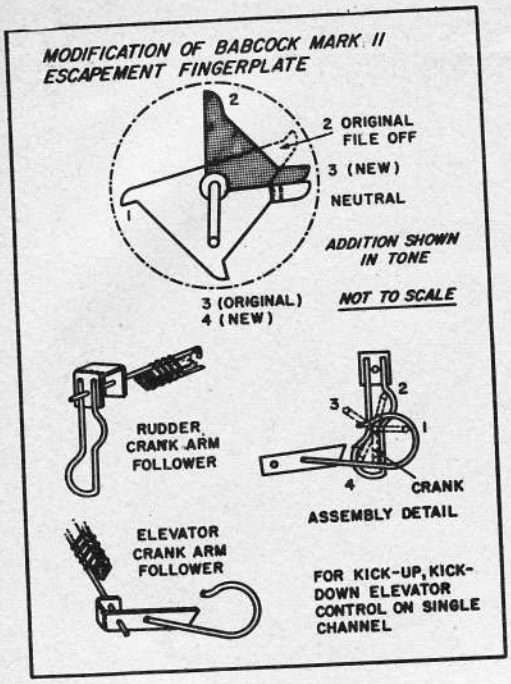


Poor Man's "Multi" Control

■ Remember the "kick-up" elevator arrangement on my radio controlled "Dreamboat" a couple of years ago? It became so popular Babcock Models included the feature in their escapements.

Next modification was to add a "kick-down" feature to the Babcock Mark II escapement. A ten-cent piece of brass, cutters, file and some solder was all I needed to change the existing second finger for two equally spaced between the first and the last fingers. When the original second position finger was filed off, the escapement was a four-position deal. Now the crank arm of the escapement rests at neutral with no signal; one pulse and hold brings crank arm about 90° to the right; two pulses and hold moves arm 180° straight up from neutral; three pulses and hold carries arm around 270° over to left; four pulses and hold, arm goes to final (now called fourth) position.

How to convert the new positions into a series of desired controls? The rudder follower furnished with the escapement can be used, but a modification is desirable. The elevator follower, forced down when escapement is actuated to last position, will follow crank arm up on second position when you solder a piece of wire to it bent into the hook shape shown. A paper clip is good; it bends easily, yet is strong enough for the load.

A look at the assembly detail sketch shows how the sequence works. At neutral rudder follower is straight up and down, elevator follower is held at neutral by spring loading the elevator to neutral. To do this, use a piece of spring wire (3/64) anchored to the stab about three inches ahead of the elevator hinge line and trailing straight back so the elevator rests on it. A bit of experimenting will be required here, depending on the size of your model and the control surface.

Now when you pulse once and hold, rudder is actuated, but crank arm is free of the elevator follower—so you have right rudder and neutral elevator.

With two pulses and hold, arm is almost straight up. How close to straight up depends on how accurately you soldered the 2-fingered brass piece to the original finger plate. When arm is straight up it pushes elevator follower up by engaging the top of the hooked wire. Rudder follower is at neutral—or nearly so.

Going on to three pulses and hold, arm, over to the left, gives left rudder. Position of the new finger which yields this action is such that elevator follower is again free of crank arm. Thus we have left rudder and neutral elevator.

Finally, in fourth position elevator follower is pressed down exactly as with an unmodified escapement. Here, with the unmodified rudder follower, a slight amount of left rudder will also be held.

A note of caution. With the original "kick-up" elevator control, rear end of elevator torque rod has the wire bent over to the right elevator, so when the crank arm follower is pressed down, the elevator moves up. Now, with this new "kick-up, kick-down" arrangement the rear end of the elevator torque rod should be bent over to the left elevator, so that when the crank arm follower is pressed up, the elevator goes up. With this arrangement, the sequence is right rudder, up elevator, left rudder, down elevator. This is by far the best since you will use up elevator much more than down elevator.

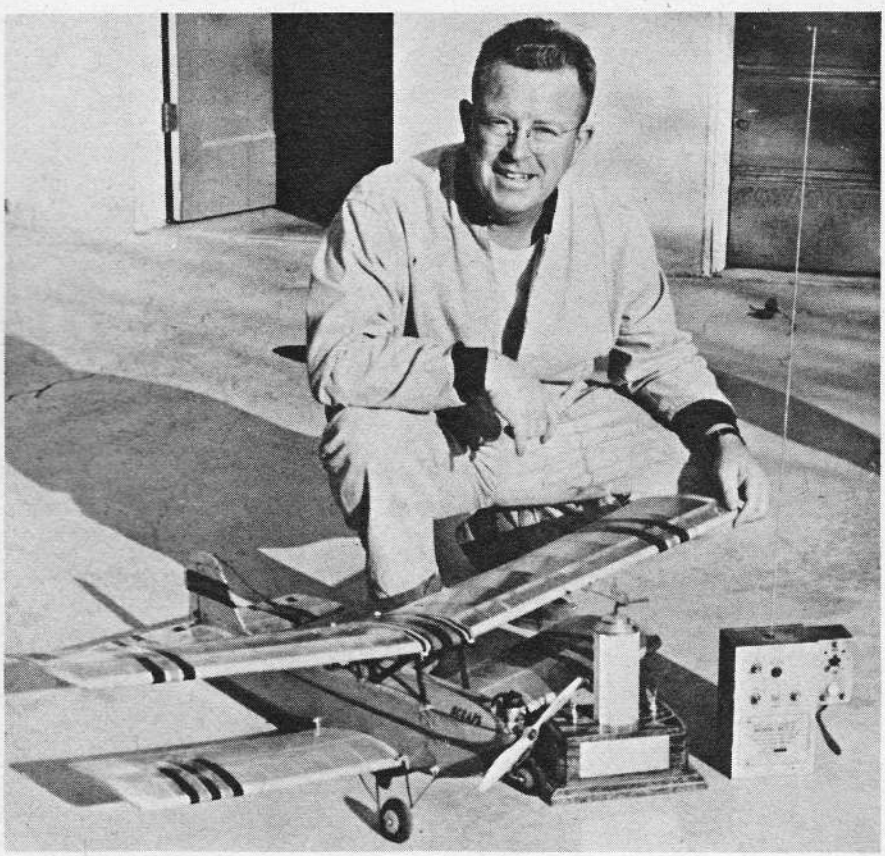
So there's the basic idea. Here are a few things you have to watch for. First, as mentioned, you could use the rudder follower provided with the Babcock Mark II escapement, but this will hold the rudder slightly off center when you use up or down elevator to result in your loops pulling to the right and your power dives turning off to the left. So, if you're particular bend a wire follower as shown which allows the rudder to trail freely when you are using up or down elevator. Then, by a small trim tab on the rudder you can adjust for straight loops and dives.

You can use a wire torque rod for the rudder, but the balsa rod with wire ends is my preference. For the elevator you must use at least 3/16 square balsa; for a model over four-foot span you'll need ¼ square. Air loads on the elevator are heavier than on the rudder. The elevator tends to "streamline" itself unless the torque rod is stiff enough to prevent this.

For the piece which gives two new fingers, sweat solder brass shim of the same thickness as the finger plate. Cut the piece with fingers a bit oversize, then after it is firmly in place, file the fingers down so they engage and disengage the clapper arm properly on signal and release. Make sure the new fingers clear the neutral clapper arm retainer. You may have to file away just a little of the rear edge of the neutral clapper arm to permit the two new fingers to pass freely.

Amount of elevator action, up or down, will depend on 1) the length of your linkage to the elevator from the torque rod, and 2) size of the wire hook added to the elevator crank arm follower. Of course the hook has to be long enough to clear the crank arm when right rudder is being held, but if too open at the top you'll get very little action as the arm went in top position. It is better to close the hook so the arm just slides com-

(*Continued on page 62*)



Author Ken Willard...

Poor Man's

(*Continued from page 32*)

fortably through the opening from hook top to upper edge of original elevator follower arm.

Here's a very important point. Make a limit stop for the elevator so it can only go as high as the hook forces it. Otherwise, some fine day you'll be stunting upside down, the air load on the elevator will momentarily slack off, and since you're upside down, the elevator will be pulled farther into the up position by gravity. Then the crank arm, instead of slipping over on top of the original elevator follower, will slip under it to lodge firmly against the arm and the wire hook. When this happens, your controls are locked in practically full left rudder with just a very slight amount of up elevator. Wham! (I discovered this the hard way during test flights with the system.)

Naturally, now that you have four fingers where there were only three, the time interval between pulses must be shorter, or you must slow down the escapement by bending the rocker in so that it engages the star wheel longer.

Use ¼ inch rubber for positive elevator action—particularly to carry through the down position against the spring loading.

I found that flying with this setup adds a lot of maneuvers to what you can do with "Mickeymouse" planes. Consecutive loops, Cuban eights, power dives, even inverted flight. However, I ran into some trouble trying to keep up with the pulses, until I discovered that the system works perfectly with an Ectron beepbox, once you synchronize the speed of the escapement to the speed of the beepbox. This is not hard and the synchronization holds quite well as both the beepbox and the escapement rubber unwind. If they get out of synchonization, you have the button available.

Although I haven't yet installed one, motor control could be added using the "quick blip" system, since the interval between neutral and first position remains the same. So, using a single Babcock Mark II escapement, modified with a few cents worth of brass sheet, and adding a motor control if you so desire, you've selective rudder, elevator and motor control—all actuated by single channel and one escapement plus a motor control unit—and for my money that's the "poor man's multi-control!"