The Dead Stick Flyer

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Tech Corner: *Transmitter Dual Rate & Exponential Controls for RC Aircraft*

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Dual Rate Control: What is it, what does it do, and how can we use it effectively?

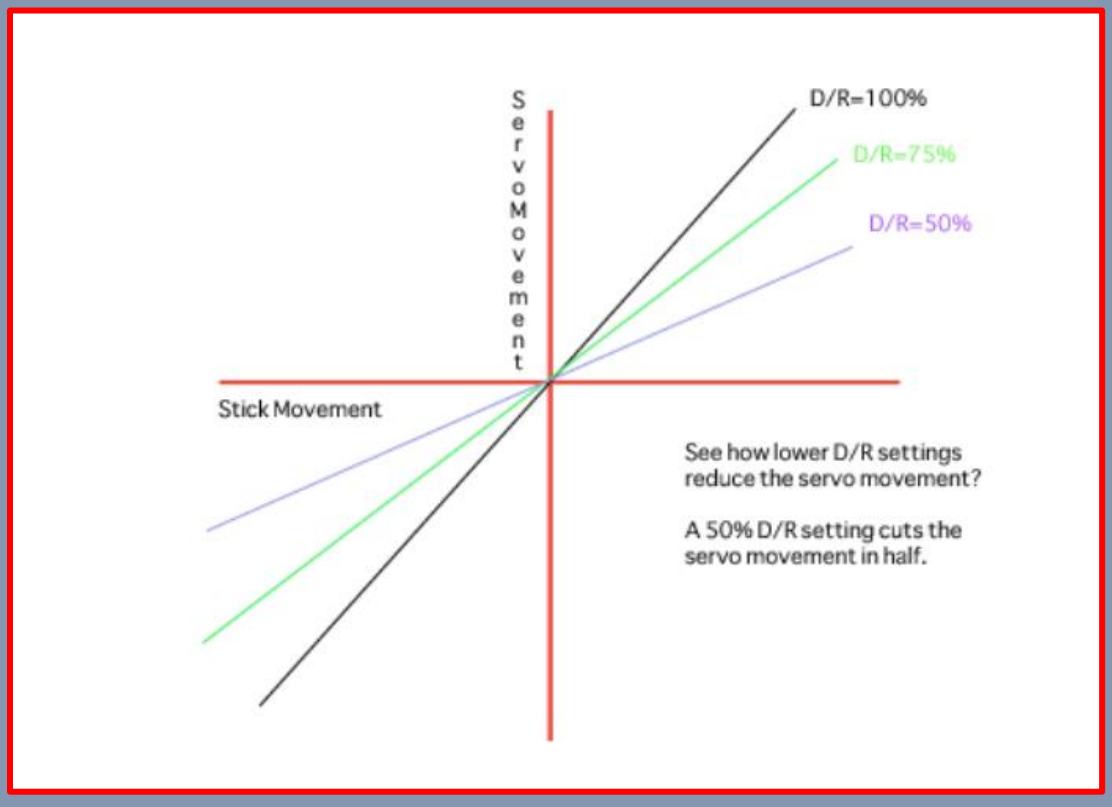
Simply stated, Dual Rate Control settings are two servo travel settings, High & Low, for the Elevator, Ailerons, and Rudder. On all transmitters the Dual Rate settings control the amount of servo travel in direct relation to the transmitter stick movements for the Elevator, Ailerons, and Rudder. Usually, the Dual Rate settings are configured with a default "High Rate" and "Low Rate" setting of 100% for each control surface until the user changes them to match their flying skill and preferences. It may take several flights to get the settings changed to your liking and style of flying. The throttle control is usually not considered for Dual Rates.

Dual Rate settings can be set up based on the type of flying you do with your aircraft. You can set up Dual Rates differently if you fly 3D maneuvers versus Pattern Flying, or just simple Straight & Level flying. 3D flying requires a high amount of servo travel for a lot of surface deflection to perform the 3D maneuvers. In contrast Pattern and Straight & Level flying require a lesser amount of surface deflection to afford more stable and smooth maneuvers.

Graph 1 below shows the amount of servo and transmitter stick movement based on a "High Dual Rate" setting of 100% and "Low Dual Rate" settings of 75% and 50%. Notice that the servo and stick movements at 100% are equal to each other. For every degree of stick movement there is an equal degree of servo movement or surface deflection. However, the "Low Rate" settings of 75% and 50% have a much lower degree of servo movement or surface deflection compared to your stick movements. The important lesson here is that you can control the amount of servo travel and surface deflection, for the Ailerons, Elevator, and Rudder to match the type of flying you want to do and flying command of your airplane.

If you are a "Pattern or Straight & Level" flyer and you have a hard time keeping your plane stable, you can adjust the "Low Dual Rate" controls to have a lesser amount of servo deflection to help make the airplane controls less sensitive. You can keep the "High Rate" setting at its original setting of 100% adjusting only the "Low Rate" setting to suit your flying control preference. Please read your transmitter's manual for the procedure to adjust the "Dual Rate" controls. You will want to program all of your planes with the same switches so it will be consistent from plane to plane. Please note each plane will have different "Low Dual Rate" settings to match each of your airplane's flying characteristics. This will certainly make flying your airplane more enjoyable and less stressful. It may even reduce your chances of a mishap because the controls were too sensitive while flying and landing.

Graph 1: Dual Rate Settings



Exponential Controls:

In contrast to "Dual Rate" controls, Exponential (or Expo) settings do not change the total amount of servo movement or surface deflection, but it does change the proportional rate or speed at which the servo movement responds in relation to the stick movement. See Graph 2 for a better visual explanation of the movement correlations.

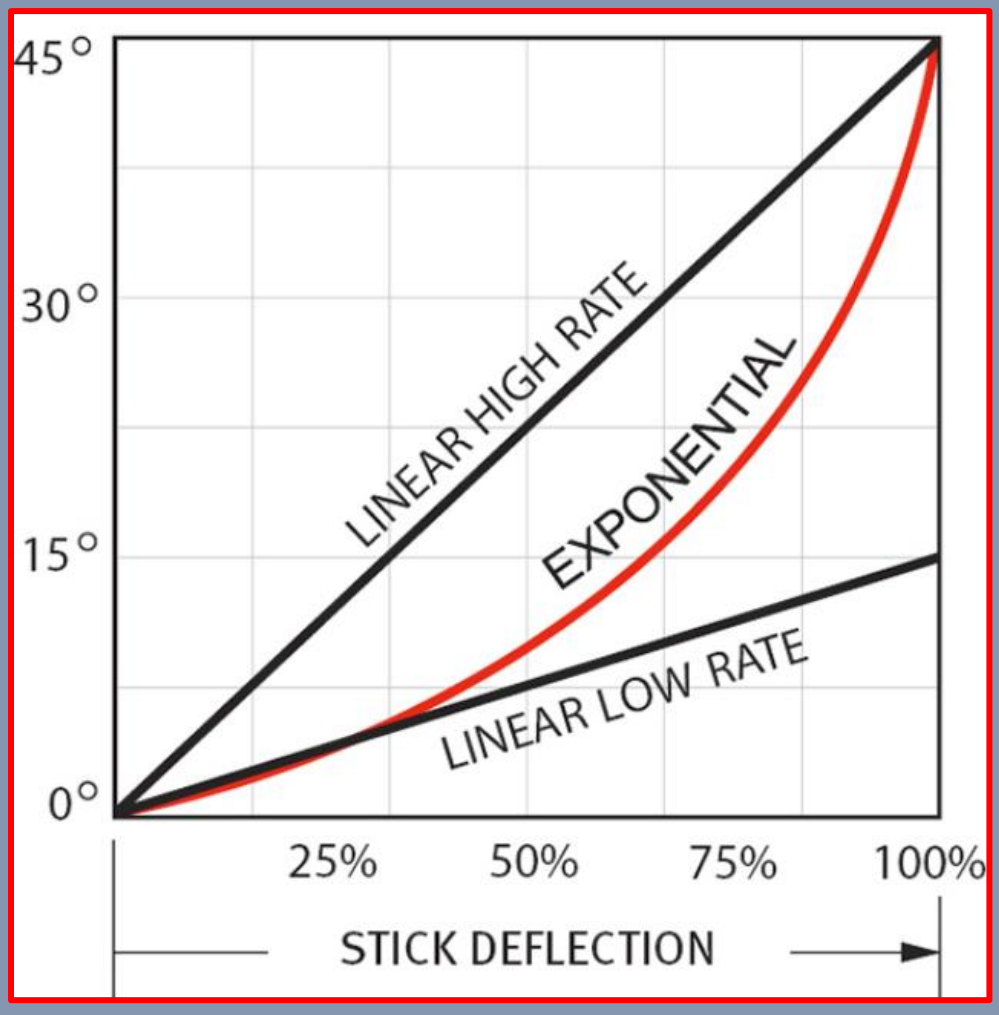
The Exponential setting will help to soften (lessen) the response of the servo movement in relation to the stick movement at the beginning portions of your stick's movements. If you move the transmitter stick from 0 to 100% you will see that the servo moves at a different proportional ratio but eventually catches up as it approaches the end of the full stick travel. The servo will move 100% to equal the stick movement at the end. As a result, the higher the Exponential rate you program in your transmitter for each surface control, it will have a greater softening or delayed effect on the servo movement in relation to the stick movement.

The use of Exponential or "Expo", as it is often called, will also help make your flying more stable and less sensitive. Just like "Dual Rates", Exponential is a user controlled setting and can be set up based on your style of flying, skill level, and the type of aircraft you are flying.

You will have to experiment and decide for yourself whether to use only "Dual Rates" or both "Dual Rates" and "Exponential". As always, start with a lower rate and make small adjustments until you find a setting that suits your needs. Please refer to your transmitter's operating manual for specific ways to program these functions. A word of caution, depending on your transmitter (Futaba, Spektrum, Airtronics, etc.) the effects of Positive and Negative settings for Exponential are reversed. One way the setting has a lessening effect and the other way increases the effect of the servo proportional movement. Be sure to decide which you want to use. Most users usually choose to lessen, or soften the servo movement effects.

In Graph 2, the Linear High "Dual" Rate and Linear Low "Dual" Rate lines are without any Exponential programmed in. The Exponential line shows the effect of Exponential programmed in and its softening or delayed effect of servo travel. Remember, Exponential settings do not change the amount of servo travel from 0 to 100%. The amount of servo travel is changed, or reduced, with the "Low Dual Rate" setting.

Graph 2: Exponential Settings with a Softening Effect



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