

The Mode 1 Transmitter, New for 3D or Old-Fashioned?

--David P. Andersen



The two most sensitive controls in most R/C airplanes are ailerons and elevator. Mode 1 transmitters minimize unwanted interaction between these controls by placing them on separate sticks.

Typically the ailerons and throttle are on the right stick while rudder and elevator are on the left stick. In contrast, Mode 2, the more common configuration in the USA, has ailerons and elevator on the right stick with throttle and rudder on the left.

During a half-time airshow at Top Gun, Quique Somenzini, Mode 1 pilot, FAI F3A world champion and inventor of 3-D flying, flew two amazing consecutive slow-rolling circles over the same path at an altitude of about two wingspans in a mild crosswind. The roll rate was constant, one roll per circle, wings vertical to horizontal at the four quadrants, all in sync to music!

Such precision flying requires subtle motions of elevator and rudder while holding a constant roll rate with ailerons. Quique's amazing performance was made possible in part by separating pitch and roll into separate controls. Eliminating unwanted interaction enhanced Quique's ability to make subtle simultaneous changes in one without inadvertently affecting the other.



Mode 1 is more common in Europe and Japan where it is sometimes called "airplane mode" and Mode 2 is called "helicopter mode." Many older flyers prefer Mode 1 because they learned to fly on reed radios in which the elevator switch was on the left and the aileron switch was on the right. They achieved proportional control by tapping these switches.

The advantages of Mode 1 appear to be the following:

- Students can learn one control at a time. First, they learn to fly around the sky using only ailerons on the right stick. An instructor can operate the left stick to adjust the student's flight while the student practices only the ailerons on the right stick.

Then they learn to improve the turns by adjusting pitch and yaw with the left stick. Mode 2 student pilots must learn both elevator and elevator simultaneously.

- More precise control of slow rolls. One can hold a constant roll rate and throttle setting with one hand while finessing the elevator and rudder with the other hand. This is why Mode 1 pilots tend to choose rolling maneuvers in competition.
- Smoother landings in a cross wind. The pilot can hold a precise fixed amount of up elevator and rudder while battling turbulence with the ailerons on the other stick.
- Mode 1 pilots tend to think of the left stick as a pointing device to aim the direction of the fuselage while the right stick is used for rolling and power. Ease of pointing tends to simplify 3-D maneuvers such as knife-edge and hovering.

The disadvantages of Mode 1 are:

- Both hands are busy most of the time so it is more difficult to reach trim levers and switches. Mode 1 pilots tend to operate the flaps and retracts only in straight and level flight.
- Most transmitters are sold as Mode 2. They must be converted to Mode 1.
- Incompatible with full-sized aircraft which combine pitch and roll on a wheel or control column. Well, except for the early Wright Flyers.
- A lot of newer people to the hobby don't even know what mode 1 is.

The advantages of Mode 2 are:

- The left hand is freer to operate trim levers and switches.
- The pilot can adjust throttle without affecting the ailerons.
- Logically intuitive for helicopters.
- Many people say the only reason for mode 2 is "That's how full-size fly." But not really. The rudder is not on the throttle lever.

