

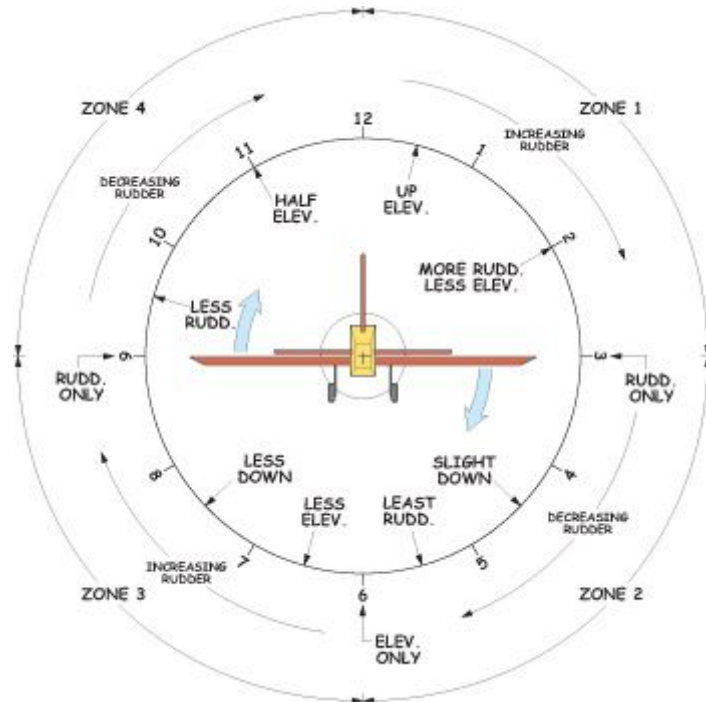
Pilot's notes

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flying the slow roll

Continuing our voyage of discovery into the art of aerobatics we'll take a look at the slow roll this time around, and in relation to this, the side-effects that your model may display through active use of the rudder. These side effects make such manoeuvres more difficult to perfect, so we'll briefly investigate why this is, and examine possible remedies.

So, without further ado we'll tackle what is one of my favourite manoeuvres in terms of challenge and appearance. Believe me, if you can properly deliver an excruciatingly slow roll below 50 feet from one end of your field to the other, onlookers will really be impressed...why? Because you must use all the controls to do it properly, let alone using them at the right time - you're flying every inch of the manoeuvre all the way around!



MAKE IT S-I-o-W

Remember our practice flight path? Crank up your angle of attack again, going for a 10 - 15° flight path... You should be getting pretty good at this rolling malarkey by now, so be confident. Break it in half again, performing the first part of your four pointer only until you get to the end of Zone 2, but do it even slower. In return for that effort you can skip the pause at the end of Zone 1. In other words, perform half a slow roll but think of it as two quarters of what you've already learned without the first pause. Concentrate on making it slow and steady; 2 seconds duration for this half roll is ideally what we're looking for, i.e. count 'one thousand, two thousand'. Keep doing that until you get a nice long, slow, half roll.

As with many manoeuvres the first part is the key where the introduction of a little rudder from the 12.30 position (soon after beginning the roll) along with a little elevator, helps to keep it on track. The faster you fly the easier this is to slow down, so hit the juice to start with but try to reduce speed a little as your confidence grows - say to 75% power.

When you have Zone 1 and 2 nailed, keep it going through Zones 3 and 4. These will be harder, and because you're blending all the controls with no pauses it'll require very careful co-ordination.

If you find this a little difficult then try approaching from straight and level inverted flight; following application of the roll command introduce rudder and elevator and try to get a smooth roll back upright. Remember the rudder stick will go in the same direction as the aileron in this situation because you're upside-down. When this feels good, bolt the two together.



The moment you start to get it roughly right and stop thinking about the zone clock and these instructions then you're almost home and dry; making the transition from instruction to intuition is our ultimate goal - not to have to think about it too hard but just do what's required. Zone 3 is likely to be where it'll go pear-shaped because everything's going back to front - but persevere. You can do this!

A good slow roll is three seconds long - you can't perform it at this speed without doing things properly. Five

seconds is great, and longer is outstanding, but by that time you'll be wanting to position the middle inverted part of the manoeuvre in front of you, and that means performing half the roll heading towards you! Remember where we started with all of this and our box in the sky with centre and end manoeuvres - the roll is generally a centre manoeuvre.

In due course you should be able to do straight, horizontal slow rolls at your choice of pace - and since you've mastered both the two-pointer and the four-pointer, then it's up to you how many hesitations you throw in-between. Just do a slow roll and then stop here and there!

Tackling this manoeuvre with a well-trimmed F3A style aerobatic model is much easier than with your average run-of-the-mill sports aerobatic type. The acid test in general is how the model responds to rudder commands. If you get a pure yaw response where the model neither rolls, climbs nor dives upon application of the rudder then rolling manoeuvres, particularly slow rolls and hesitation rolls, become much easier to perfect. But what if you do get adverse side effects?

KILL OR CURE

The majority of models aren't perfect in their response to control input, and such imperfection will often be down to the basic design itself - not problems induced by the builder. Many models have design flaws in them, and the most common of these is rudder response impurity. In other words you get more than just yaw for your rudder input. This affects the model in every attitude - for example through even the first quarter of a roll you might find yourself having to make elevator inputs to correspond with the rudder to correct the side effects.



Don't be disheartened if it's really bad, just keep trying to master it on the model you have whilst you seek a better one. Remember what I said earlier in the series? He who can fly a bad model well is ultimately more skilled than he who flies a good model badly, even though it might not be apparent to spectators!" When you get your hands on that good model it'll be child's play!

There's much to say about design and alteration of a model to improve its yaw response. Many solutions are quite drastic and may often involve taking a knife to the model to make material adjustments. With today's computer radio, small amounts of side effect can be programmed out,

which is definitely worth doing. But if the problem is quite severe then programming out might leave you with a difficulty somewhere else. For example the amount of mixed control throw on the other surfaces may be excessive, so resulting in a greater variance in the cure at different speeds and possibly promoting a premature stall in certain situations.

So what happens, and why? Most yaw response discrepancies are more practically fixed at the design or building stage and revolve around the amount of dihedral on the wing, the tailplane area relative to the wing and the position of the tailplane.

Conduct a test by flying straight and level, then apply rudder and observe.

Dihedral: The amount of dihedral (and in the case of high-wingers possibly even anhedral, i.e. opposite to dihedral) influences the model's roll response to rudder input. If the model rolls in the direction of the applied rudder (i.e. apply left rudder and the model banks to turn left) then you have too much dihedral - the model is behaving almost like a trainer. If the model rolls in the opposite direction to the applied rudder, then there's insufficient dihedral. If the reaction is quite obvious then you really should consider whether it's possible to take a saw to the wing, increase or decrease dihedral as required, then re-join and strengthen. If you're looking for purity and the model is worth it then make the change.

Tailplane: The most common fault with the tailplane is its position. If you observe the model diving when applying rudder from a straight and level path then the tailplane is likely to be too high, and it may have insufficient area. If the model climbs then the opposite applies.

A classic example is the Chris Foss Acrowot. This is a terrific time-honoured design and very pretty, too - we have a lot to thank Chris for with his WOT designs. I've owned a couple of these models and whenever I hear of anyone building one I recommend the following modification because the model is worth the alteration. Fact is, it's strong in every aspect except pitch response to rudder. The solution at the time of building is to lower the tailplane by 1". As if by magic the model's response to rudder becomes much more pleasant and there's no tendency to dive at the ground. If you can cope with the change to its appearance then also reduce the root chord by 1" and add 1 1/2" to its span

(including elevators) - but that results only in a minor change.

PITCH PATTERN

If the reaction to pitch isn't severe then there might be some small areas of change possible. Bear in mind that for every alteration made to treat a symptom, another effect could be produced elsewhere, so make one change at a time then re-trim and test the model in other manoeuvres. Possible causes of pitching can be:

1. Model pitches up: Move C of G back, increase wing incidence, add down trim to the ailerons.

2. Model pitches down: Move the centre of gravity forward, decrease wing incidence, add up trim to the ailerons.



WRAPPIN' UP

If you're satisfied that the behaviour of the model is great in every other aspect, and assuming you've experimented with moving the C of G around for the purpose of general set up, then it's simpler to program that computer Tx to smooth out the smaller side effects. But this is always a treatment of the symptom and not of the cause!

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