

# GETTING STARTED IN RADIO CONTROL

## by Phil Greenberg

Field tuning and test flying are big factors in successful RC flying—here's how it's done

Above: Ed Mahler showing fine form as he launches Norm Rosenstock's Electron No. 14. The five foot ship is powered by an E.D. 3.46 cc engine for slow speed flying, and a Fox 29 for high speed flying. The model is equipped with one of Radio Control Research's two-tube receivers.

Right: Here is a good example of where not to launch your ship—near automobiles! Bill Johnke launches Jim Higginbotham's modified Live Wire powered by a McCoy .09. Job has original receiver and includes engine control, using rudder escapement as selector, with additional relay for actuation of the throttle. Now step away from those cars, John.



• After reviewing all the factors that go into radio-control flying, we've come to the conclusion that the most important single item for successful operation is having your radio equipment tuned properly. The following outline, in addition to the specific instructions that were packed with your set, is standard procedure:

Transmitters for 27¼ mc. operation are fixed-tuned. Therefore, in order to make sure that the receiver in your plane picks up the signal you send over your transmitter, it is necessary to constantly check the tuning of your receiver. Most radio-control receivers are "slug-tuned," which simply means that a small screw-type adjustment is provided for tuning. Once the final adjustment has been made, the screw adjustment must be locked in place with a jam nut, or by other means, to prevent any movement due to vibration.

Your receiver should be mounted in the fuselage in the same position as it will be flown. Rearranging the receiver may affect the tuning, and throw it off frequency. Plug the 0-3 ma. meter in your receiver circuit and set the potentiometer for minimum plate current. If your receiver has an antenna trimmer, it should be set for minimum capacity, but leave the antenna connected (see April 1953 FLY-ING MODELS).

Turn on the receiver and readjust the pot. for "idle" plate current. Turn on the transmitter and key it while slowly adjusting the tuning screw on the receiver. Watch the meter and notice when the plate current "dips" suddenly. Tune for minimum plate current while holding the signal on. Key the transmitter on and off to make sure that it is *your* transmitter that is causing this action.

Now, pick up your plane and walk about 50 feet from the transmitter while someone keys equal on and off pulses. Watch the meter to see that the receiver responds as you continue to walk away. If you lose the current drop, walk back a few feet towards the transmitter and retune for minimum current with the signal on. The antenna trimmer condenser may require a slight readjustment also. Don't add too much capacity, or you'll knock out the signal altogether.

Continue walking away to about 1,000 feet, and recheck operation after locking the tuning screw. The receiver





Above: Bernie Spera holds his Bootstraps A-RC Model, powered by a Mills 1.3 cc diesel engine, just before getting ready for a flight. Has CM radio.

Left: A close-up view of a rudder linkage. The escapement is mounted in the cabin. The lower wire loop is for the winding escapement motor.

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must function perfectly at this distance, otherwise do not attempt to fly the ship.

This distance check should be made after any hard landings that might upset the receiver settings. Also, make it a practice to check your operation periodically throughout the day's flying. The distance check is the only way you can duplicate flying conditions and determine if the set will work in the air. Obviously, you must have good ground range or you will be unable to maintain radio control if your plane flies further than you originally intended.

Use hand signals for your ground checks. A sensible system, which we use, is for the person at the transmitter to indicate what is going on. For instance, for signal "on," he holds one hand up—for signal "off," nothing. When you want the signal changed, you raise your hand and lower it again, so you can work on the ship. When you are finished checking, and are satisfied with the operation, wave your hand to signal your assistant to shut off the transmitter. By this system, just looking at your assistant will tell you if you have signal "on" or signal "off," and you can change whatever it is by merely raising your hand.

WHAT TO AVOID: 1. When you set up your transmitter and flying equipment, stay away from parked cars, overhead wires, and trees. We can't overemphasize the hazards of flying near parked cars. Invariably, there are women and children in and near them. Also, there is always the chance that your ship might get out of control and smash into one of the cars. Glow fuel from a running engine won't help the car finish very much either.

Wires and trees are not only flying obstructions, but they are radio hazards as well. Both will act on your radio set like gremlins and you'll spend a long time trying to figure out what's going on. Wires will act like large antennae, and tend to throw your receiver off frequency, making it insensitive to your signals. Trees, because of their high moisture content, will act as a direct short to ground of any signal. Do not tune up your receiver by walking into or near a wooded area, because you will be out of tune when the plane is in the air and clear of the trees.

2. Wind direction and velocity are the most important natural conditions (Please turn to Page 44)

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that the radio-control flier must contend with. Set up your equipment on the upwind end of the field. While you are learning how to fly, make sure your landing area is downwind. Also, try not to fly into the sun, because by the time you can see again, after just a split-second look at the sun, your ship will be heading downwind.

ADDITIONAL PRE-FLIGHT CHECKS: In addition to the actual tuning of the receiver, there are other checks that must be made. Check the battery voltages, and the operation of the relay. Relay operation is checked by plugging in the meter, and adjusting the potentiometer from "idle" current down to below "drop-out" current. Readjusting the pot for idle current will enable you to check pull-in value. The escapement will respond when the relay drops out, and will return to neutral when it pulls in again. This is the time to check to make sure you have sufficient turns in the escape-ment rubber.

Then, with the engine running, turn on the receiver and escapement switches and check the entire unit with the transmitter signal. Go through several complete sequences of rudder operation. If the rudder does not go opposite on alternate signals (skipping), or if there is any hesitation in going into or returning from a control position (sticking), then the unit is not operating properly. Unless it works perfectly, don't launch the ship. It is not going to work any better in the air.

**FLYING:** If everything is working properly, set your rudder for right turn coming up, and launch the ship. We suggest using the hand-launch method for your take-offs. R.O.G.'s are very pretty, but they are more likely to become fouled up.

Take-offs must be made into the wind, the same as full-scale aircraft. Head the ship into the wind while it climbs for altitude. Try one or two gentle turns, just to feel out the response of the controls. Don't hold a turn too long, because the ship will continue to turn slightly after you have stopped the signal. Too much of a turn will cause the ship to head downwind. Try to avoid getting into this situation, because you will find that, in order to bring the ship around and heading upwind, you will lose altitude as well as the actual ground distance that the plane is traveling. Try to hold the upwind heading for a few hundred feet before trying any maneuvers.

Limit your first flights to a 20 or 30second engine run, by means of the timer. This will keep your ship nearby, in case you make any mistakes, or if you misjudge the wind. If you get yourself into any trouble, just let go of the control button until the plane straightens itself out—then start controlling again. Make lots of short flights until you become accustomed to the way the plane responds to your signals. Take it easy at first, and remember that you are training to become a pilot, and you won't find any student pilot of full scale aircraft trying aerobatics or endurance records while he is learning to fly.

There is only one way to become a good radio-control pilot, and that is to get out and fly the plane often.

**TROUBLE SHOOTING:** One of the most common causes of trouble is engine vibration. It will affect both the receiver relay and the escapement, showing up as a tendency for the rudder to "skip." One way to eliminate this trouble is by switching to another propeller. Unbalanced props or operation at wrong engine speeds can cause excessive vibration. Try various sizes and pitches to see which one will eliminate the vibration.

Next thing to check is the receiver suspension. If the rubber bands are too tight, it will transmit the vibration from the frame to the receiver, and cause the relay to chatter. Fasten the receiver securely, but loosen the rubber a bit if it seems too tight. Include a snubber to prevent forward motion of the receiver in the event of a crash. Don't forget to put that sponge pad in front of the receiver.

Another source of trouble is the escapement rubber. Too heavy a rubber size will cause the escapement to skip. Use rubber lube on the escapement motor to extend its life and permit more turns.

Check the battery boxes to be sure that all contacts are positive and clean. Contacts will become corroded if weak or dead batteries are left in the ship for any length of time. Clean the contacts from time to time with a piece of smooth sandpaper.

A defective switch may cause erratic operation of receiver or escapement. Worst offender in this category is the slide-type ball-contact switch. The slide-type knife-contact switch is better, and the toggle switch, although a bit heavier, is the best.

The escapement linkage and the rudder must operate freely. If the linkage is sluggish, substitute the next smaller wire size. Be careful, when doping the rudder, not to dope over the hinges in the area between the rudder and the fin. Any stiffness or binding in the linkage or hinge should be eliminated completely. Allow a little free play in the system; and don't worry about it because the rudder will streamline while in flight. The main thing to keep in mind is

The main thing to keep in mind is not to launch the ship unless everything is working perfectly. If you can't adjust it properly on the field, pack it up and fix it at home. That way you'll be able to fly the ship the following week, instead of taking unnecessary chances on losing it now.

#### **FLYING MODELS**

### Answering Your R/C Questions

Q. I would like to inquire as to whether there are plans available for a sailplane capable of carrying radio-control equipment?—S. L. MOORE, 1801 Arapahoe, Boulder, Colorado.

A. In the October 1952 FLYING MODELS, you'll find a very satisfactory layout in FM Design Sheets Number. Scale up the contest towliner to a six-foot span, using an aspect ratio of about 10 to 1.

Q. Where should a radio-control model balance? Should the stabilizer lift the tail in flight, or just "stabilize"?—FRED RAITCH, 31 S. Hampton Road, Columbus 13, Ohio.

A. As a general rule, the model should be made to balance at a point approximately 25% back from the leading edge. This location of the C.G. will give steep spins and spiral dives, but will also show good recovery characteristics.

Most R/C ships today use a symmetrical stabilizer, whose angle of incidence is varied to provide proper longitudinal trim.

Do you have any questions on radio-control? Send them along to: Phil Greenberg, c/o FLYING MODELS, 215 Fourth Ave., New York 3, N. Y. we'll try to answer them as soon as possible, in a forthcoming issue, as space permits. Let's hear from you! Your questions must pertain to commercial equipment—we cannot provide special circuits.