

DUAL CONTROL FOR R/C

by Phil Greenberg

● "Keep it simple, and you'll stay out of trouble!"

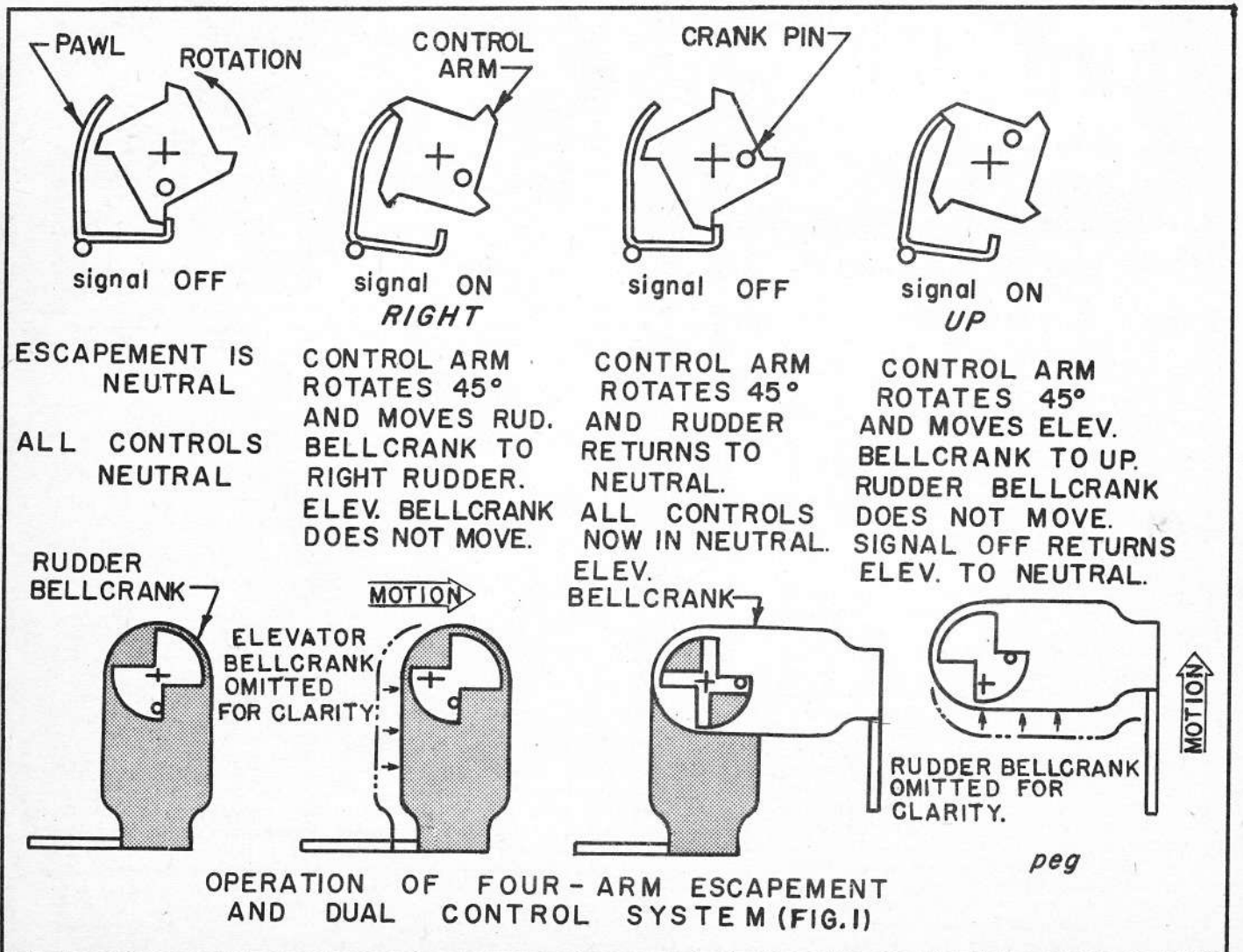
That's the best piece of advice we've ever received, and we're only too happy to pass it along. But today's R/C fans don't seem to believe in this bit of sage advice, and keep writing to ask about multiple controls, such as adding elevator and motor controls to their rudder-only ships. We really can't blame you much, because we had the same ideas when we were starting in R/C.

While we were trying to get a single channel system to operate a full set of controls, plus engine, flaps and landing gear, we had to concede that the required mechanism was too costly, and beyond the range of the simple hand tools which

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Above: Decals are a visual means of keeping track of the control positions. A flip of the switch pulses the transmitter to the correct control position with ease and accuracy.

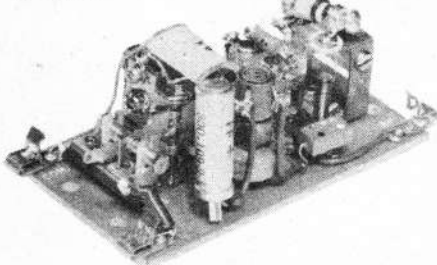
Above: Simple bellcranks and an actuator cam are all you have to make. Rudder and elevator control is obtained by using a four-position escapement with your present single-channel radio.



R/C NEWS

**Citizen-Ship Radio Controls
The Ideal Christmas Gift**

Now everyone can afford to give or own the best . . . **CITIZEN-SHIP** radio controls, pacemaker of R/C flying. Look at these **NEW LOW PRICES**—



Announcing Revolutionary NEW CITIZEN-SHIP

465 mc Model AR Receiver
for SMALL R/C planes including 1/2A
Requires only 2 1/2 inch wide fuselage

Sensationally
low priced at **\$22⁹⁵**

. . . the new **CITIZEN-SHIP** model AR receiver is similar to the famous CR but has the antenna removed resulting in 70% volume reduction and width reduction of 30%. It has just two simple tuning adjustments allowing it be **TUNED ON THE FIELD**. A true value at **\$22⁹⁵**

We are NOT discontinuing 465 mc **CITIZEN-SHIP** model CR receiver with antenna for medium and larger size models . . . guaranteed to fly "out of the box" **\$29⁹⁵**

New LOW Price on CITIZEN-SHIP LC 27.255 Transmitter

With TWO tubes, **CITIZEN-SHIP** type LC 27.255 transmitter (pictured at left) has much greater output than single tube jobs, reliable trouble free circuit . . . new lower price, less batteries

\$34⁹⁵

Announcing NEW Lower Price Model PSN Escapement

Some reliability and quality as **CITIZEN-SHIP** model SN escapement, but tooled for high speed production, resulting economy enables us to retail PSN escapement at low, low price

\$5⁹⁵



CITIZEN-SHIP "27" LR, RE-CEIVER, for 27.255 kc. **\$24⁹⁵**

TRANSMITTER model CC for 465 mc band, price less batteries. **\$39⁷⁵**

Citizen-Ship Test Meter **\$9.95**

Citizen-Ship SN escapement **\$9.95**

Good Bros. 4 position escapement **13.50**

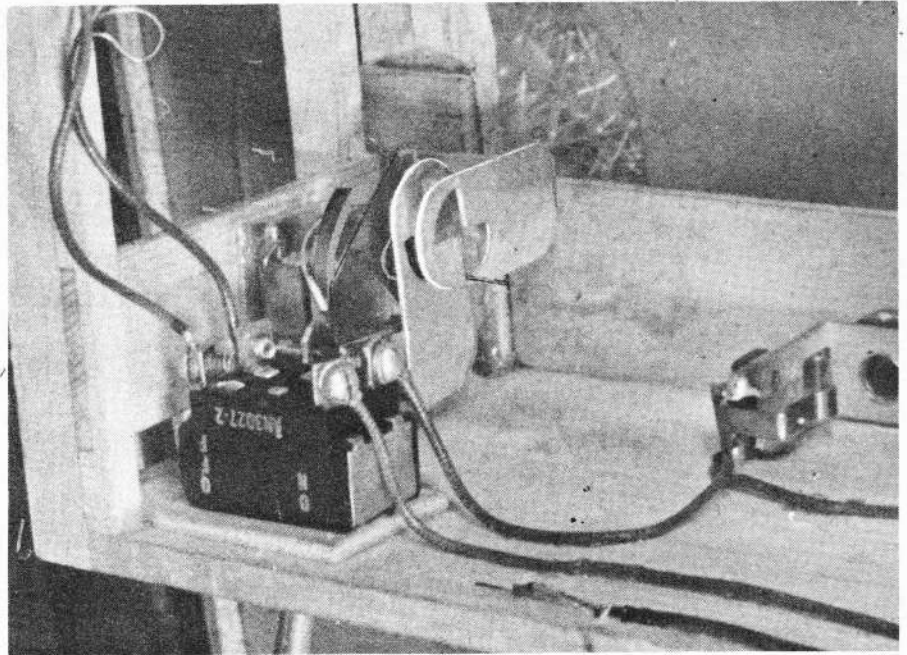
Bell Crank and Rudder Horn **.75**

VERNON C. MacNABB CO.

announces change in name only to

CITIZEN-SHIP RADIO CORP.

909 Westfield Blvd. Indianapolis 20, Ind.



Above: Note how the bellcranks are mounted at 90° to one another to obtain control motion in two planes—vertical and horizontal. Right: Drill the control box cover holes as indicated.

R/C DUAL CONTROL

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we had available. You see, like many other builders, we build all our stuff in a restricted area in our apartment.

The requirement of simplicity led us to our idea for developing a dual control—for both rudder and elevator—that would operate with a single-channel radio set.

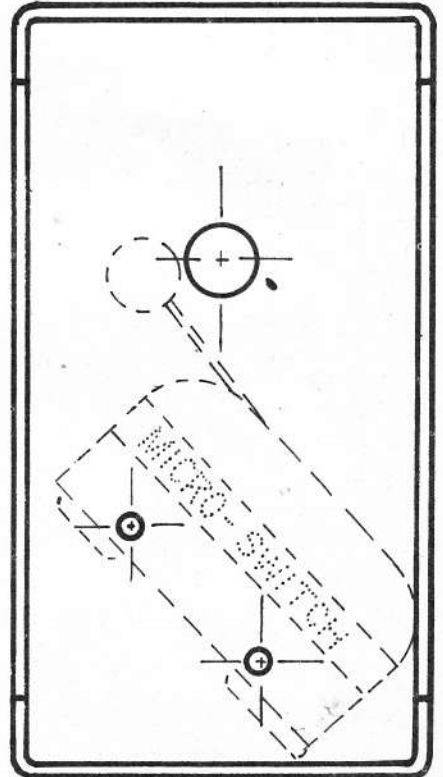
There are some definite advantages to be gained from a dual-control system. After you study them, it will be up to you to decide if these advantages are worth the small amount of extra effort required to obtain them.

In order to accomplish stunt maneuvers with a rudder-only ship, it is necessary to spin the ship down to pick up stunting speed. Completion of a loop, for instance, would then depend on proper pull-out, wind direction, and the climbing ability of the model airplane. Elevator control would simplify a maneuver of this type, since it is only necessary to dive the ship with "down" elevator, and then give "up" elevator to complete the loop. The maneuver is smoothed out considerably, resulting in a tighter and faster pattern, without the usual hesitation as the ship approaches the top of the loop. Similarly, elevator control can be useful for the Immelman, and also for take-off, landing, climbing, inverted flying, power stalls, as well as tightening up turns.

Naturally, the performance of the model is more realistic and spectacular with the added maneuverability. If you feel that your ship's performance leaves something to be desired, then try adding elevator control. But, be sure you can handle the rudder alone before you add any additional controls.

The main feature of our gadget is the simplicity of construction. It can be made with an egg-beater drill, a pair of tin

FIGURE 3



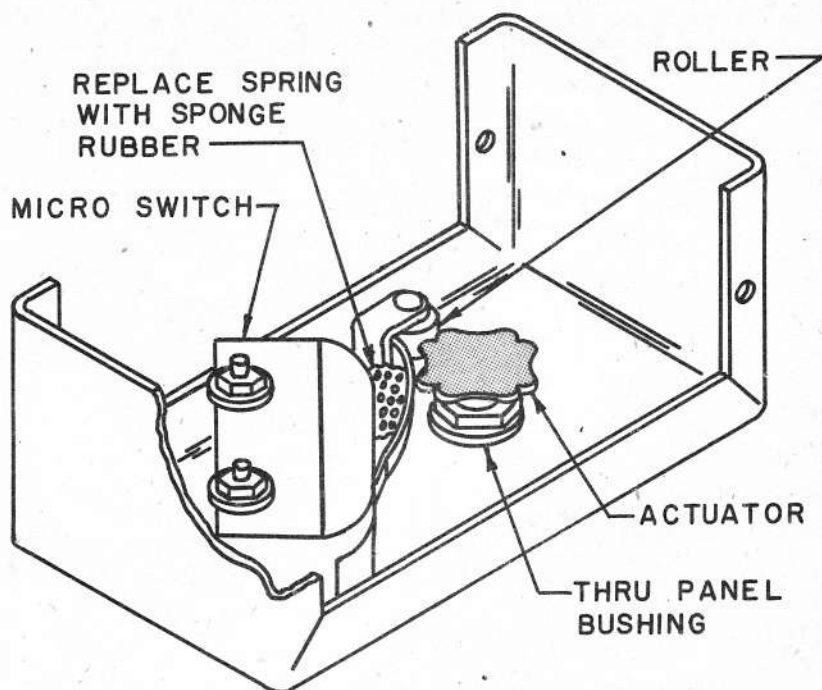
FULL SIZE BOX COVER LAYOUT

snips, one or two files, and a small bench vise.

The system is based on the four-arm type of escapement, such as the Good Brothers or E.C.C. type. We rebuilt an old Control Research two-arm escapement, and it works just as well.

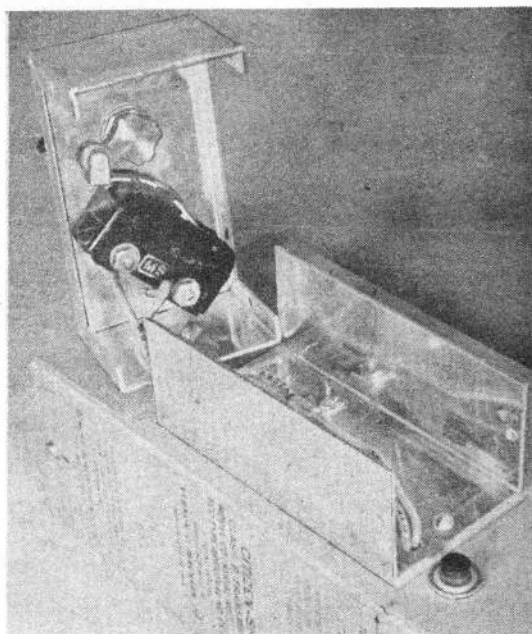
Figure 1 shows the operation of the four-arm escapement, and how this action accomplishes the task of moving two con-

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INSIDE VIEW OF CONTROL BOX COVER
FIGURE 4

The photo and drawing show the inside view of the control box. Note how the actuator and the Micro-Switch mount to achieve a "blipping" action when the control knob is rotated. Sponge replaces the switch spring to supply a solid "feel" to the control switch.



R/C DUAL CONTROL

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control surfaces independently. The sequence is shown, beginning with everything in neutral. The upper row of diagrams depicts the action of the escapement control arm, pawl and crankpin. The lower row of drawings shows the corresponding action of the bellcranks, which are arranged in front of the escapement, with the crankpin extending through the cut-outs as indicated.

The complete installation of the bellcranks, without the receiver, is shown in one of the photos. We used a Citizen-Ship 465 mc receiver—you, of course, may use

any r/c receiver for this installation.

The sequence of Up-Left-Down-Right lends itself readily to the simple control box which is shown in the other photos. The arrow on the outside of the box indicates the direction the switch is rotated to maintain synchronization with the airborne unit. Switch position is shown in Neutral after Right. The letters are decals, and the arrow is cut from a sheet of Trim-Film.

Figures 3 and 4 give you the details of the control box. Note that the small spring under the Micro-Switch arm is removed and replaced by a wad of sponge rubber. This gives a solid feel to the control switch, so you don't have to watch the switch position while the plane is flying.

The wire leads from the Micro-Switch

are soldered to the operating switch terminals. The operating switch is used to synchronize the controls before take-off. If you're in a hurry to fly the ship, and you want to bother remembering the sequence, then the ship can be flown with the operating switch itself. But, we suggest building the control box, as it is very simple, and can be made quickly.

Getting back to our ship, the rudder linkage we used is the same as the one used on the standard "Live Wire". This was also duplicated on the elevator.

The force necessary to neutralize the rudder was obtained by using four strips of nylon hinge material. However, after trying it on the elevator, we found it didn't have enough spring to lift the bell-crank. So, we experimented with several arrangements, and finally used a beryllium copper spring (.032" x 1/8" x 2") and a small rubber band tensioner. "Down" elevator deflects the spring, and "up" pulls against the rubber band.

The only maneuver we haven't tried yet is inverted flight. The reason for this is that we are using a regular metal tank, which will only feed fuel for a few seconds in the inverted position. But we're going to lash on a pressure tank and give it a whirl.

We would be very interested in reading about your results with this control system. So, drop us a line and let us know how you make out!

BILL OF MATERIALS

- 2 pieces .064" x 1 1/2" x 3" 24ST aluminum
 - 1 piece .032" x 3/4" x 3/4" sheet brass
 - 1 Micro-Switch #BZ-2RW2
 - 1 4" x 2 1/8" x 1 5/8" Plexi-mount case—ICA #29337 (aluminum)
 - 1 piece 1/4" diameter 7/8" long brass shaft
 - 1 through-panel bushing assembly
 - 1 2" long pointer knob
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