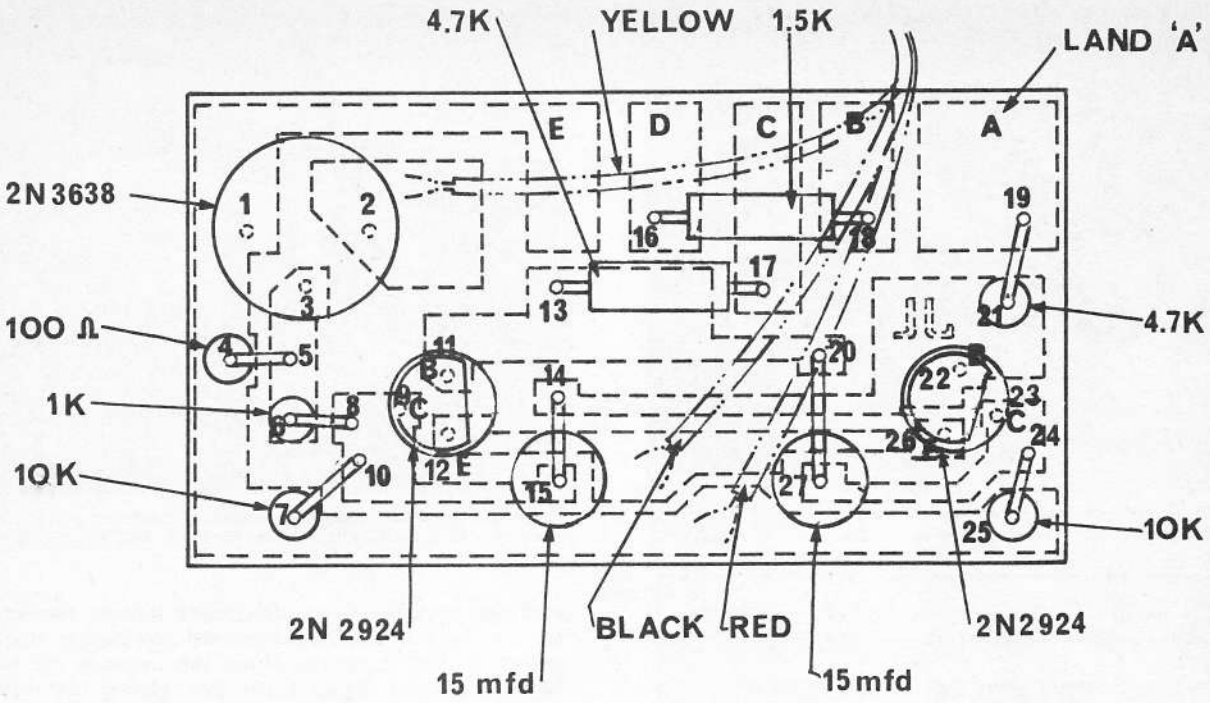
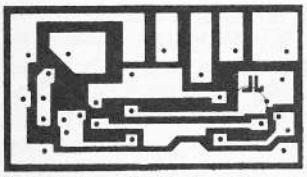


FIG. 2



The Lanterman Reed Pulser

Actual size printed circuit board.

By JAMES LANTERMAN . . . DON'T DISCARD THAT OLD-FASHIONED REED SYSTEM. LET'S PUT IT BACK TO WORK WITH THIS NEW KIT, SOON TO BE RELEASED BY WORLD ENGINES. OR SCRATCH-BUILD IT YOURSELF FROM THIS COMPLETE STEP BY STEP HOW-TO-DO-IT.

► Stop right there you Rusty Thumb types!!! Are you too slow on the switch? Has your flying become not-so-smooth because you're not giving it that gentle blip . . . blip . . . blip that's so necessary for those look-so-easy maneuvers? Perhaps you want to acquire a proportional type control without turning that six or ten channel reed system out to pasture. If so, this reed pulser, latest Controlaire contribution to improve R/C flight performance, is just the item for you.

World Engines, Inc. will be offering it in kit form but by use of this article, the illustrations and diagrams you can build it in your workshop. It's uncomplicated construction and dependable design should make it popular. The pulser's operation is (*Continued on next page*)

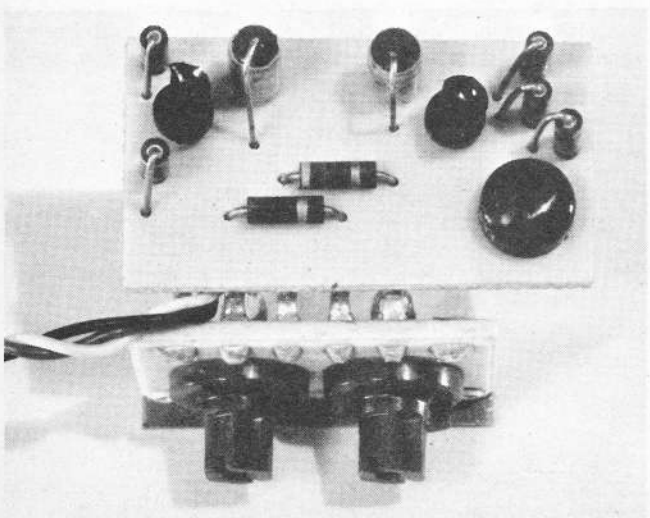


Photo #1. Top of printed circuit board showing arrangements of the various parts. Use correct values if you are scratch-building the pulser.

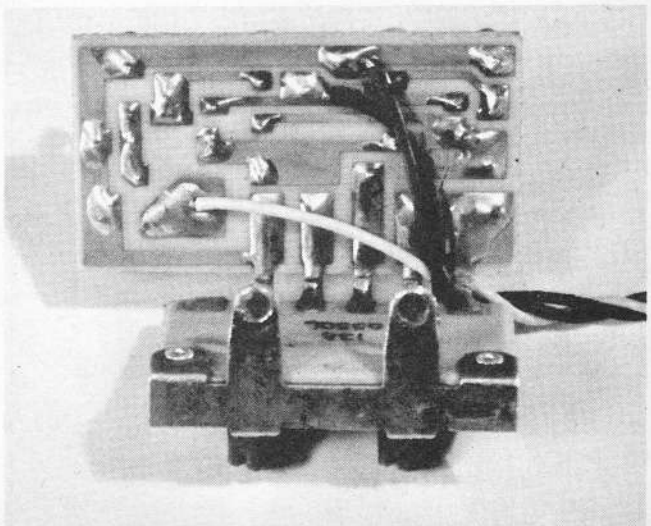


Photo #2. Bottom of the printed circuit board shows circuit lands, also hook-up wires. Note shiny solder joints, indication of a good job.

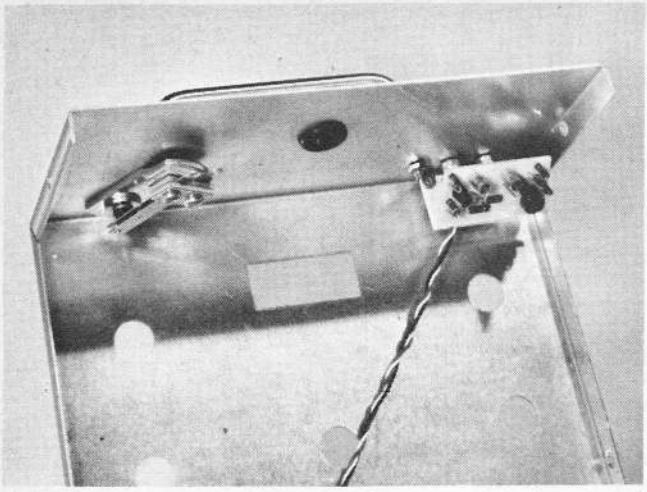


Photo #3. Interior of transmitter case showing position of switch and pulser. Note unit is not wired but bent upward to clear Tx P.C. board.

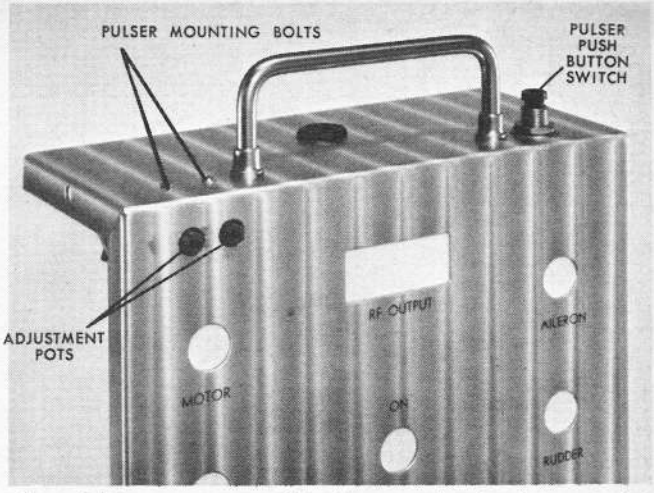


Photo #4. Transmitter case with insides removed and pulser mounted in place, also the button keying switch. Parts mounted for easy accessibility.

LANTERMAN REED PULSER

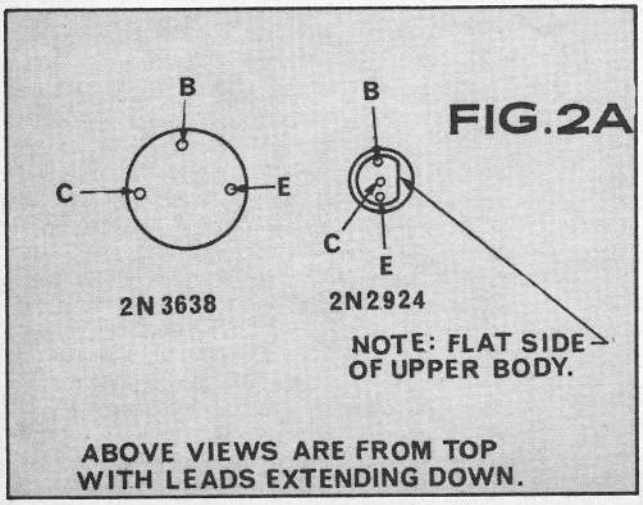
straightforward too, let's explain it briefly.

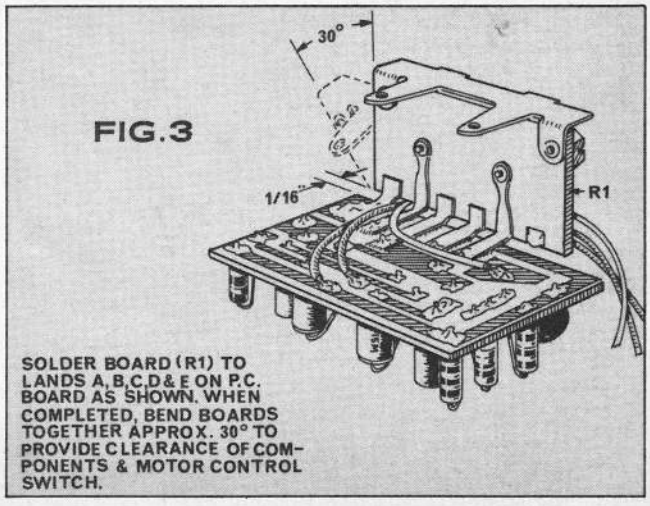
First, consider the normal operation of a reed transmitter and the reaction of a servo to its signal. Upon receiving a transmitted signal via the receiver, the servo starts to move and will continue to move at its regular speed to its extreme limit of travel. That is, it will travel to the limit as long as a signal is received. This movement, of course, has caused a particular control surface to be displaced in the airstream thereby changing direction of the model's flight. Now let's look at what happens when a reed pulser has been added to the transmitter circuitry. First, the pulser is turned on only at the operator's command and it remains on only as long as he continues to keep a pushbutton switch depressed or closed. This switch is a regular SPST push-button type of the normally open variety. It is easily obtainable at any electronic parts store. A convenient place to mount the switch is at the top of the Tx (transmitter) case, just above the aileron lever switch. You can reach it easily with your forefinger and still blip the lever switches. Let's continue with the effect the pulser has on the Tx. We'll assume the modeler has depressed the button switch and put the pulser in action. From the moment the pulser is turned on—*any* signal from that transmitter will be a pulsing signal and it will pulse at a regular rate as set by the adjusting pot built into the pulser unit. Of course you won't get a pulsing signal if you haven't also operated one of the lever switches. And the pulser does not affect dual simul operation; you will still be able to use rudder and aileron together.

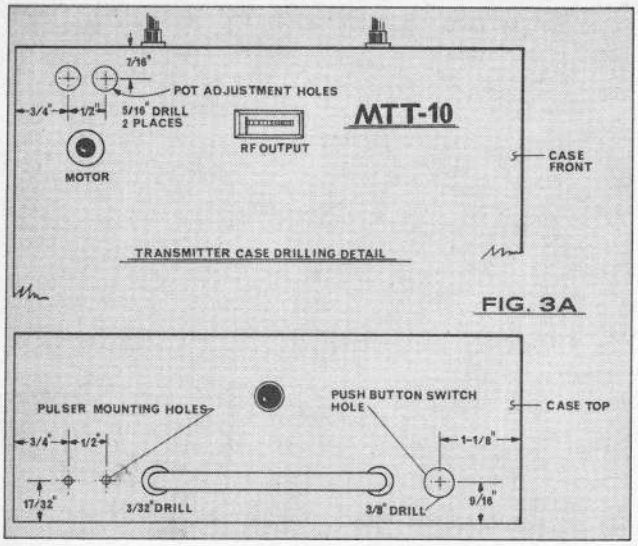
What happens to the servo action? Well, when the pulsed signal is introduced to the servo, the servo no longer travels directly to its limits. Instead, it commences to travel toward the limits in a series of progressive—regressive steps, much like a drunk taking three steps forward and two back (see (Fig. 1). This series of steps slows the servo's speed and the particular control surface operated by that servo enters the airstream at reduced speed. The speed and distance the servo travels is determined by the width or spacing of the pulse. This is also adjustable by a pot built into the pulser unit. In order to return the Tx to normal operation, simply release the button switch.

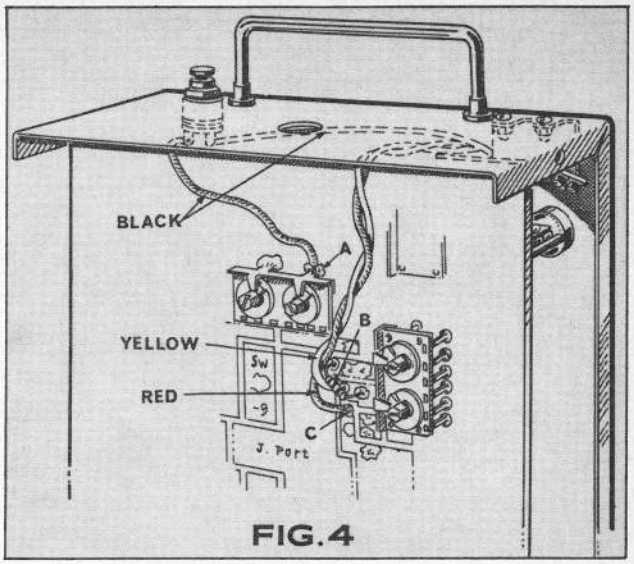
Now you can begin to see what happens. By operating the pulser and simultaneously blipping a lever switch, it is possible to hold a control surface out in the airstream at some position between neutral and the extreme. As a result, a degree of proportional with reeds can be obtained. A real educated thumb might accomplish the same result but the reed pulser makes it easier.

Construction of the Reed Pulser: First, you'll need a small piece of printed circuit board about ⅞" x 1½".









Use the photo process with the actual size copper land layout printed here (Fig. 1A) or use Scotch tape and cut out the land layout with a sharp knife. Etch in ferric chloride. With the P.C. board, the following parts are also needed: one #2N3638 transistor; two #2N2924 transistors; two 15 mfd. 15 v. electrolytic condensers; two 30K ohm pots (miniatures mounted as a pair in one unit); seven ¼-watt resistors in these values—(one 100 ohm; one 1K ohm; one 1.5K ohm; two 4.7K ohm and two 10K ohm); three 12″ lengths of stranded hookup wire—1 each of these colors; red, black and yellow. Don't forget the SPST push-button switch (normally open) with its ⅜″ chrome washer and ⅜″ hex nut plus two 2-56 x ¼″ long pulser attach bolts and their associated lock washers and nuts. A complete parts package is available for $10.98 from World Engines.

Assembly Notes

Assembly instructions and steps are quite detailed and comprehensive but a few notes are in order. To help get an understanding of the parts placement an illustration, Fig. 2 is provided. It is a giant size view of the top of the circuit board with the components in position. The dotted lines and shading represents the copper lands underneath. Note that all holes have been numbered and these numbers as used in the different assembly steps key the proper placement of each component lead. Photo 1 shows the P.C. board top and photo 2 shows the bottom. No special tools are required: pair of small wire snippers dikes or stripper; long nose pliers; screwdriver; penknife; small ball of steel wool; drill, 3/32″, 5/16″ and ⅜″ dia. drill bits, rosin core solder and a pencil-type soldering iron. Of the latter, the Ungar unit works well when used with the 37½ watt element and a ⅛″ chisel tip. Remember, not much heat is needed.

Assembly Instructions

Placement and position of parts on the P.C. board follows standard practice, that is the parts are mounted either vertically or flush (laying down against the board). To install each component, pass leads through holes in board, bend them over slightly to hold part in place (do this on copper side) and then apply a minimum amount of solder with just enough heat to make it flow nicely. Lastly, snip off excess leads flush with solder. Cut end of lead will be about 1/16″ above copper at this point. Check off step and go on to the next.

( ) 1. Start assembly by cleaning the P.C. copper. Hold board firmly and buff vigorously with steel wool. After copper is bright and shiny blow off the steel wool residue.

The transistors are installed in the next three steps. Identify their leads by referring to Fig. 2A. The 2N2924 transistors are mounted with their bottom spaced about 3/16″ above the surface of the circuit board. Do not flush mount. No heat sinks will be necessary.

( ) 2. Install the 2N3638 transistor in holes 1 (emitter), 2 (collector) and 3 (base). Mount flush to board.

( ) 3. Install one of the 2N2924 transistors in holes 9 (collector), 11 (base), and 12 (emitter).

( ) 4. Install the remaining 2N2924 transistor in holes 22 (base), 26 (emitter) and 23 (collector).

( ) 5. Next, install one of the two 15 MFD electrolytic condensers with the positive lead to hole 14 and the negative lead to hole 15. The capacitor should stand vertically over hole 15 (negative lead).

( ) 6. Install the remaining 15 MFD electrolytic condenser with the positive lead to hole 20 and the negative lead to hole 27. The capacitor should stand vertically over hole 27 (negative lead).

( ) 7. Two identical resistors 4.7K ohm (yellow-violet-red) are installed in the next step. One in holes 19 and 21 (stand vertically over 21), and the other lying flush in holes 13 and 17.

( ) 8. Now, install a 100 ohm resistor (brown-black-brown) in holes 4 and 5, standing vertically over hole 4.

( ) 9. Install a 1K ohm resistor (brown-black-red) in holes 6 and 8, standing vertically over hole six.

( ) 10. Install a 10K ohm resistor (brown-black-orange) in holes 7 and 10, standing vertically over hole 7.

( ) 11. Install a 10K ohm resistor (brown-black-orange) in holes 24 and 25, standing vertically over hole 25.

( ) 12. Install a 1.5K ohm resistor (brown-green-red) in holes 16 and 18, lying flat.

( ) 13. Prepare the three wires for installation (there are one red, one black and one yellow wire). First, strip about ¼ inch from the end of each of the three wires.

( ) 14. Tin these ends and cut the tinned part of each to about ⅛ inch length.

( ) 15. Solder the red wire to the copper land containing holes 25 and 7 at the point about midway between them where the land is widest.

( ) 16. Solder the black wire to the copperland containing holes 12 and 26 at the point about midway between them where the land is widest.

( ) 17. Solder the remaining yellow wire to the copperland around hole 2.

( ) 18. Now hold R-1 (that's the designation we've given the unit with (*Continued on page* 40)

The Lanterman Reed Pulser

(*Continued from page* 31)

( ) 18. Now hold R-1 (that's the designation we've given the unit with the dual 30K ohm pots) in your left hand with the bottom up and the six tooth-like projections facing you. Numbering the left tooth 1, continue through six going from left to right. Cut ⅛" off teeth 2 and 4 and then cut tooth no. 6 off completely.

( ) 19. R1 is now to be soldered to the copper circuit board.

( ) 20. Lay the circuit board down, copper side up, with land A in the upper left corner. Now, R1 is held with the bottom facing you and the teeth contacting the circuit board. The circuit board and R1 are now 90° to each other. Tooth 1 should be on land A, tooth 2 on land B, tooth 3 on land C, tooth 4 on land D and tooth 5 on land E. Take care to insure 1/16 inch clearance between the edge of R1 and the circuit board (Fig. 3).

( ) 21. Solder R1 to the circuit board.

( ) 22. Now grasp R-1 and the circuit board which were soldered together at the angle of 90 degrees. Bend them together until this angle is reduced to about 60 degrees in order to provide clearance for components and the motor lever switch after the pulser has been mounted.

( ) 23. This completes the assembly of the reed pulser. At this point, go back and double-check your assembly. After you have double-checked the assembly, the reed pulser is now ready to be attached to your transmitter.

( ) 24. It is necessary to drill five holes in the Tx case to mount the reed pulser and switch. Remove the Tx from the case by removing the antenna and four locknuts on the lever switches. Removal is necessary to eliminate possibility of damaging the circuit board while drilling and also simplifies installation of the reed pulser and pushbutton.

( ) 25. Following exactly the measurements and hole sizes given in Fig. 3A drill the necessary holes.

( ) 26. Cut the red, yellow and black wires on the reed pulser to 6" in length. Strip ¼" from the ends of the wires and tin them. Wrap the red and yellow wires together. Thread all three wires between teeth 1 and 2 of R1.

( ) 27. Set the pushbutton for the pulser on your bench with the two terminals facing you. Referring to Fig 4 for the correct terminal—solder the black wire from the reed pulser to the right hand terminal of the pushbutton.

( ) 28. Strip ¼" from the end of a 5" black wire and tin it. Solder the black wire to the left hand terminal of the pulser pushbutton.

( ) 29. Mount the reel pulser in the Tx as shown in Fig. 4 and photo 3. Attach it to the case with two 2-56 x ¼" bolts, lock washers and nuts. The bolts go down through the Tx case top.

( ) 30. Mount the pushbutton switch in the Tx case as shown in Fig. 4 and photo 3. Place through hole, slide on the ⅜" chrome washer and tighten the ⅜" hex nut.

( ) 31. Install the Tx circuit board in the case securing it with the four locknuts previously removed. Thread the black wire from the pushbutton and the red and yellow wires from the pulser between the top of the Tx case and the top of the Tx circuit board (Fig. 4).

( ) 32. Referring closely to Fig. 4 locate copperland A on the Tx circuit board. Land A is the point where the top right support leg of the bounce pots is soldered. Solder the black wire from the left-hand terminal of the pulser pushbutton to land A.

( ) 33. Referring to Fig. 4, locate copperland B on the Tx circuit board. Land B is the one to which the right lead of the only 100K ohm (brown-black-yellow) on the Tx circuit board is soldered. Solder the yellow wire from the reed pulser to land B.

( ) 34. Referring to Fig. 4, locate copperland C on the Tx circuit board. Land C is directly below land B. Solder the red wire from the reed pulser to land C.

Pulser Adjustment

As mentioned previously the pulser's

width and rate are adjustable. Width or on-off ratio can be varied from 10 to 90% and the rate from 1 to 7 cycles per second. Two small pots (Potentiometers; Unit R-1 in the assembly) make these changes.

Refer to photo 4 to properly identify the pulser adjusting pots. Their adjusting knobs stick out of the Tx case at the upper left corner. Let's identify them further—the right knob we'll call Pot A and the left knob Pot B. First these pots should be set to what has been found to be an optimum position for all around flying use. Use the screwdriver slot in each knob and the numbers on a clock face to make the setting. Pot A's slot should be rotated away from the stop in a clockwise direction to the 4 o'clock spot. Pot B's slot should be rotated away from the stop in a clockwise direction to the 7 o'clock position.

A small amount of adjustment may be needed to suit your individual requirements. However, it is necessary to use your aircraft to make the adjustment and the model, the receiver, servos and control surfaces must be operating correctly before starting. Leave both pots at their optimum setting, turn on the Tx, depress the pulser button and operate the elevator lever switch to the *down* position. Watch the elevator action. It should be moving in a back and forth action towards its stop or limit. If it seems that further adjustment is necessary, do the following steps.

1. Keep the elevator in the *down* position and keep the pulser on.
2. Starting from the optimum position, first turn Pot B (pulse rate) clockwise, increasing rate, or counter-clockwise, decreasing rate, until desired control surface speed is achieved.
3. Now adjust Pot A (pulse width) in the same manner until the desired control surface travel is obtained. Release the elevator lever switch.
4. Operate the aileron lever switch to *right* aileron.
5. Check to see that the aileron control surface moves towards its limits in step-like motions.
6. If not, increase the pulse width Pot A slowly until it does.

The adjustment is now complete. Here's to more enjoyable and smoother flying.

Monokote . . . How To Do It!

(*Continued from page* 16)

to its paper backing, but how it looks, glistening and smooth, stuck to your airplane. The process of transferring Monokote from the former to the latter is the main purpose of this article

One last word before we get down to work. We're sure that the bosses at Top Flite, Mike Schlesinger and Sid Axelrod, won't object to our saying that no matter how new and revolutionary Monokote is (and it truly is), it still has one thing in common with all other covering materials. The quality of the finished job still depends a great deal on the patience and skill of you, the modeler. On the other hand, we can safely guarantee that *any* modeler who exerts the same amount of patience and skill with Monokote as they do with any other covering method they have ever used will, in considerably less time, have a more beautiful, rugged, and fuel proof finish than they ever had before.

In this connection, two warnings: First, Monokote is not a miracle worker. As with any covering material, the finished job won't be any better than the framework under it. Secondly, *do not,* we repeat, *DO NOT* prime or seal the framework of your model with dope or sanding sealer! Dope will lift off with the adhesive if the Monokote is pulled off the frame-