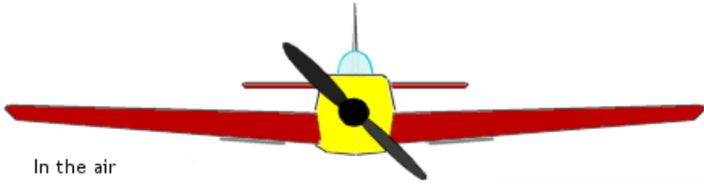


Final Geography Project – “Come Fly With Me”

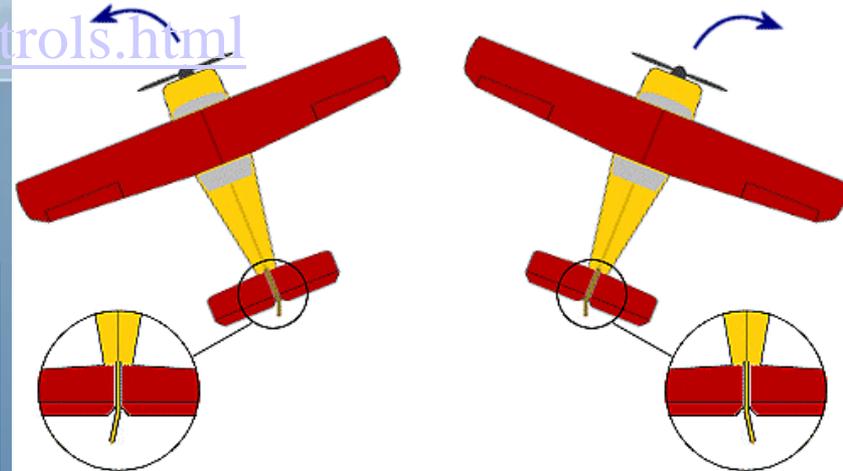
- **Introduction:** The purpose of this culminating project will be to demonstrate your knowledge of famous cities, geophysical features and landmarks from around the world! Using the Google Earth flight simulator or similar software, you will fly to various locations around the world and provide a narrated video tour as part of a travel company promo!
- **Requirements:**
 - 1) 5-7 minute video with narration, featuring information you have researched about each location (see below)! **25 points**
 - 2) Using Camtasia or similar software, record your simulated flight in Google Earth to at least 10 locations across ALL seven continents! Locations can include famous cities, geophysical features and landmarks, such as the Eifel Tower, Mount Fuji, Moscow and the Forbidden Palace. Locations can even be underwater (think Titanic!) if you have the right vehicle! **25 points**
 - 3) One of your landmarks must be created in Google Sketch Up and imported into Google Earth for the flyover! **25 points**
 - 4) Complete at least four flight maneuvers you learned from Mr. Cegielski’s flight school! **25 points**
- **TOTAL: 100 POINTS**
 - **By the way, have you passed my flight school?**
- **Helpful online resources:**
 - http://www.gearthblog.com/blog/archives/2009/08/planes_for_google_earth_flight_simu.html
 - <https://support.google.com/earth/bin/answer.py?hl=en&answer=148089>
 - <https://support.google.com/earth/bin/answer.py?hl=en&answer=36241&topic=2376994&ctx=topic>

<http://www.rc-airplane-world.com/rc-airplane-controls.html>

On the ground



In the air

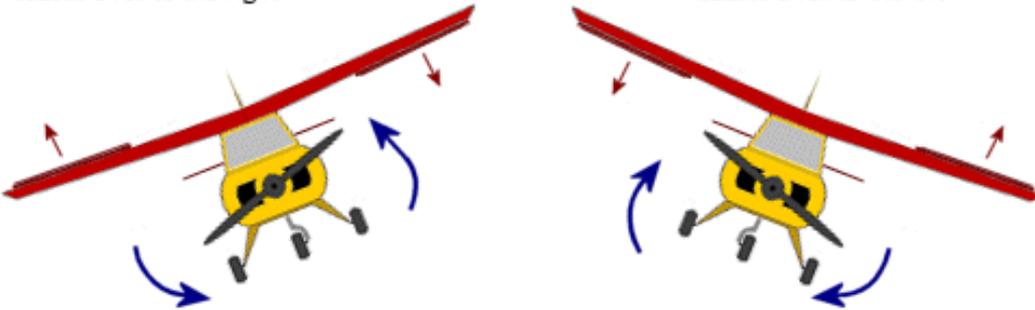


Left rudder cause left yaw

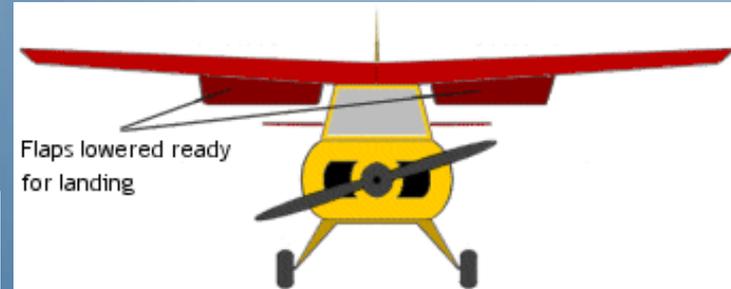
Right rudder cause right yaw

Left aileron down, right one up causes a roll to the right

Left aileron up, right one down causes a roll to the left

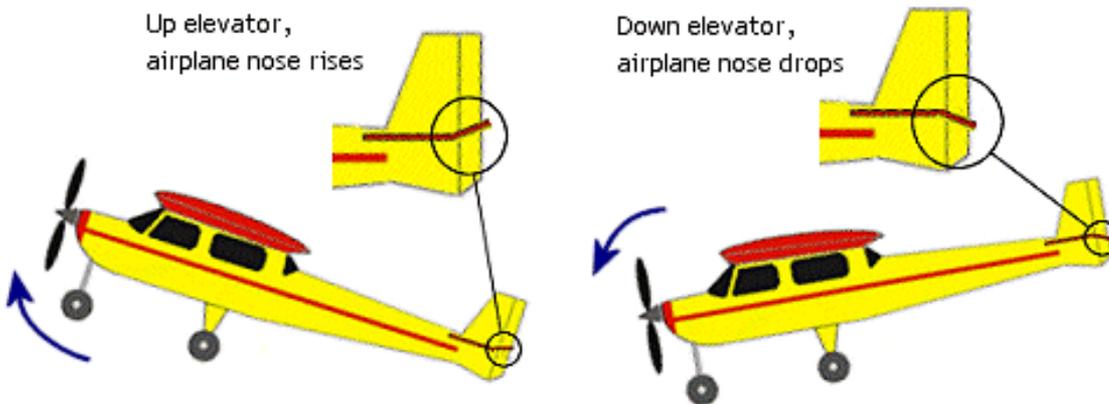


Flaps lowered ready for landing



Up elevator, airplane nose rises

Down elevator, airplane nose drops



Throttle

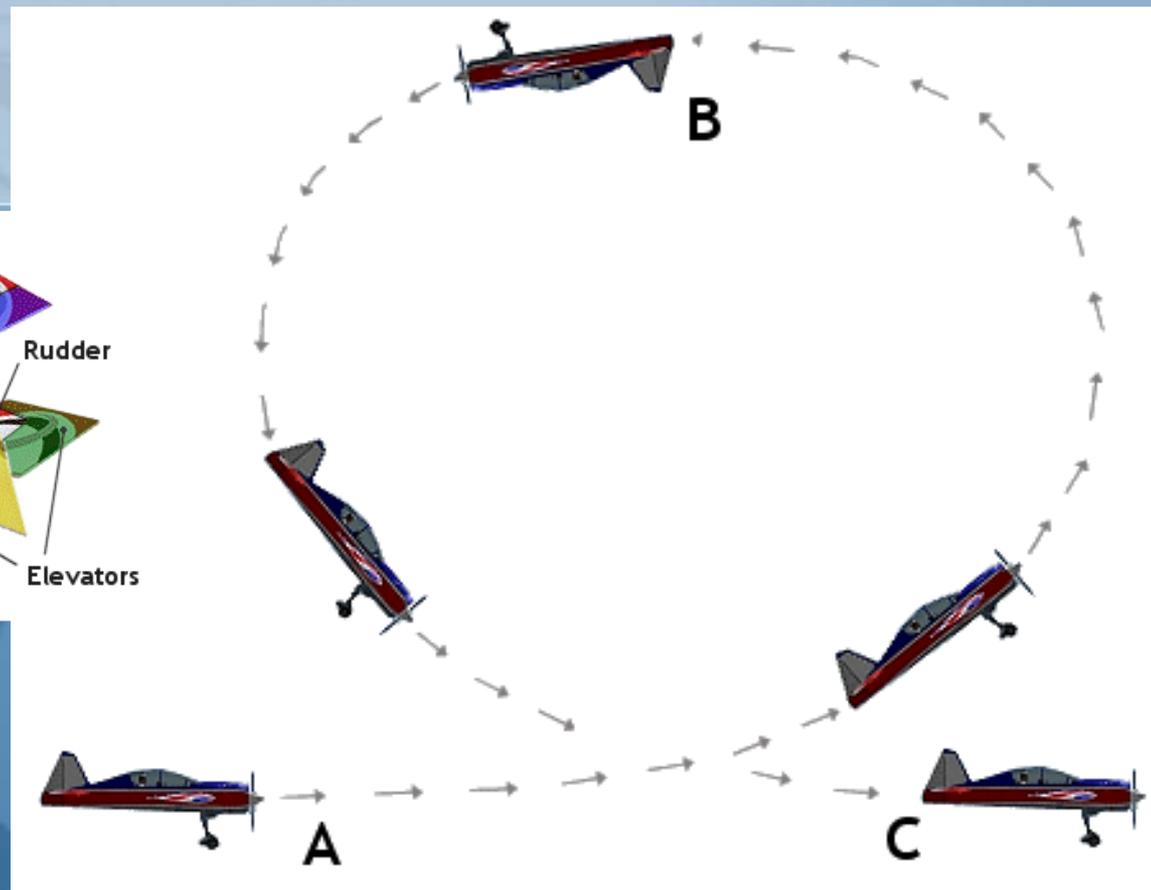
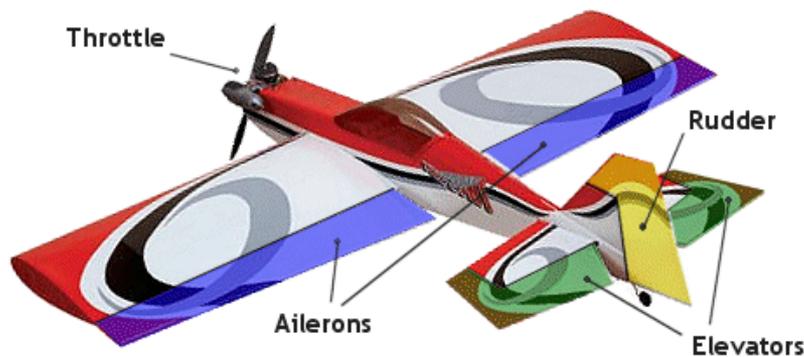
Rudder

Ailerons

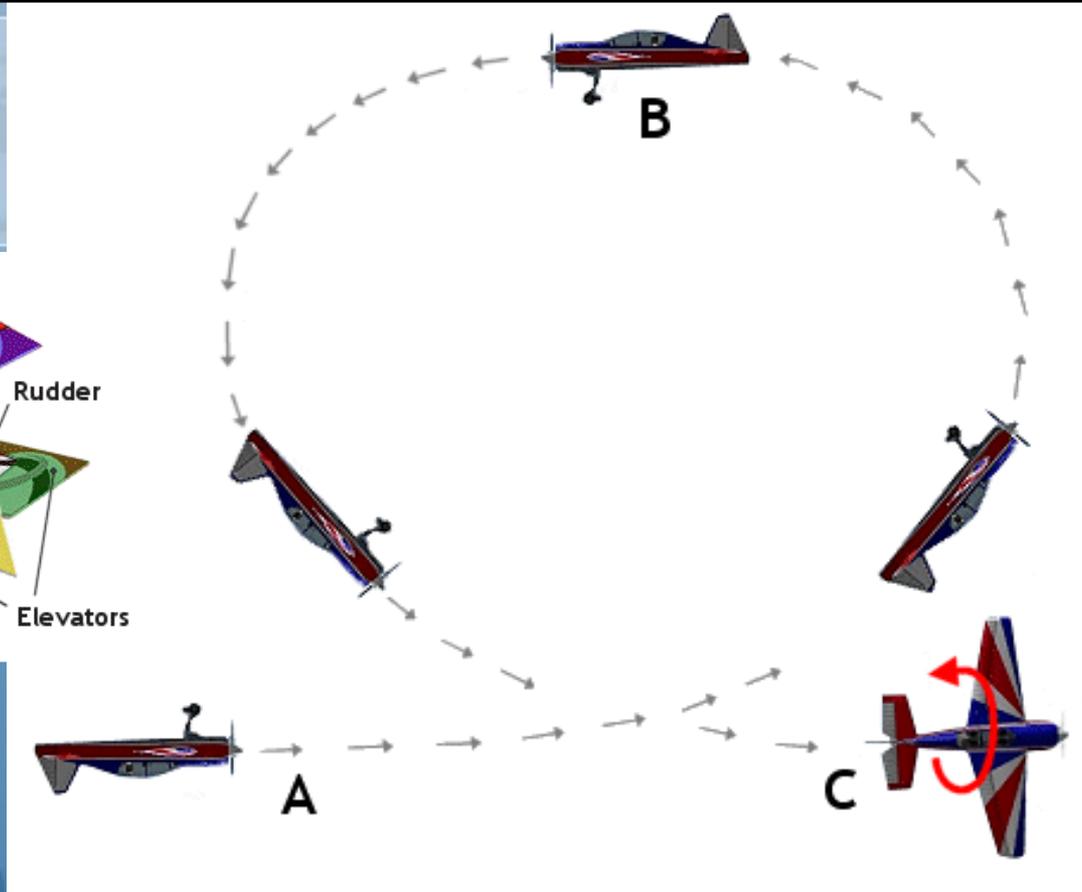
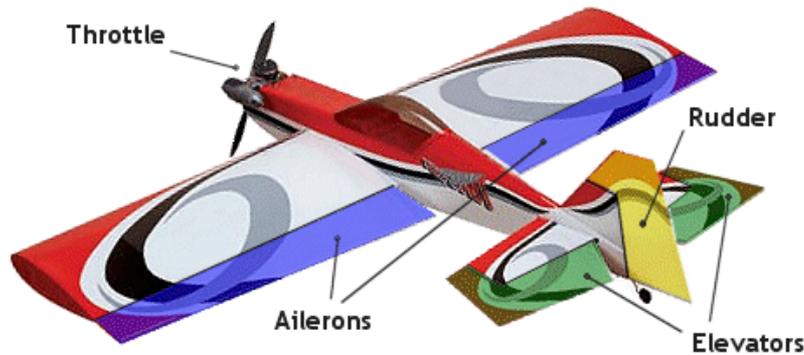
Elevators

• **Basic plane controls!!!**

LEVEL I:



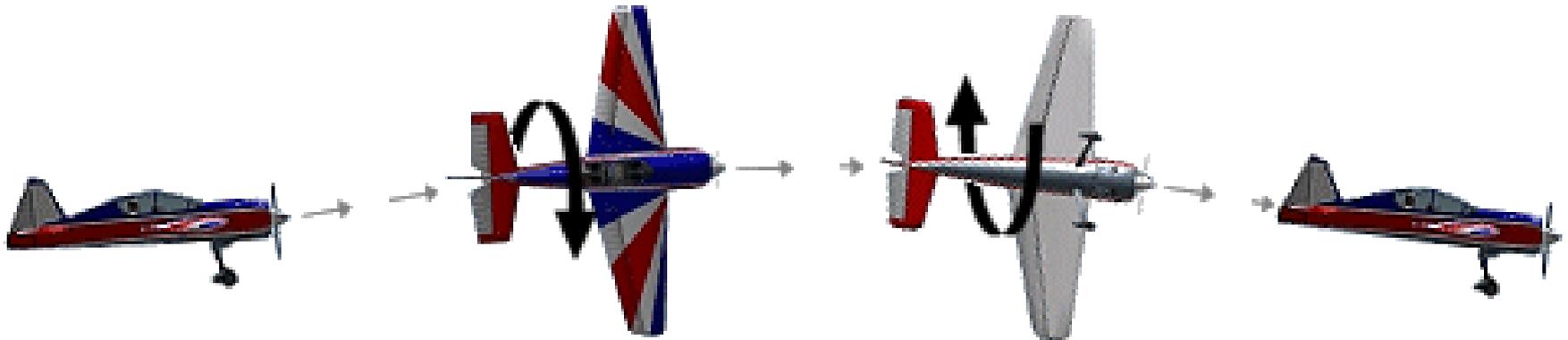
- **INSIDE LOOP** - How to fly it: The inside loop is the easiest of all stunts to pull off and any rc airplane with elevators is capable of looping. Start by flying straight and level into wind, no lower than, say, 50ft/15m high. Open the throttle to full power and, at point A in the picture above, pull back on the elevator stick to start a climb - not too suddenly, be gentle but definite. Keep the power on. The airplane will go into a vertical climb, let it keep going until it starts to roll over onto its back - point B in the picture. At this point, close the throttle and keep holding the elevator stick back, adjusting it as necessary to maintain a tidy path. You might also need to use ailerons/rudder to keep the path of the loop as vertical as possible. At point C in the picture, level out the airplane by returning elevator to neutral and increase power to exit the loop, flying straight and level again.



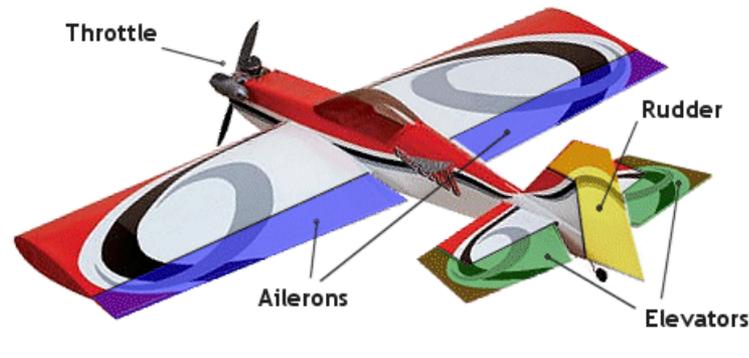
- OUTSIDE LOOP** - How to fly it: Method 1: The outside loop, also called a bunt, is an inside loop but with the airplane inverted *i.e.* the top of the plane faces outwards. Your airplane must be inverted (*i.e.* rolled through 180 degrees) at the start of the loop (point 'A' in the picture). The danger here is to remember to use down elevator to get the airplane to climb. Accidentally applying up elevator at this point will send the airplane crashing in to the ground!

Keep holding in down elevator and let the airplane do a full loop. At the top of the outside loop (point 'B'), your airplane will be right side up. Reduce power and continue the loop back down towards the ground and at point 'C' roll through 180 degrees to bring the airplane right side up to exit the maneuver.

- Method 2: An outside loop can also be started from the top (point B in the above picture), by flying straight and level at a good altitude and applying and holding in down elevator all the way round the loop. You need to reduce power at the start of the dive until the bottom, then increase to full power to complete the second half of the loop.



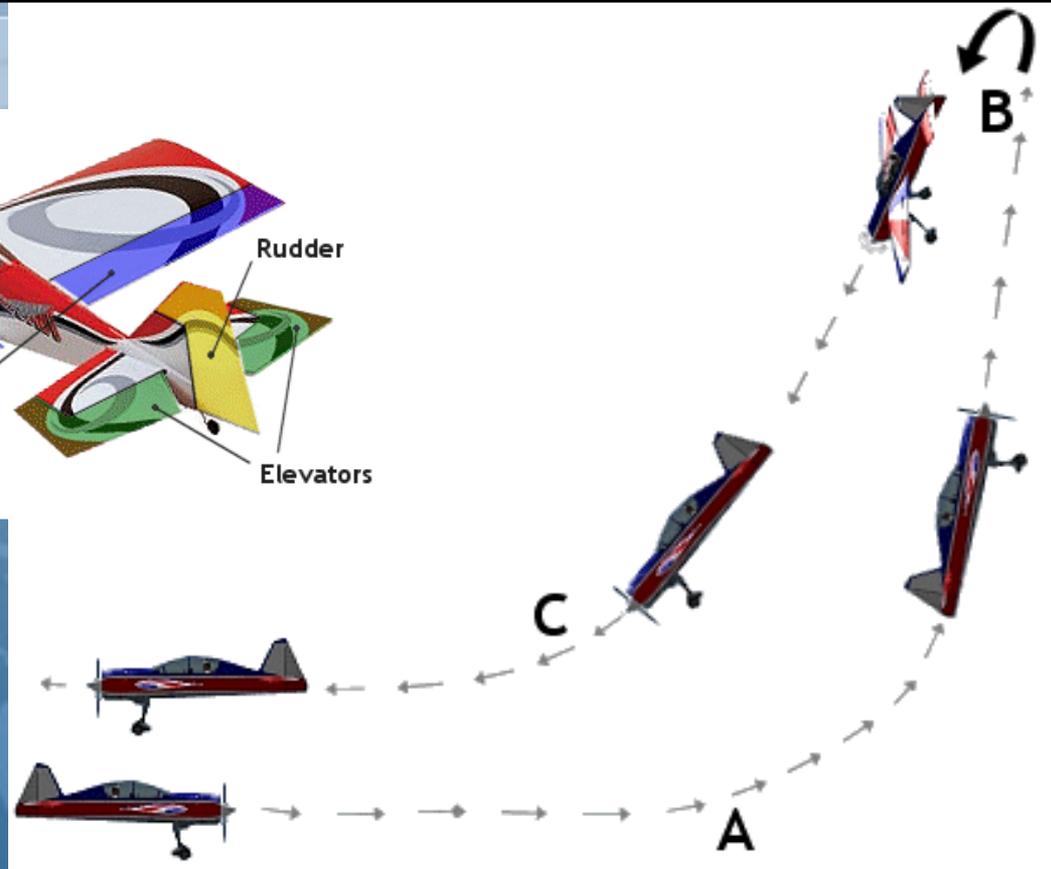
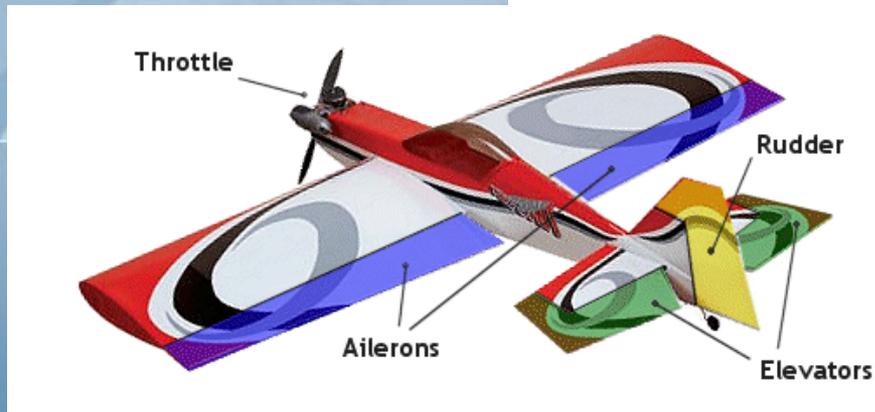
<http://www.rc-airplane-world.com/basic-rc-airplane-aerobatics.htm>



THE ROLL - How to fly it: The roll requires ailerons but if your airplane only has rudder then you might be able to pull off a larger, somewhat untidier 'barrel roll'. A roll with ailerons is a very smooth maneuver and not too difficult to pull off. Same start as the inside loop; fly straight and level on at least half throttle. To begin a roll, apply a very small amount of up elevator and left or right aileron a split second afterwards. No need for full power this time, keep the throttle stick where it is throughout the roll. If you are using rudder alone you'll need to apply much more up elevator and put the plane in to a small climb before rolling.

As you apply elevator and aileron, the airplane will start to roll over. Keep the aileron stick in the same position but you will probably have to adjust the elevator to keep the roll tidy. As the plane inverts, release elevator and apply a tiny amount of *down* elevator when the airplane is fully inverted, this will prevent any loss of altitude during the roll (generally speaking...).

Once the airplane is right-side up again, return the sticks to neutral and resume straight and level flying.

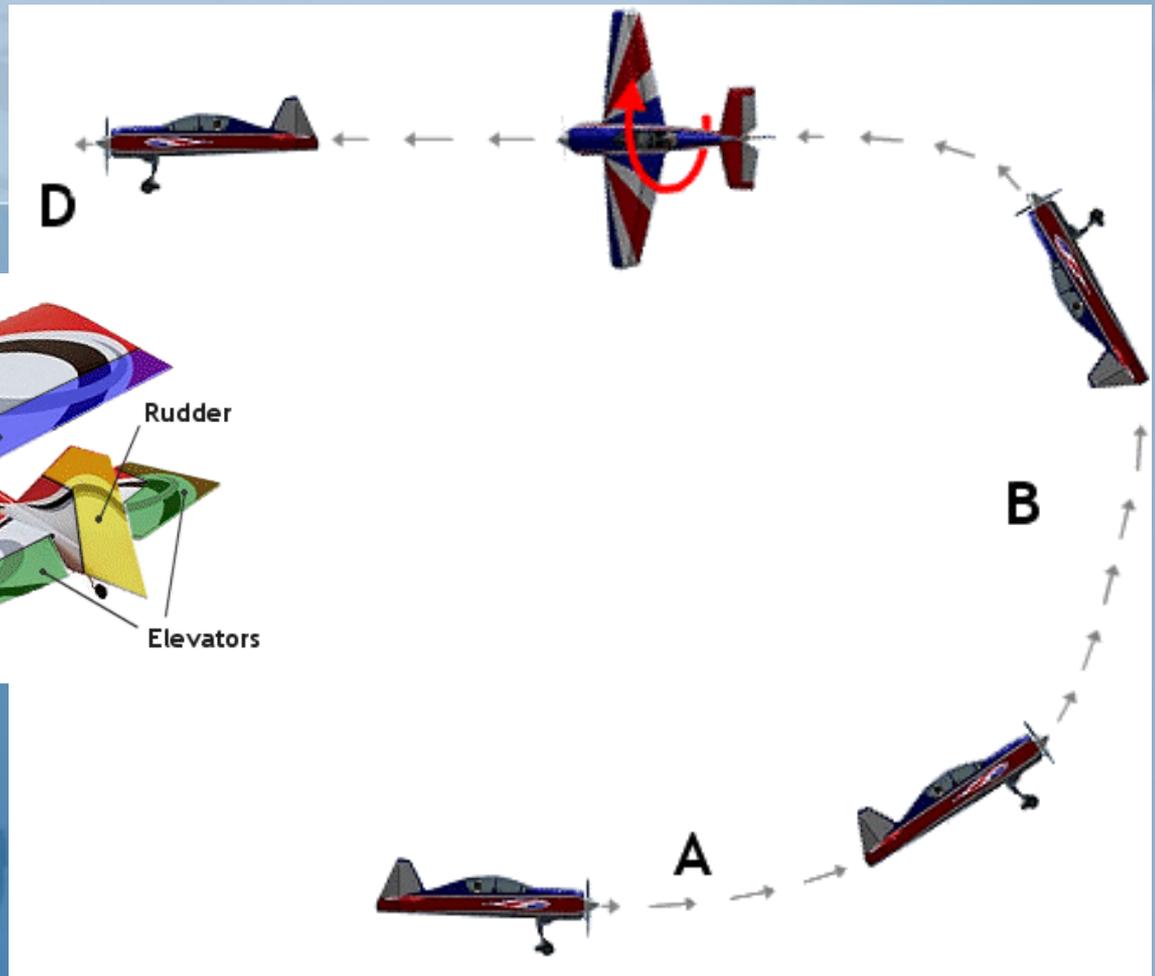
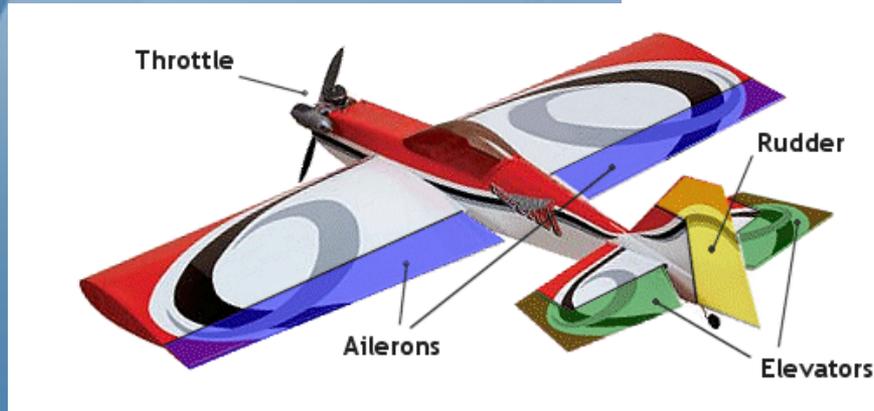


- THE STALL TURN “HAMMERHEAD”** - How to fly it: As before, begin with a straight and level flight path. At point A in the picture above, increase throttle slightly and apply up elevator, putting the airplane into a vertical climb. Adjust the rudder and elevator as necessary to maintain the vertical climb *without* going into the beginnings of a loop. Let it climb for a couple of seconds and then, at point B, reduce throttle*, release the elevator stick back to the neutral position and - here's the important part - apply full rudder to the left or right. If the airplane doesn't look like it's going to turn on its tail, give the throttle a small blip to get some prop wash (air movement) over the rudder. Once the airplane has spun round on its tail, return the rudder to neutral and let the airplane go naturally into a brief vertical dive for a second or so. Then, at point C, apply both motor power and up elevator to pull out of the dive and resume straight and level flying.
- *How much you reduce throttle depends on a few things, not least of which is the type of plane and size of rudder. You might need to keep some power on to increase the prop wash (i.e. airflow) over the rudder, to facilitate the turn.

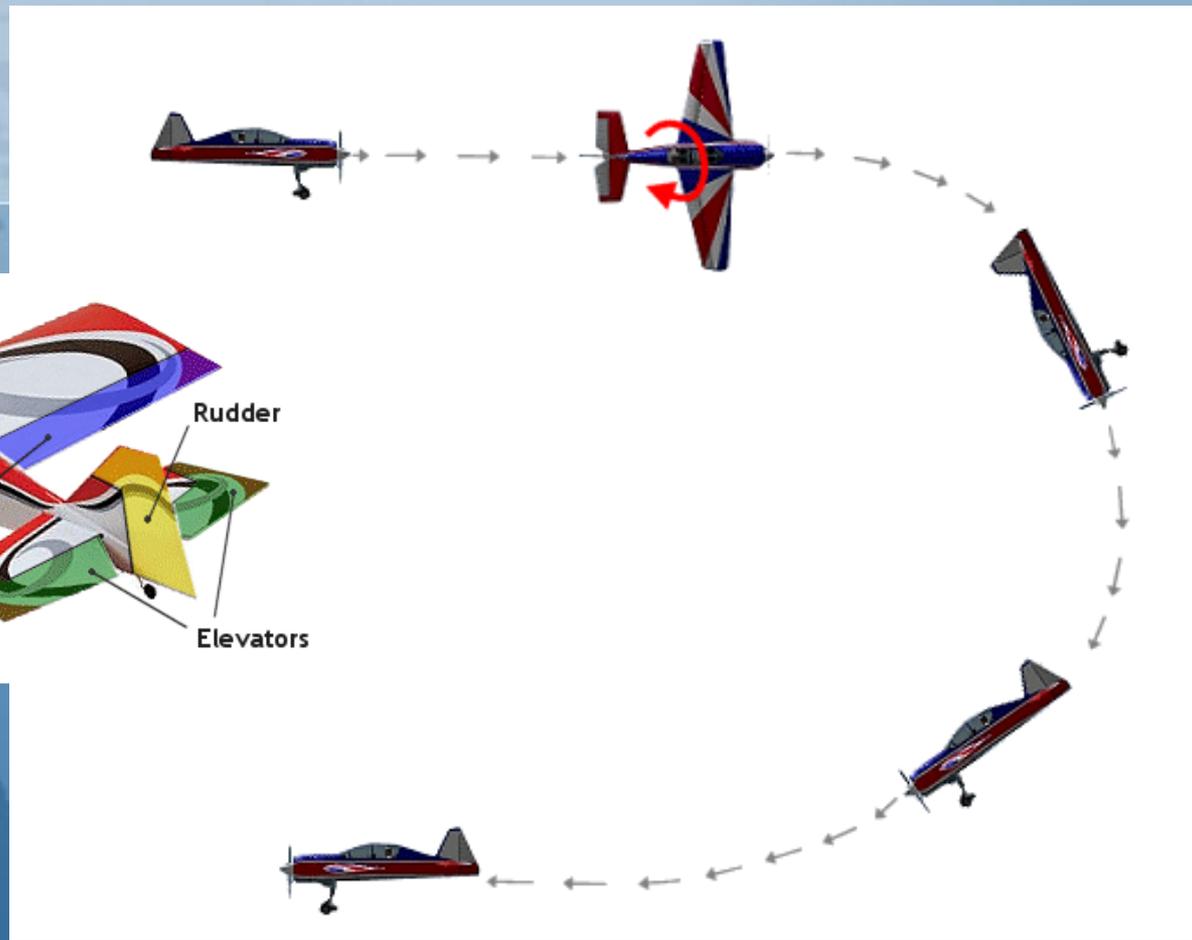
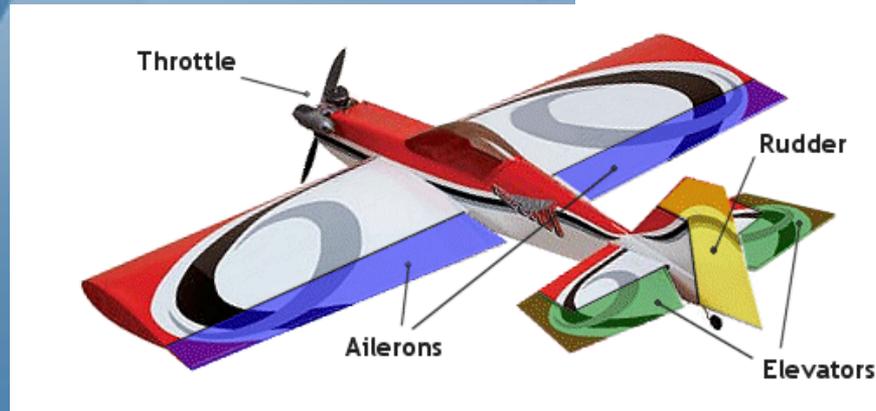
WELCOME TO FLIGHT SCHOOL, LEVEL II!

- This time, it's worth 20 additional points! This is a required assignment, not extra credit! I will report to him whether this class was successful! Four new challenging tricks as well as a final challenge!

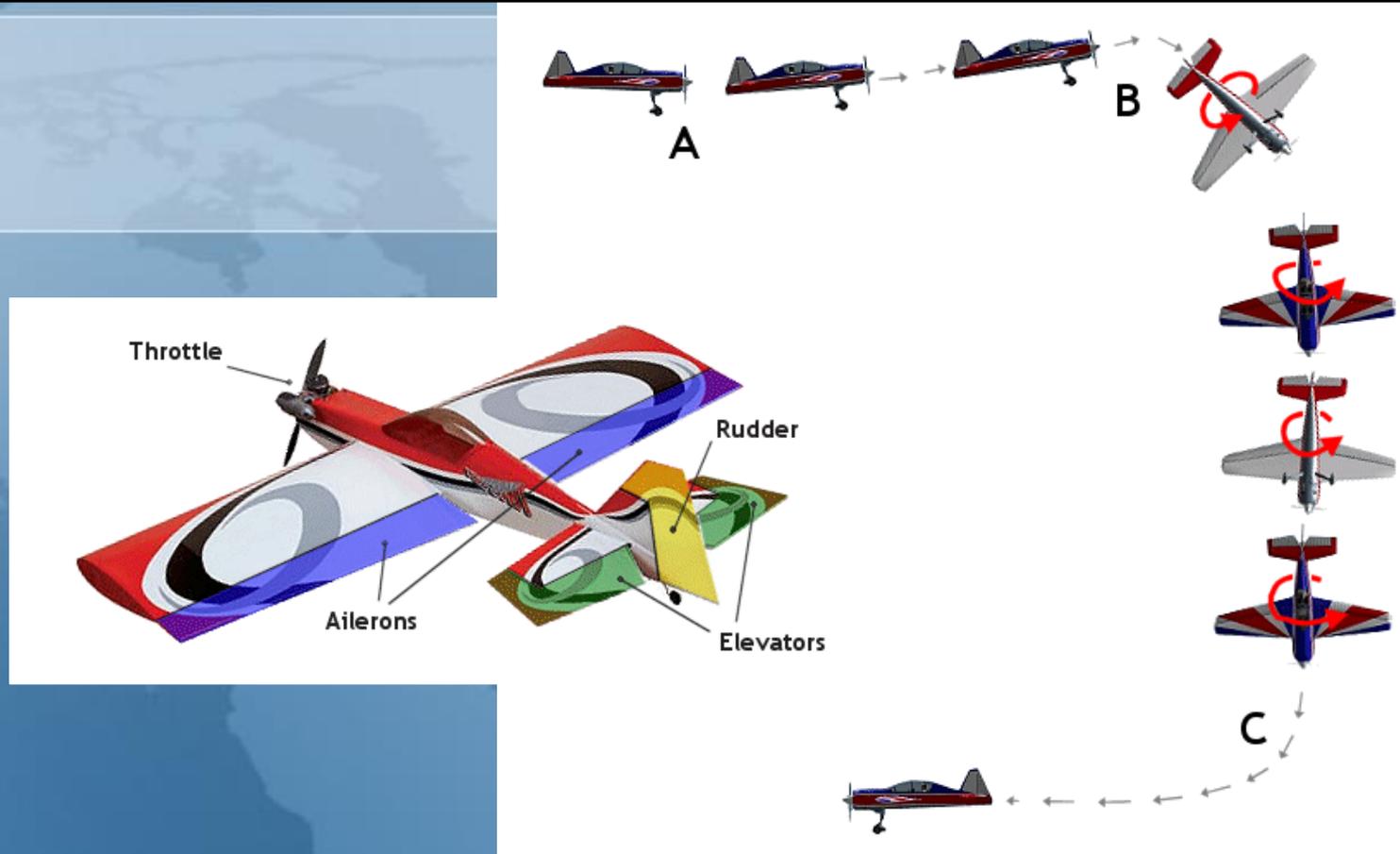




- **The Immelmann Turn** – How to fly it: Named after the German WWI fighter ace *Max Immelmann*, this aerobatic maneuver is a modified and simplified version of his attack maneuver that he used during dogfights.
- Commence the maneuver as if performing a standard inside loop *i.e.* enter the maneuver from straight and level flight at point A in the picture above, with full power. Let the airplane complete its vertical climb and roll over onto its back, then at point C use aileron to roll through 180 degrees. Level the airplane out once it has rolled over, and exit the maneuver on a straight and level course, higher than and in the opposite direction to your initial entry course.



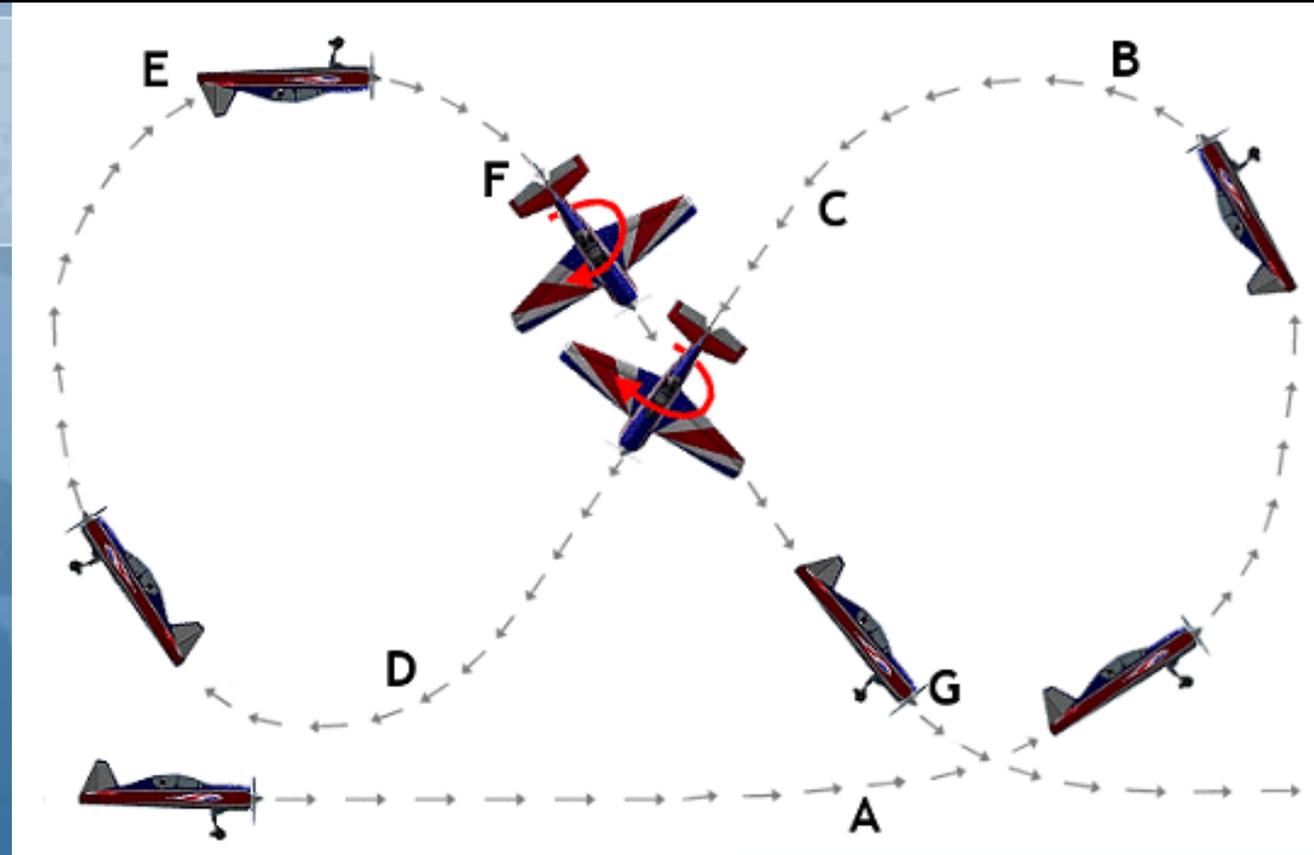
- **The Split-S** – How to fly it: The Split-S is essentially an inverted Immelmann turn, if you like. Starting with straight and level flight at a higher altitude, the airplane is rolled through 180 degrees at the start of the maneuver. *Up* elevator is applied as soon as the airplane is inverted, and the throttle reduced. The airplane then enters an 'inverted' dive and is flown towards the ground. Keeping up elevator applied, the airplane is pulled out of the dive and returned to straight and level flight to exit the Split-S maneuver. No rolling out is necessary, as the airplane will already be the correct way up.



The Spin – How to Fly it: The spin is a favorite rc airplane aerobatic maneuver and spins can go very well or disastrously wrong, depending on how much altitude you leave yourself to recover! During a spin, the airplane flies vertically downwards while rotating about it's longitudinal axis (*ie* about its fuselage). Ailerons are needed for a smooth spin, trying to spin your airplane with rudder only will more than likely result in nothing more than a wishy-washy 'spiral dive'. How to do it: Enter the maneuver into wind, flying straight and level but at a slow speed and with plenty of altitude (point 'A' in the picture above). Slow your airplane further by reducing throttle completely and applying up elevator - not too much, but just enough to initiate a full stall. The timing here is quite critical, you need to apply full rudder and full aileron (both in the same direction) just as the airplane stalls, point 'B' in the picture. If you've got it right, the airplane will continue its stall while entering a spin. Keep both rudder and aileron fully deflected for as long as you want to hold the spin. Recovery is simply a case of returning rudder and aileron to neutral while applying up elevator and throttle to pull the airplane out of the dive (point 'C').

HERE'S A SPECIAL ONE SAVED FOR LAST...

The "Rivera 8"!

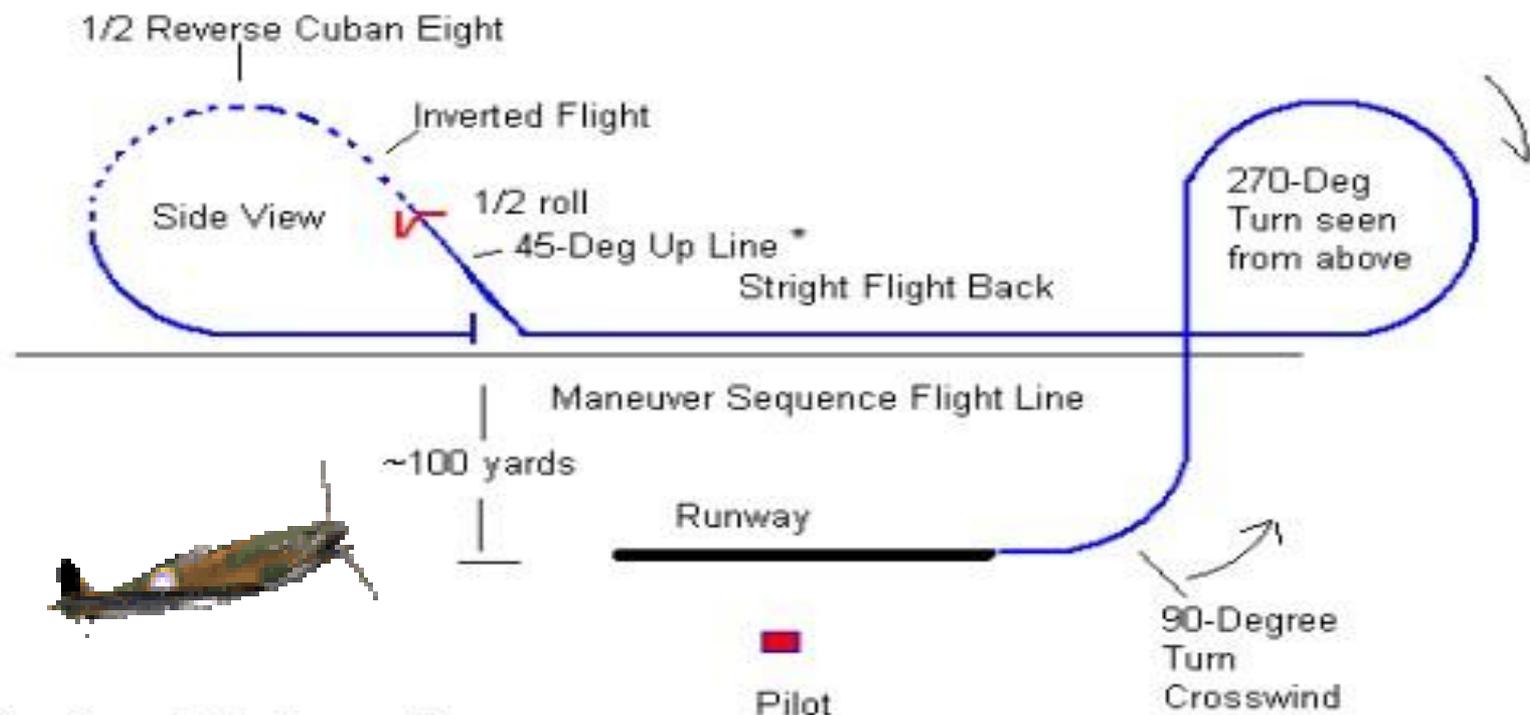


- **The Cuban 8** – How to Fly it: The Cuban 8 is one of the largest, most challenging maneuvers! How to fly it: Fly straight and level into wind and at point 'A', in the picture above, apply full power and up elevator to initiate a climb, as if starting an inside loop. Let the airplane go into its vertical climb and roll over onto its back at the top of the loop, point 'B'. Continue with the loop but at point 'C' apply aileron to smoothly roll through 180 degrees, bringing the airplane right side up. Use elevator to maintain a 45 degree dive. Continue the brief dive and level out at the altitude at which you entered the maneuver. As soon as you've leveled out, point 'D', begin a second loop and repeat the process of letting the airplane roll over onto its back, point 'E', before applying aileron at the start of the dive, point 'F', to roll through 180 degrees. Continue the 45 degree dive and start to recover at point 'G', to resume straight and level flying at your original altitude.
- To test your accuracy successive Cuban 8s can be flown while trying to keep the cross-over point in the same place in the sky, and both loops equal size.

60-Deg. Marker

Center Marker

60-Deg. Marker

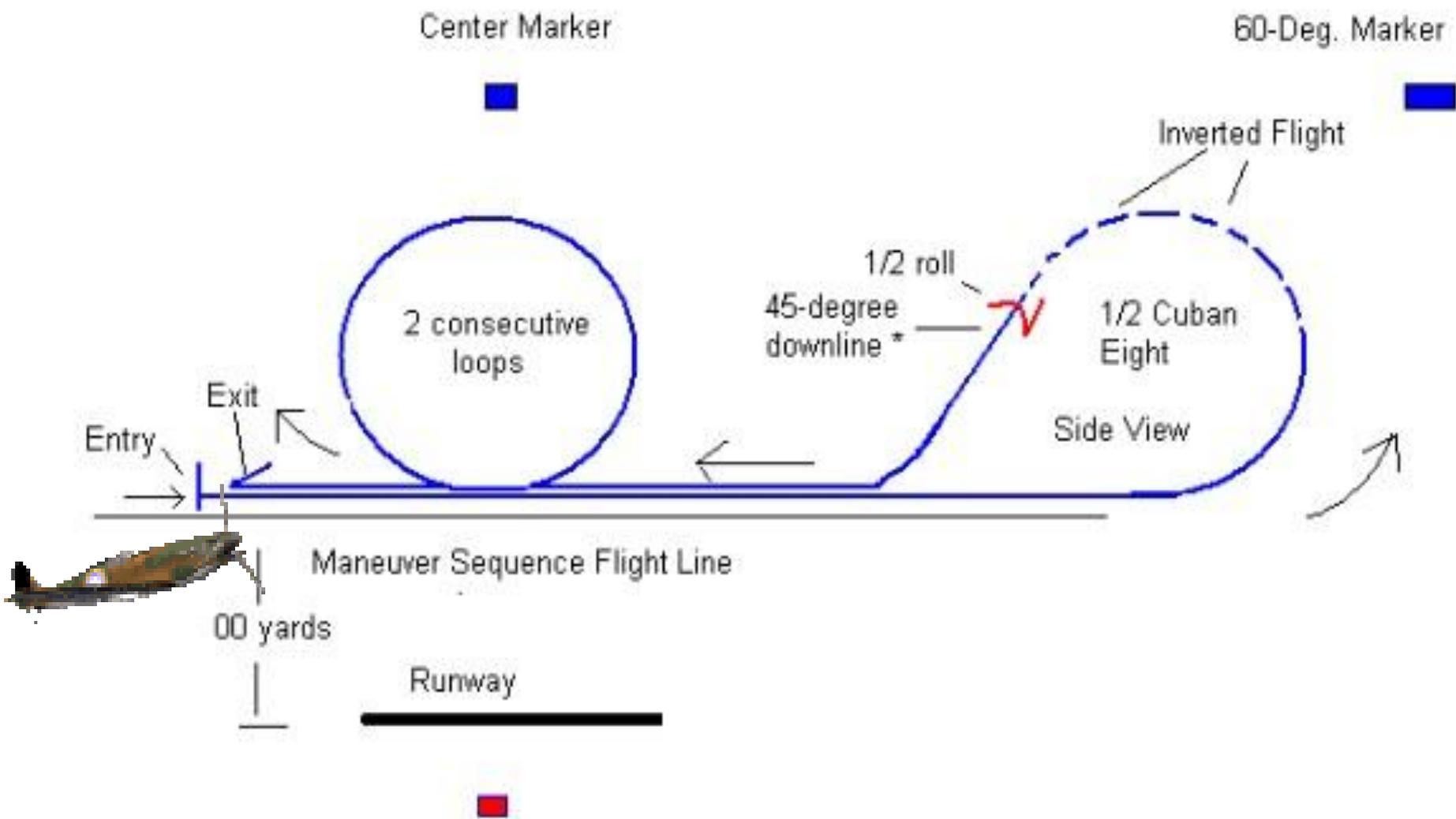


* When flown in the "corners", a 45-degree up line appears to the pilot as if it were 60-degrees up.

Takeoff Sequence
Fig. 6

<http://masportaviator.com/2006/03/13/all-together-now-part-one/>

Level 3: A New Challenge!!! 10 points!
Combo with the next...



Continue from last maneuver!!!

LEVEL 4: THE FOUR-POINT ROLE? 10 points

Finish last 90
Degrees, spin
Level out



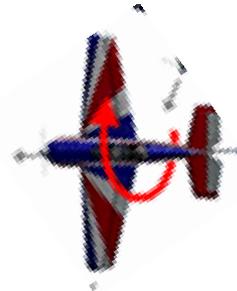
Spin 90 degrees
Right (hold 3 sec)



Spin 90 degrees right
(hold 3 sec)



Spin 90 degrees
right (hold 3 sec)



Spin 90 degrees
Right (hold 3 sec)

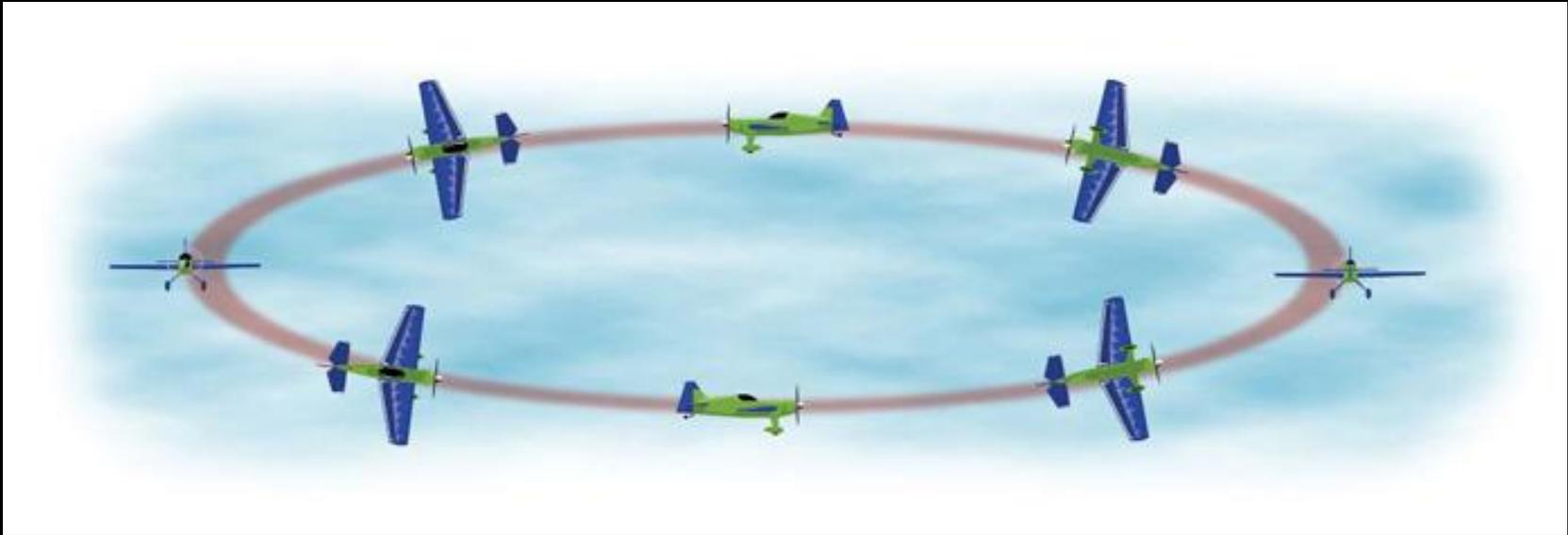


LEVEL 5: THE ROLLING CIRCLE!

10 POINTS

<http://www.flyrc.com/500501>

<http://www.youtube.com/watch?v=--UqsneUe5Q>



- A basic rolling circle is not heading-dependent, i.e., it isn't focused on hitting a precise number of rolls and precise headings. The goal is to try to maintain a constant roll rate, constant altitude and some turn rate. At the beginning, simply ensure that the turn rate continues, and we'll work on hitting precise points later.
- During your first attempts at basic rolling circles, it is important to start high enough to recover from a half loop if the maneuver doesn't go as planned. (Yes, I'm speaking from experience.)
- Start by initiating a linked roll to the left. Focus on keeping the nose high with rudder and elevator. After 1 or 2 rolls, add a very slight up-elevator at the right knife-edge position (right wing high) and a slight down-elevator at the left knife-edge position. The slight elevator will induce a slow turn rate. For their first couple of tries, I prefer to see students climbing—using too much rudder and elevator—rather than descending during the maneuver.
- Continue the linked rolls with elevator compensation for turn rate as far into the turn as you can. If you descend, be careful to stay high enough to make a recovery. The goal is to be able to maintain a constant rate of roll. It is OK if it takes you 10 or more rolls to complete a full 360-degree turn; the goal is to maintain orientation.
- As you become more comfortable with basic rolling circles, try increasing the rate of turn and decreasing the rate of roll with the goal of making one roll per 90 degrees of turn. When you're able to maneuver the model safely through a full 360-degree basic rolling circle, move on to precision rolling circles.
- Finally, rolling circles should also be flown "outside" by rolling in the opposite direction of the turn, i.e., right roll while turning left. You will have to reverse the required elevator inputs to keep the model turning during basic outside rolling circles. Definitely practice all the variations, including varying roll direction and turning direction. I tend to practice rollers with a left roll. For me, they are easier. I really have to make a concerted effort to force myself to practice right rolling circles. Be sure not to focus on rolling or turning in only one direction when you practice rollers.