set up:

Program a throttle curve so that the movement of the throttle stick is spread out around the range of torque rolling and slow maneuvering to give more control of minor throttle control movements at just above idle. This usually requires a plateau to broaden the power band followed by a steep curve at the end. A curve is especially necessary when using canister mufflers.

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