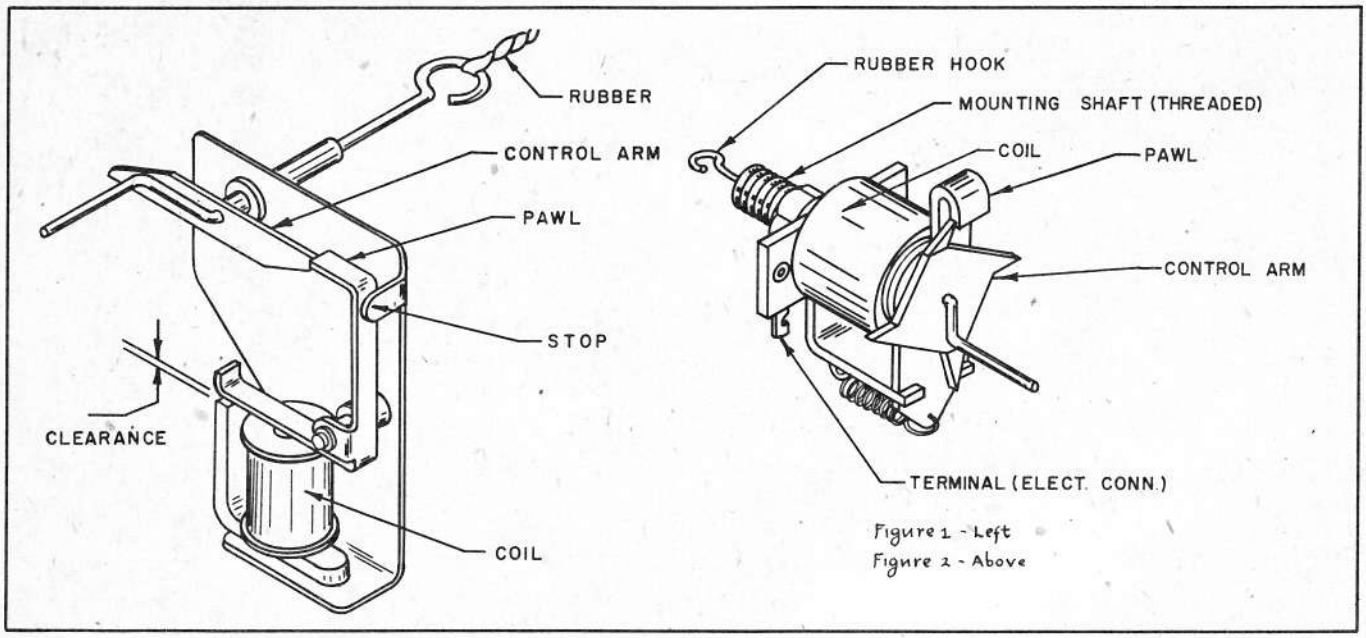

Figure 1 - Left
Figure 2 - Above

Figure 1 shows an escapement with a stop. Note the clearance between the pawl and the coil, it should be as large as practicable so that any movement of the pawl will not "skip" the escapement. Figure 2 shows a unit without a stop. To restrict the movement of the pawl, a piece of .032" brass can be fitted directly to the escapement mounting plate. Photo below, left, shows Ed Mahler and his 74" span, ten pound R/C job.

GETTING STARTED IN RADIO CONTROL

by Phil Greenberg

Information on escapement troubles and their cure — on R/C plane design — on how to perform maneuvers — and on field etiquette

● The one radio-control item which most beginners have trouble with is the escapement. Everybody, even the so-called expert, has had his share of headaches on this score, so don't be disappointed if you find yourself in some difficulty.

We have sketched two different types of escapements to help clarify some of the possible sources of trouble. Both of the types shown are self-neutralizing escapements—commonly referred to as two-arm types—which return to neutral with signal "off." Three of the general factors which can give you trouble, aside from the escapement itself, are:

(1) Engine and propeller vibration (2) Rubber motor (3) Escapement batteries.

An unbalanced prop or incorrect engine speed can cause the escapement to skip (the vibration also may affect the relay). Try different prop diameters and pitches which will vary the engine speed, in order to cut vibration to a minimum.

The rubber escapement motor also can cause skipping, and even sticking, if it is too heavy. A single loop of ⅛" flat rubber can move any control surface we've seen. Larger rubber sizes are not necessary, except in extreme cases. Be sure to use rubber lube to preserve the rubber. At the end of the day's flying, unwind the escapement motor. By leaving it wound up for long periods, the motor will be killed, the same as by overwinding.

Intermittent operation of the escapement, or failure to operate at all, generally indicates weak or dead batteries,

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or wiring difficulties. Check your batteries with a voltmeter, and carefully inspect your wiring to see that all solder joints are secure, and that there are no "open" wires in the circuit.

Besides these external trouble-makers, the escapement itself can cause a great deal of trouble. The clearance between the pawl and the coil should be as large as practicable (Figure 1), so that any movement of the pawl due to engine vibration will not "skip" the escapement. The stop can be adjusted to give the correct clearance.

The unit shown in Figure 2 is not provided with a stop. However, should any adjustment be necessary, a piece of .032" brass can be fitted directly to the escapement mounting plate, to restrict the movement of the pawl. If you have more clearance than that specified by the manufacturer, you will need additional voltage to operate the escapement.

The contact areas of the control ram and pawl must be checked periodically. They should be flat and meet true. If the edges are worn round or have developed a burr, they should be carefully reshaped with a small jeweler's file to sharp square edges. Trim both arms evenly so that they will remain of equal length.

If the escapement moves to a control position and fails to return to neutral with signal "off," check to see that you have sufficient tension on the pawl return spring. Also, check for binding in the linkage to the rudder.

When you are checking the operation of the escapement, be sure to use fresh batteries. Adjusting with weak batteries will make the unit very sensitive to all of the aforementioned troubles, and you can never be sure of reliable operation. So use fresh batteries at all times—for checking and for flying.

Another type of escapement is also available, but this one is not self-neutralizing. It is usually referred to as the four-arm type. We will describe it in a future issue, where we will present a simple system we have devised for obtaining both rudder and elevator control from a single escapement.

DESIGN OF R/C PLANES: Before getting started on the methods used for accomplishing various maneuvers, we would like to discuss a few items of airplane design that are appropriate at this time.

Radio-Control is still in its infancy and, because of this, not many good R/C designs have been developed. That is why you will notice so many flyers with the same or similar type of airplane. Most of these planes, particularly the kit jobs, are "trainer" planes and will perform a great many maneuvers. There are also a few designs available which are larger, heavier and faster, and which will do almost any maneuver in the book. But, they are also trickier to fly.

While flying your ship, it's very good to try some of the more difficult maneuvers, but keep in mind that some planes just can't do everything in the book. An R/C plane, like its full-size counterpart, must be designed and developed around a set of flight specifications. The inherent stability which the trainer must have, will work against maneuverability. By the same token, a "hot" stunt airplane, which can be readily diverted from a straight path, can't have too much inherent stability (Inherent stability is the tendency of the airplane to return to normal, level flight.)

So, we arrive at the conclusion that there is no "all-around" R/C design. A training type, while capable of many maneuvers, must necessarily be restricted in its performance characteristics in order to remain safe enough for the beginner. A stunt job must be designed as such, and probably will be too tricky for the beginner to handle.

In case you are planning on changing the performance of your plane, some of the factors which will affect the performance of any design are:

(1) Wing Loading (oz./sq. ft.)
(2) Power Loading (oz./cu. in.)
(3) Center of gravity location (% of chord)
(4) Wing Dihedral Angle (degrees)
(5) Trim (incidence of wing and tail, thrust adjustments, rudder area and movement, etc.).

There aren't enough proven designs around to establish any particular set-up as the best arrangement for any particular size airplane. However, a systematic approach, using common sense, should yield an airplane which will suit your flying taste.

FLYING MANEUVERS: Most of the R/C planes flown today are equipped with a single rudder control. Therefore it becomes necessary to use a few tricks to do certain maneuvers.

Your best bet is to first learn how to make smooth turns without losing altitude. Start all your maneuvers at an altitude of at least 250' to 300'. Practice wide turns until you can head the ship in any direction you want.

If your plane responds quickly to the controls, "blip" it around, but keep the turning diameter large. When we say "blip," we mean that you should give a signal, hold it until the ship starts into the turn, and then release the button. This will neutralize the rudder, but the plane will continue to turn for an instant, and then start to straighten out. Hit opposite rudder and release instantly, before the plane has a chance to respond. Then you can hit the button again for the desired turn. Only hold it on long enough to keep it in the turn, and repeat the "blipping" action until the turn is completed. Holding the signal on too long will turn the ship sharply, and it will drop its nose, ending up in a spiral dive. Try to end your turns with the ship heading into the wind.

After mastering the turns, the next maneuver to try is the **Figure Eight.** This is a planned series of turns in which the airplane flies through a pattern resembling the number eight. In doing this, fly so that the straight portions of the pattern are flown crosswind, and the turns at both ends are made into the wind. When done properly, this is one of the most graceful maneuvers in the entire list.

The **inside loop** is one stunt which everybody tries, but not too many accomplish. It is started by holding a turn until the plane is in a spiral dive. Keep it in the spiral dive for one or two turns and release the key. The plane will have built up speed in the dive, and when the rudder neutralizes, the ship will pull out of the dive. At the bottom of the dive, the extra speed will lift the ship up and over on its back. Once it's over the top, it will slide down the rest of the circle.

When you pull out of the dive, in order to get a snappy recovery, hit opposite rudder—for about half a second, no more! Many ships will climb two-thirds to three-quarters of the way up, but just can't get over the top to complete the loop, mainly because of insufficient power. A bigger engine will give the necessary power, but you'll have to retrim the ship, and you can expect to wind up with a faster, and peppier model when you're through.

The Immelman, hammerhead stall, rolls, and many other stunts can be done with rudder control only, but wait until you have a little more flying time under your belt before trying these. For the time being, concentrate on keeping your ship straight and level until you gain altitude; practice your turns; learn to use your glide for some maneuvers; and use every flight to practice spot landings. Keep doing this every week, and pretty soon, you'll be giving the "experts" a run for their money at the next contest.

FIELD MANNERS & TRAFFIC CONTROL: Since the 27.255 mc. band was opened last year, there has been a tremendous increase in radio-control activity. With this, has come the evil which was forecast—the problem of interference. There has been no noticeable interference from such things as hospital diathermy equipment, or ham operators—the hash we are speaking of comes from other modellers tuning up or checking their equipment.

We didn't pay too much attention to this while operating on 52 mc., because it was easy to tune to another frequency. But now, with so many on the same fixed frequency (27.255 mc.), another solution must be found.

The way we see it, it's up to all of us to mind our manners while out at the field. If you hear an engine running, extend the same courtesy that you would expect. Make it your business to know at all times when someone has an R/C job in the air. Don't turn on your transmitter while they are up.

Make your distance checks on the signals of the guy who is flying (This is a handy stunt when you are at a contest, and can't get the air long enough to complete the check-out of your own transmitter). One practicable idea that

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has been proposed, is for the entire group to use one transmitter, so that checking and flying can all be done at the same time.

Remember that it's an honor system, and nobody can, or wants, to check up on you. Before turning on your transmitter, remember always to "Do unto others as you would have others do unto you."

If you must have the air all to yourself, then get out early enough to beat the rest of the mob, and you'll have no difficulty. Otherwise, in order not to disturb anybody, or be disturbed, switch to the 465 mc. band, which is also "license free," or go into audiotone operation, or else get yourself a ham ticket and switch to 6-meter operation.

If your club or flying group has worked out any system of R/C Traffic Control, or if you have any ideas of your own, we would appreciate hearing from you about them, so that we can pass them along to other readers.

Answering Your R/C Questions

● Our mail bag brings up a very interesting question from Darryl Zempel, 2423 Blaisdell Avenue, Minneapolis 4, Minnesota, who wants to know if anyone has ever tried an R/C jet-powered model. He is also interested in the performance of such a model.

Frankly, Darryl, we haven't seen one, although we've considered trying one ourselves. The radio installation would be the same as in the usual R/C models. However, the increase in speed would be too much for a beginner to handle. Perhaps some of our readers could help with some information, if they know of such a plane.

● We also heard from Sol Goodstein, 1275 Edw. L. Grant H'way., Bronx 52, N. Y., who is interested in a multitester for R/C. He is also building his own receiver and needs an air-wound coil and an R.F. choke to complete it.

Well, Sol, just keep tuned to these pages, as we expect to have the details on a multi-meter in the next issue, plus some additional information on meters. The air-wound coil that you want for 27.255 mc. can be made from about twelve turns of a Barker and Williamson type 3006 "Miniductor" coil. Another type of coil can be used, the "slug-tuned" type, which consists of about 12 turns of No. 20 wire wound on a Cambridge Thermionic No. LS3 3/8" diameter coil form. It may be tuned by a 4-30 ceramic trimmer. Use an Ohmite Z-50 for your RF choke.

● Bernard G. Henderson of 1977 Carmen Pl., Los Angeles 28, Calif., wants to know if you can operate both the rudder and elevator from one R/C unit. There have been several systems devised for this type of operation and some of these have proven to be successful and satisfactory. The Bonner Compound escapement, available commercially, will offer rudder and elevator control, and can be switched over to motor control on alternate flights.

We have our own system based on a four-arm escapement which gives rudder, elevator, and motor control. In addition, there is still another system under development which will offer proportional rudder control, with two-speed motor, and possibly elevator control. Remember, though, that you should keep your first R/C job as simple as possible. After you've tried your wings on rudder only, you can make your next job one with some of the extra gadgets thrown in.

We'd like to hear from more of you fellows, now that we've got this nice warm summer flying weather. Send in your letters, and let us know about your activities, including your troubles, if you're having any. We can also use some pictures, so that we can show everybody how you're doing. Also, we'll give full credit for any of your ideas or gadgets which we present in this column. A simple pencil sketch will do, and we'll draw it up in real style. So let's hear from you real soon. Write: Phil Greenberg, c/o FLYING MODELS, 215 Fourth Ave., N. Y. 3, N. Y.

WACO "N"

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bottom with 3/16" sheet, watching the direction of the grain. Now, cover the fuselage top, beveling the forward portion to provide a slot in which the wing will fit, trailing edge first. Apply two coats of sanding sealer and sand smooth.

WINGS: The wings are very simple and construction is started by cutting the wing joiners from 3/32" plywood. Next, cut the leading edges to length and cement to the joiners. Pin one leading edge directly over the plan and cut rectangles from 1/16" sheet balsa measuring 1/4" x 1 1/16" for the upper wing and 3/16" x 15/16" for the lower wing.

Cement these rectangles to the leading edge that was pinned to the plan and add the trailing edge and solid wing tip. It will be found that the correct dihedral is automatically formed by the joiners. Also note that only the top wing requires a center section.

When the wing structures are complete, shape the leading edge, ribs and trailing edge as shown in the side view. Sand well. Recement all joints and cover with light silkspan using thin cement or thick dope as the adhesive.

Clear-dope the wings three times, sanding lightly with finishing paper between coats.

FINAL ASSEMBLY: Applying liberal quantities of cement, attach the upper wing to the fuselage by fitting it into the slot formed by the previously attached fuselage top. Fillet the wing by applying cement all around the joint.

In order to attach the lower wing, a slot must be cut up through the fuselage bottom to the joiner location shown. This task is eased by the grain direction of the fuselage bottom. Save the piece that is removed.

Carefully fit the wing joiner into the

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