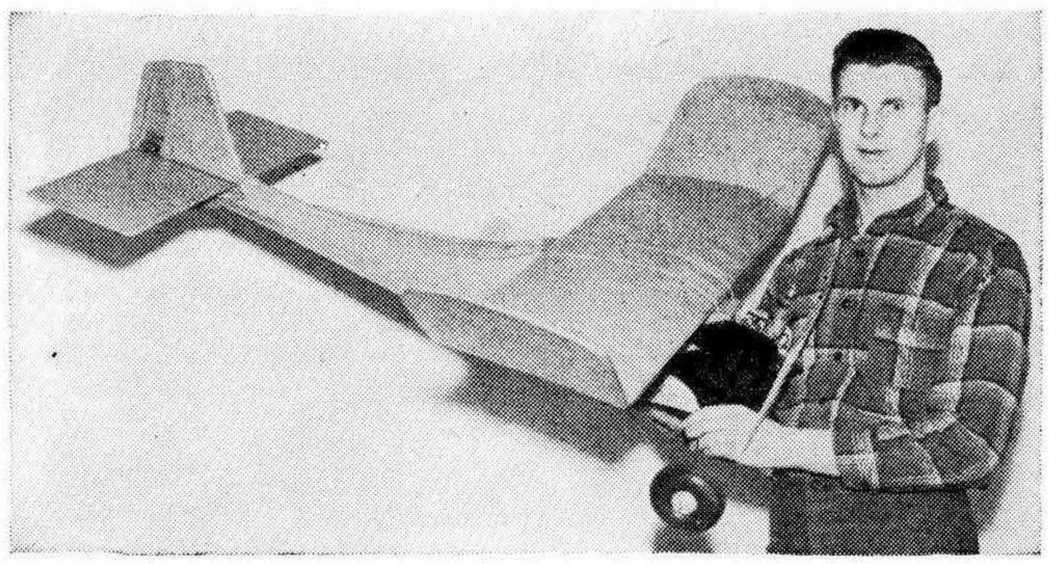


The author with R. C. plane equipped as described in this article

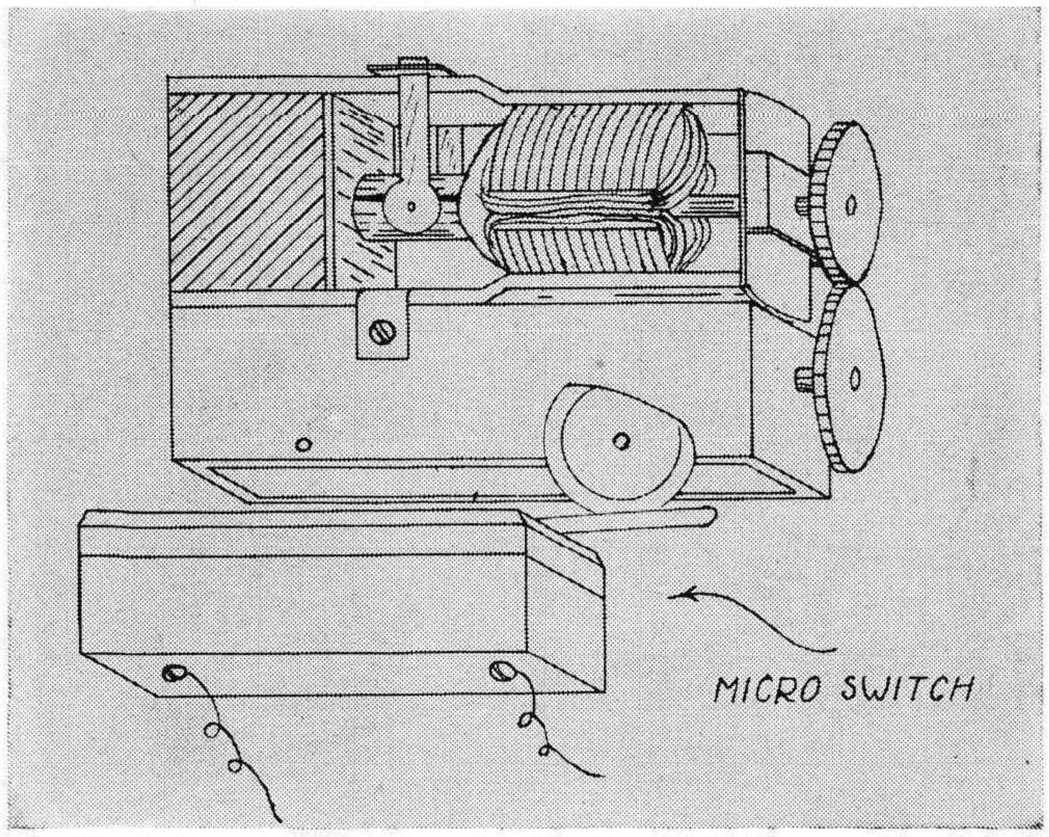


Fig. 1 A model train motor truck is the heart of the pulsing unit

Simple Pulse CONTROL

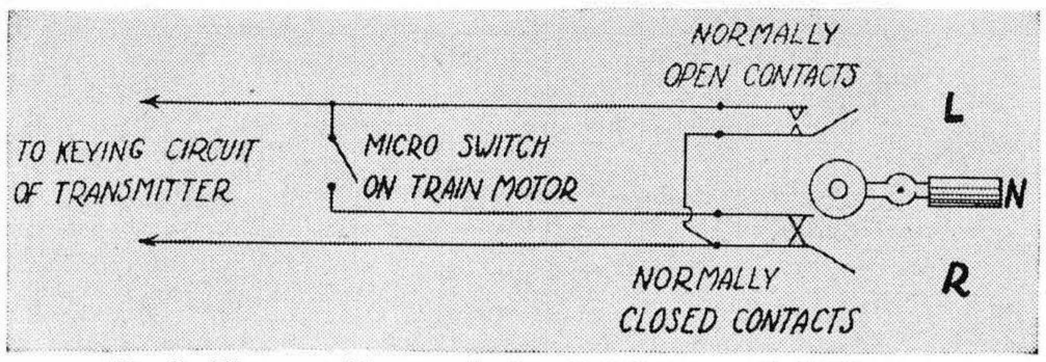


Fig. 2 Three-position control switch is connected this way

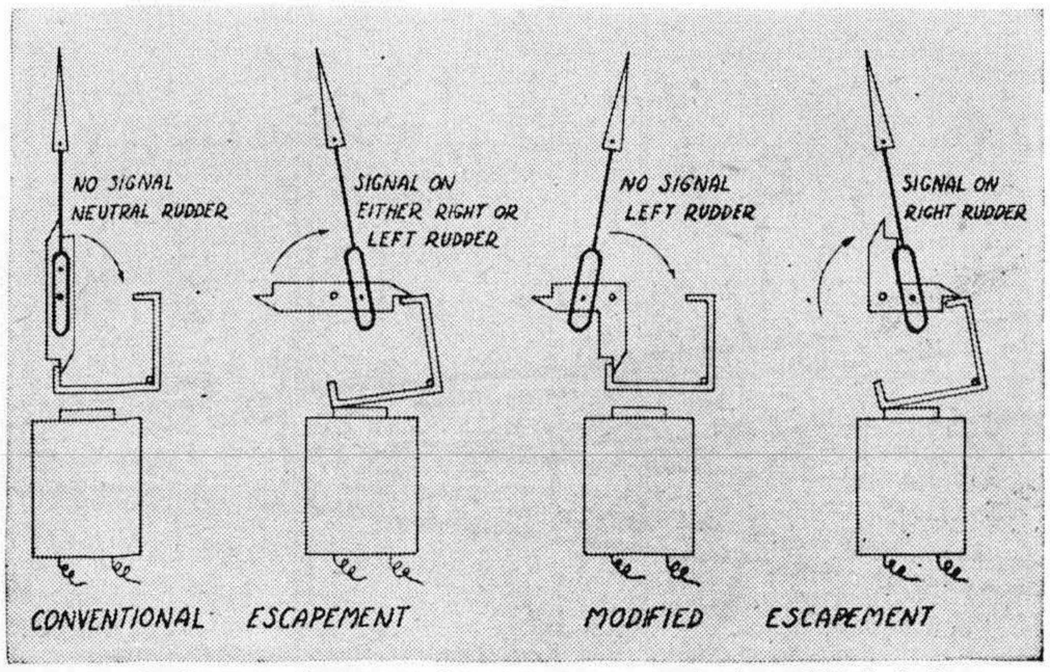


Fig. 3 Action of standard escapement, and of modified design

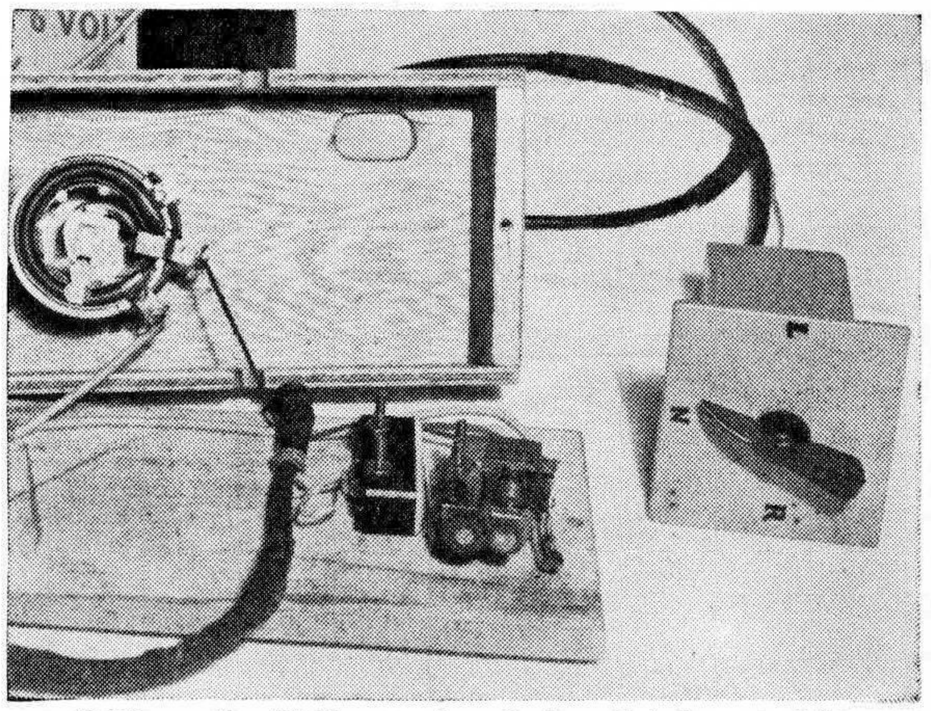
by E. PAUL JOHNSON

PULSE rate control for R.C. model airplanes was first introduced to readers of M.A.N. by George Trammell in the July, 1947, issue. While competing against Trammell in the 1948 Nationals, I was convinced by his spectacular performance that it was about tops in radio control. Pulse control is much better than the conventional escapement method because there is no necessity of keeping track of the sequence of the escapement. Mr. Trammell's control, as described by him in his article, is fine for the fellow with a complete machine shop, but for the average modeler a simpler pulse device is needed. I will describe in this article what I have developed along that line and have used with surprising success.

First let us analyze what pulse control is. If the radio equipment in the plane were arranged so that signal-on gave us right rudder and signal-off gave us left, we could fly a nice zigzag pattern, controlling with a key or switch. If the signal was turned on and off fast enough, the rudder would flip right and left so fast that the plane would fly on a straight course. If the signal was held on, the plane would circle right. If the signal was held off, the plane would circle left. All that is necessary now is to make the equipment to perform these operations.

Any transmitter and receiver can be used without change. The only alteration necessary is in the escapement. This change is a simple one that can be made easily by any modeler with only the tools that are necessary for general model airplane construction. The other equipment needed for keying the transmitter in pulses and for controlling the direction of the plane by the operator can be purchased from any model shop. The whole arrangement is so simple that even the novice can put it together. I'm sure if the reader tries this type of control he will be more than satisfied.

I am using a Good Brother's transmitter and receiver which is manufactured by Beacon Electronics, and an *Aerotrol* escapement with modifications which will be described later in



Pulsing unit with its speed control; switch box at right

the article. I can recommend this equipment as I have had excellent success with both.

For a keying device to key the transmitter on and off, I used a HO train motor and driving unit. One of the wheels was filed flat on one side to form a cam, and a micro switch was placed so that it is turned on and off by the wheel (Fig. 1). Micro switches can be purchased from any radio supply or war surplus store. Take care when filing the wheel and keep checking the amount of time that the micro switch is on and the amount it is off during one revolution of the wheel. When the wheel is filed, the right amount the micro switch will be on one-half revolution and off one-half revolution. This will make your pulses even and keep your model plane flying straight when the operator's control is set on the neutral position. If the pulses are uneven, the plane will tend to circle right or left, depending on which pulse is longer.

The train motor is powered from a 6-volt Hot-shot battery and its speed is controlled by a power rheostat in series with the motor leads. These rheostats are used in model railroading as a speed control for the trains. The train motor I used was a 6-volt prewar model. These are rather difficult to obtain now because all the post war models are 12 volts. It was discovered by experimentation that the new 12-volt motors seem to run about as well on 6 volts as the prewar 6-volt models. So don't let it worry you if all you can get your hands on is a train motor designed for 12 volts. The ol' 6-volt Hot-shot will run her fine.

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Simple Pulse Control

(*Continued from page* 34)

A three-position telephone switch is used for the operator's control (Fig. 2). This switch has two sets of contacts, one set normally open and the other, normally closed. If the switch is turned right, the normally open contacts are closed and a steady signal is sent out by the transmitter causing the plane to circle right. If the switch is turned left, the normally closed contacts are opened and no signal is sent out causing the plane to circle left. If the switch is in center or neutral position, a pulsed signal from the train motor and micro switch is sent out and the plane flies straight.

The train motor, drive unit, micro switch and power rheostat were housed in a small box built for the purpose and connected to the transmitter by a short length of coaxial cable. A three-wire cable was run from this box to the three-position toggle switch, which is held in the operator's hand. It is advisable to have this cable long enough so that the operator can stand up and even take a few steps one way or the other in order to keep the plane in view at all times.

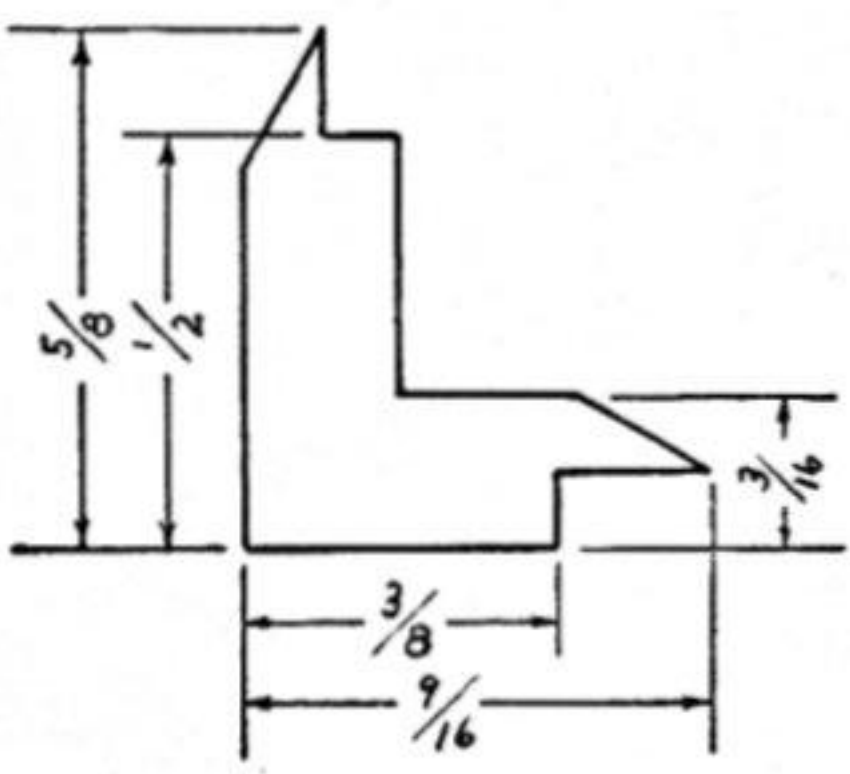

Fig. 4 New arm to be made for escapement

In constructing the control for the plane, the straight rotating arm on an *Aerotrol* escapement was removed and an L-shaped one put in its place (Fig. 3). *Caution*—be sure this arm is made of brass or some other nonmagnetic material. There are no definite dimensions for this arm. It is made more or less by a cut-and-try method. Make it slightly oversize, and by observation the amount to be filed off can easily be determined. The dimensions of the arm on my escapement are shown in Fig. 4. These can be considered a basis for the approximate dimensions necessary. A single loop of rubber was run inside the entire length of the plane fuselage to turn the moving arm. Every time a pulse is sent from the transmitter the escapement in the plane operates causing the rudder to flip right and left. When a steady signal is sent from the transmitter, the escapement is held in an operating position causing the plane to turn right. When no signal is sent from the transmitter the escapement is in nonoperating position and the plane circles left. Two thousand turns are put on the rubber, which is enough to flip the rudder steadily for 6 min. Since about half of the time you are turning right or left you have enough winds for a twelve-minute flight; the rubber does not unwind in the turns. I advise getting an indoor winder for putting the turns in the rubber. 2,000 turns put in with a drill or other low ratio winder is quite a tiresome job. Indoor winders can be purchased from Junior Aeronautical Supply Co. (JASCO).

I have made approximately fifty flights with my present radio controlled plane, using this equipment, and have never had

a mishap. It responds perfectly and there is no guess work or keeping track of the sequence of an escapement. When right rudder is given, the plane goes right and when left rudder is given, it goes left. Not only is this control simpler from the operators standpoint, but the equipment in the plane weighs no more than a standard escapement control. My present plane, complete with radio equipment, weighs 4-1/4 lbs.

I am sure anyone who tries this control will be satisfied beyond expectations. Try it out, and I'll see you at the next R. C. contest.