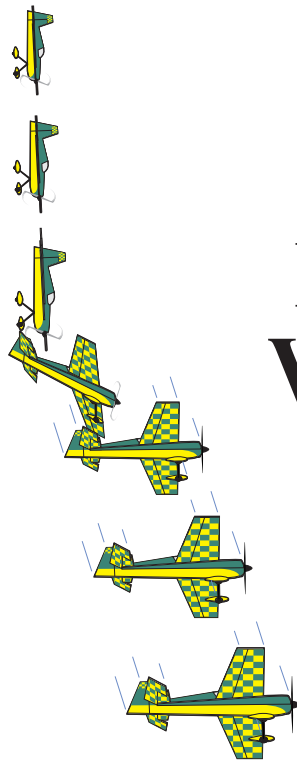
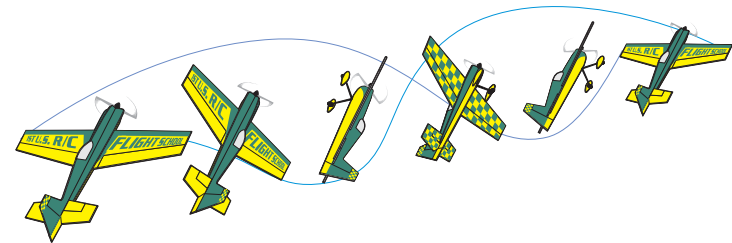


High Alpha 3D Maneuvers

Harrier Pass



**Elevator
Back Flip
Parachute
Whip Stalls**



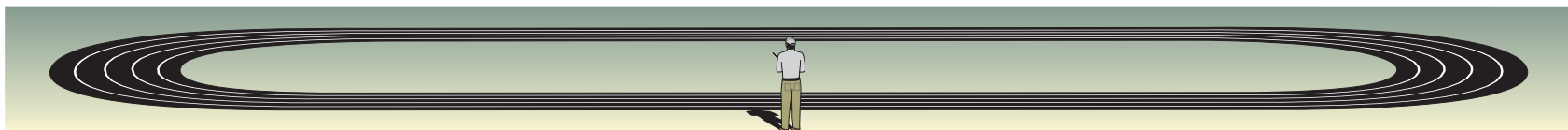
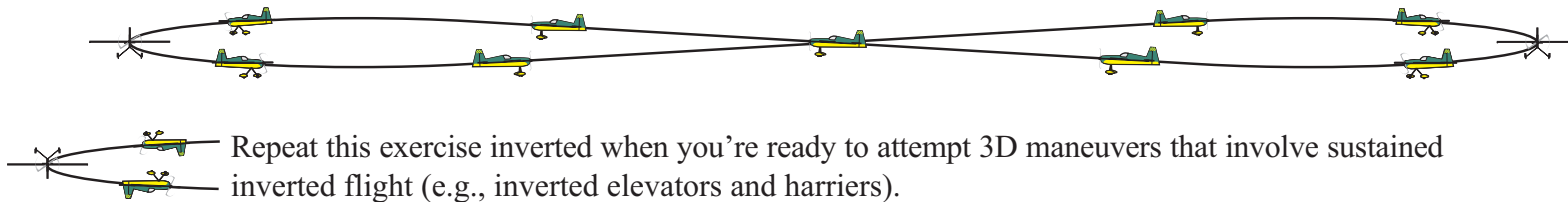
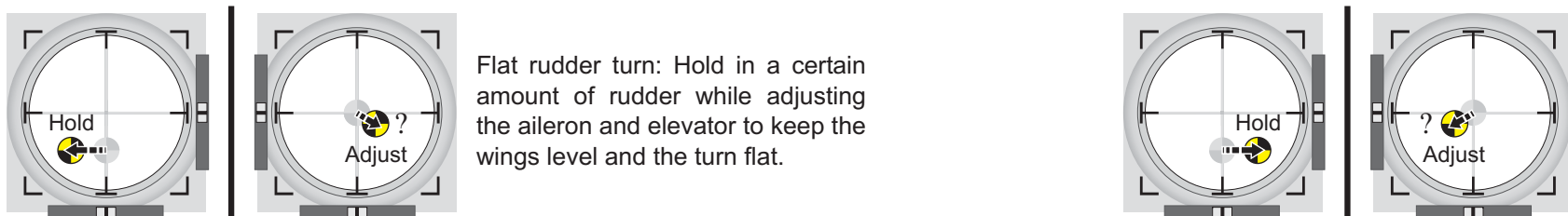
**Rolling Harrier
3D Rolling Turn
3D Knife Edge**

Rudder Warmup

Note: Every flight mode and maneuver presented in this section is flown on high rates. Good throttle management is therefore required to maintain slower airspeeds and manageable control responses.

If possible, practice the maneuvers on a simulator before attempting them for real. You will probably find that a simulator has a largely different feel than real world 3D flying, but a sim will help sharpen your reflexes and expose you to manipulating all the controls simultaneously.

The first practice step toward becoming a 3D pilot is learning to use the rudder at all times: Start by trimming your plane for slow flight at approx. 1/3 throttle and practice race track and figure 8 patterns primarily using the rudder to steer. Test your agility when turning with the rudder by using the aileron and elevator to keep the wings level and the turns flat. There's no telling how the mixes programmed earlier will effect this exercise, but one thing is for certain about 3D related flying, it helps if you remind yourself before each flight to keep your fingers moving!



3D Elevator



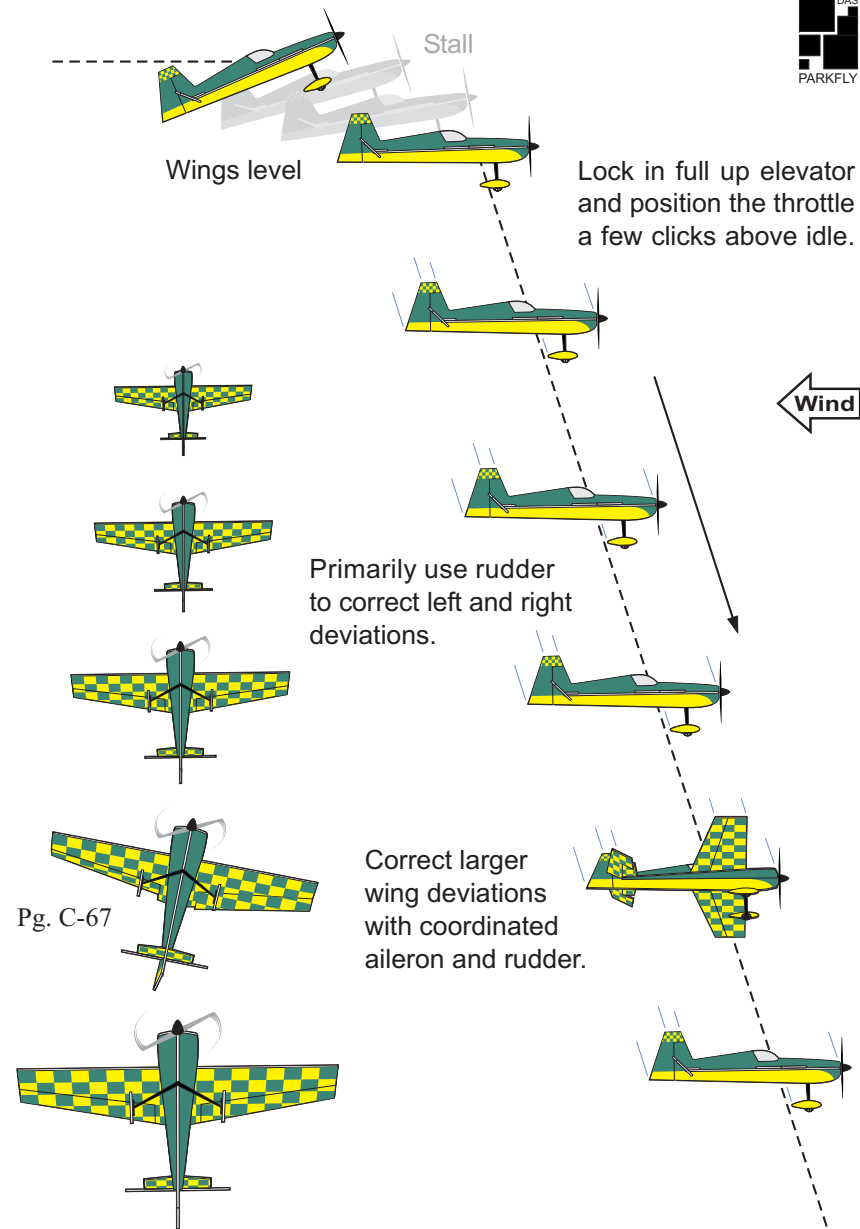
During a 3D “elevator”, the plane drops almost vertically in a flat attitude: Start by pointing the airplane directly into the wind. Cut the motor and increase up elevator to enter a stall. At the moment the plane stalls, hold in full up elevator and add a few clicks of throttle to provide enough propwash over the tail to maintain control authority and keep the fuselage level. Adjust the power as needed to raise or lower the nose.

Throughout the descent, rudder is the primary control used to correct left and right deviations, including leveling the wings. Note that you will probably need to hold in some right rudder to correct for propwash and P-factor.

During the descent, you will most likely encounter the post stall *high alpha* or high angle of attack phenomena of wing rocking: While both the left and right wings will be deeply stalled, they tend not to stall exactly the same. Consequently, continuous rudder corrections, backed up by tiny aileron corrections if necessary, will be needed throughout the descent to keep the wings level.

Note: Adverse yaw while applying aileron at high angles of attack will be significant. Therefore, anytime you need to make a larger aileron input, you must coordinate rudder in the same direction as the aileron to prevent yaw.

If the wings start to rock uncontrollably, exit the maneuver by adding power and relaxing the elevator.

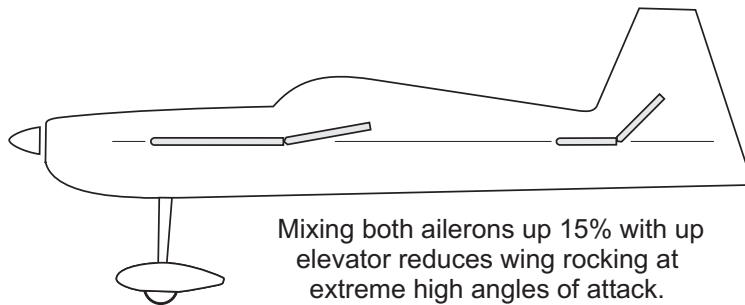


KPTR: Rudder is your primary directional control, unless a larger wing correction is needed, and then aileron and rudder must be coordinated together.

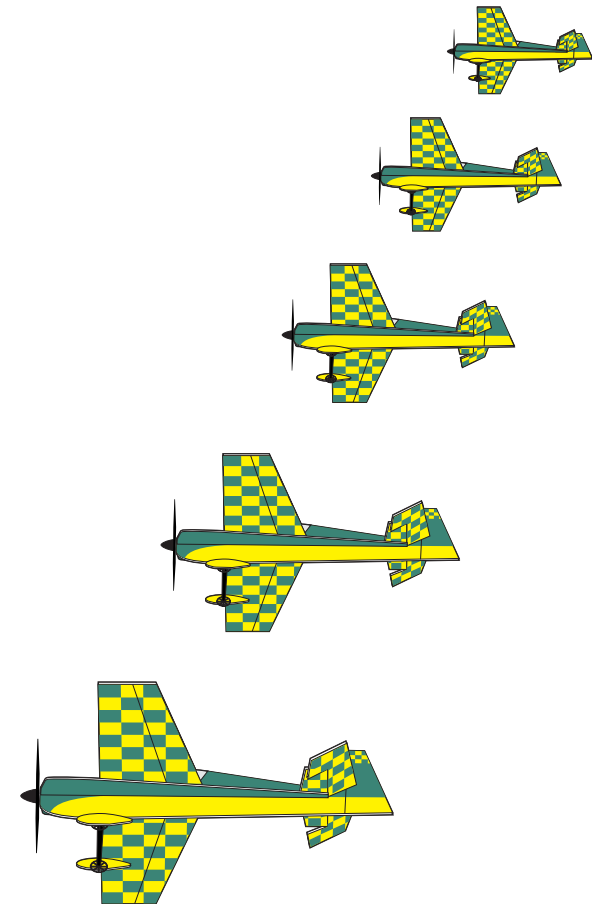
3D Elevator Cont.

To reduce over-controlling, your rudder and aileron inputs must be brief. Race car driver analogy: If you have watched car racing on TV, you may have noticed the in-car camera shots of a driver bumping or nudging the steering wheel. That's because race cars are typically driven on the edge of control, and if the driver over-controls just once, he can send the car out of control. Therefore, to avoid spinning out, race car drivers make several smaller (bump) corrections, rather than one larger correction. Similarly, an airplane teeters on the edge of control during most post stall high alpha 3D maneuvers, and thus your rudder and aileron corrections must be kept brief to avoid aggravating the wing rocking phenomena.

If your airplane utilizes 2 aileron servos and the flaperon function, wing rocking can be reduced slightly using the elevator-flap mix to deflect both ailerons up approx. 15-20% when holding in full up elevator. While you're at it, you may as well program both ailerons to lower 15-20% with down elevator to compliment future inverted high alpha maneuvers.



Elevator summary: Point the airplane into the wind, cut the power, and smoothly pull full up elevator. When the plane stalls, add a few clicks of throttle to keep the fuselage level and hold in some right rudder to correct for P-factor. Use the rudder to correct left and right deviations, and use coordinated aileron and rudder inputs to correct larger wing deviations.

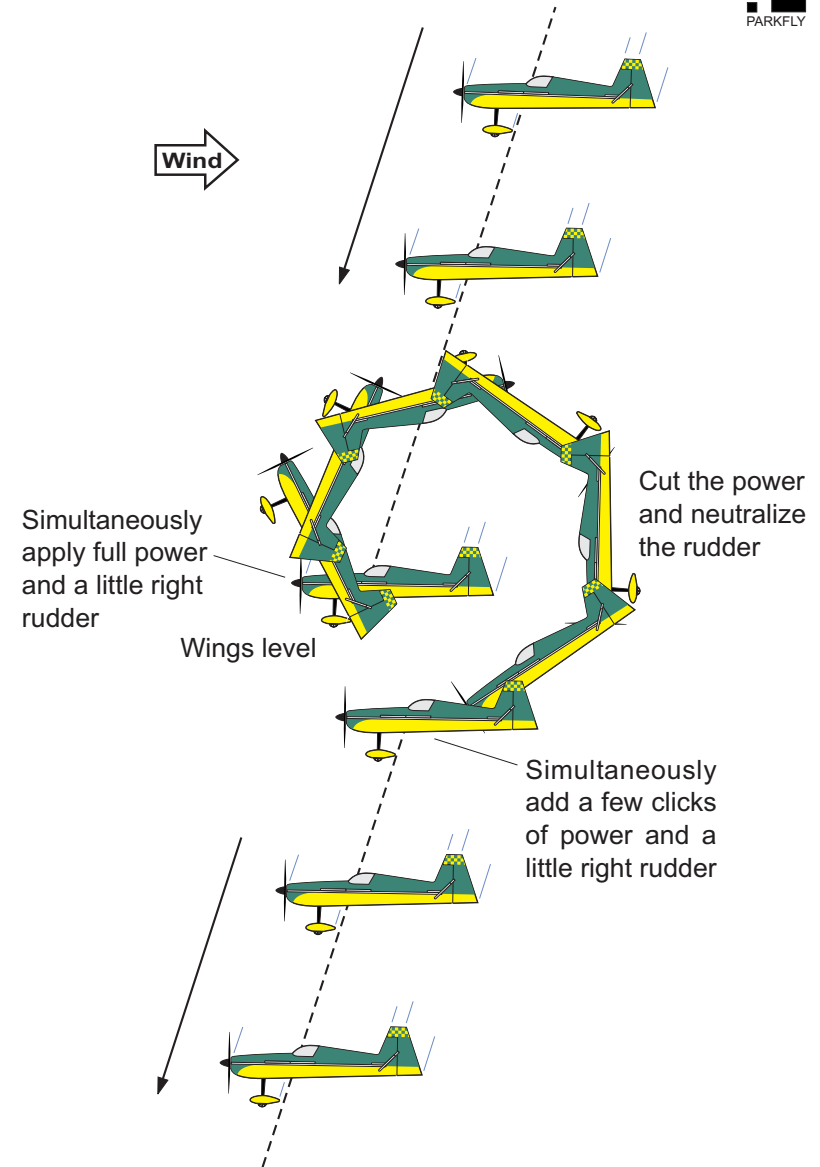


3D Back Flip (Micro Loop)

Once established in an elevator, you can add a back flip to it: While maintaining full up elevator, simultaneously apply full power and a little right rudder to initiate a back flip and correct for increased propwash and P-factor. On the back side of the loop, quickly cut the power and neutralize the rudder. Then at the instant the fuselage nears level at the bottom of the loop, simultaneously add a few clicks of power and a little right rudder to keep the fuselage level and correct for P-factor. You can then either descend in an elevator or increase the throttle and exit the maneuver. (Note: The plane will barrel roll out of this stunt if you fail to enter it with the wings level, if you over-control the rudder, or if too much aileron is mixed with the rudder.)

With experience and altitude you will be able to perform several individual back flips while dropping out the sky in an elevator. Back flips can also be entered from slow flight or while hovering into the wind.

Side note: Back flips and later waterfalls (forward flips) can be enhanced with 60 degree elevator deflections and an aft C.G. However, as a rule, it would be a mistake to increase the elevator travel and the difficulty of everything else you do for the sake of one or two maneuvers. This is a case where an advanced 3D pilot might utilize a more sophisticated radio (e.g., JR 10X or 9303) capable of a third rate or “flight mode” setup to achieve 60 degree elevator deflections just for certain maneuvers.

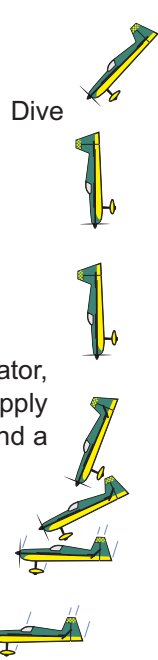


KPTR: The keys to this maneuver are getting settled into a stable elevator before attempting the back flip, and coordinating the correct amount of rudder with the throttle.



3D Parachute

Quickly pull full up elevator, then simultaneously apply a few clicks of power and a little right rudder.



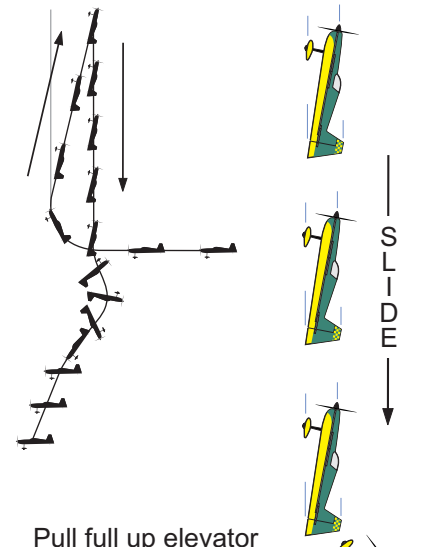
Idle

A “parachute” is an elevator started abruptly from vertical dive: Cut the motor and then push the airplane into a dive straight at the ground. After a moment or two, quickly pull and hold in full up elevator, then add a few clicks of power and a little right rudder to enter an elevator. With enough experience and altitude, you’ll be able to perform multiple parachutes coming down.



The coolest entry into an elevator is from a “whip stall” at the end of a tail slide. Start by pointing the airplane directly into the wind and increasing the throttle. Pull the airplane nearly straight up, cut the motor and perform a tail-slide. In order to whip stall into an upright elevator, the plane must initially flop out of the slide toward the canopy. Since this isn’t precision aerobatic flying, you can angle the upline slightly to ensure that the plane falls toward the canopy. As soon as the plane starts to fall out of the slide, quickly apply and hold in full up elevator. At the instant the fuselage nears level, simultaneously add a few clicks of power and a little right rudder to enter an elevator.

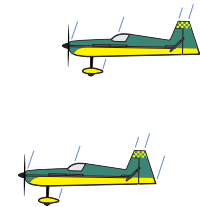
Note: If the wings are not perfectly level at entry and kept square during the upline, the plane will fall off to the side and void the maneuver.



Pull full up elevator as soon the plane starts to fall out of the slide.

Whip Stall

At the instant the fuselage nears level, apply a few clicks of power and a little right rudder.

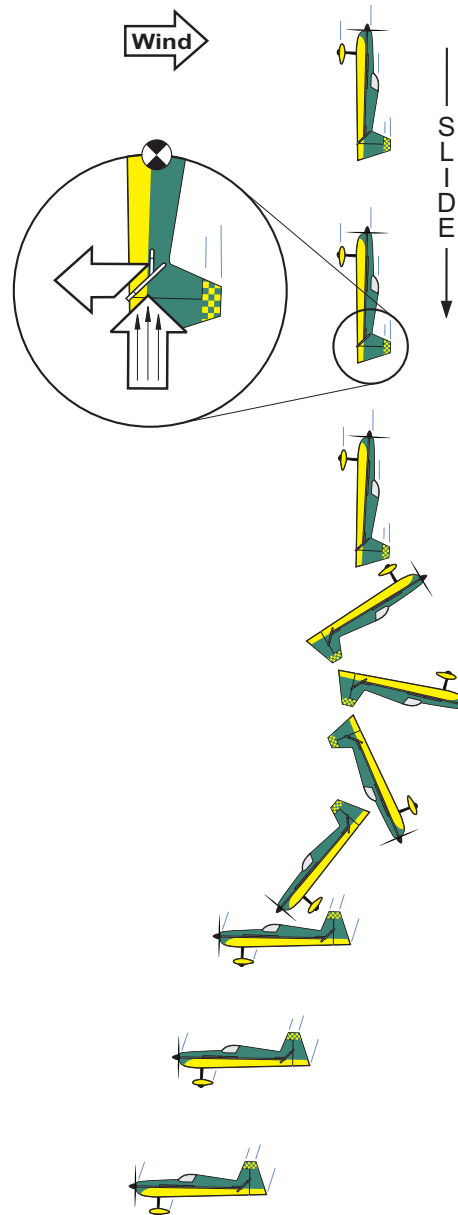


Advanced Rapid Whip Stall

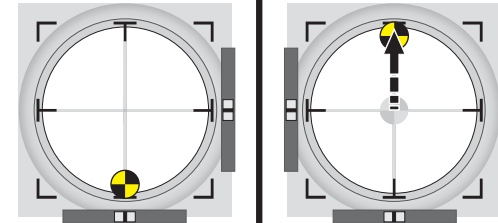
Keeping the fuselage attitude truly vertical prior to the tail slide results in a longer slide and a more rapid and impressive whip stall. In order to get the plane to flop toward the canopy into an upright elevator, you'll need to input full down elevator right after the slide starts so that the air striking the deflected elevator from the rear pivots the plane toward the canopy. As soon as the plane starts to fall out of the slide, quickly switch to full up elevator. Then at the instant the fuselage nears level, simultaneously add a few clicks of power and a little right rudder to enter an elevator.

(Note: Depending on the airplane and the wind, you may still need to cheat a little toward the canopy near the end of the upline to make sure that the airplane flops the right way, but not as much as when sliding without elevator.)

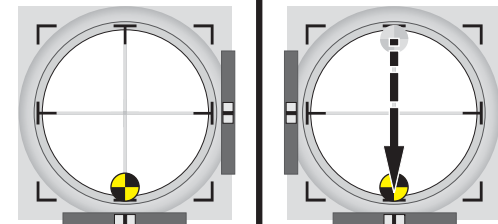
Whip stall summary: Point the airplane into the wind. Pull up into a nearly perfect vertical attitude and cut the power. Quickly apply full down elevator immediately after the plane starts to tail slide. As soon as the plane starts to fall out of the slide, quickly switch to full up elevator. At the instant the fuselage nears level, simultaneously add a few clicks of power and a little right rudder to enter an elevator.



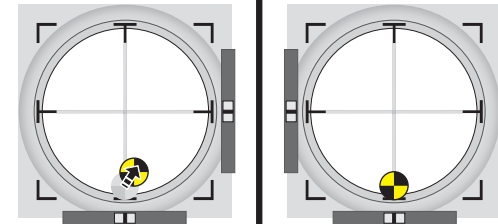
Apply full down elevator immediately after slide starts.



Quickly pull full up elevator as soon as the airplane starts to fall out of the slide.



At the instant the fuselage nears level, apply a few clicks of power and a little right rudder.



KPTR: Quickly input full down elevator as soon as the plane starts to slide backwards, then quickly switch to full up elevator at the instant the plane starts to fall out of the slide.