A happy Walt Good after his 1952 R/C duration record flight of 40 minutes, 28 seconds, at Andrews Air Force Base, near Washington, D.C. The model is his 6-foot Rudder Bug, with a Forster .29 ignition engine. Transmitter control box is in his left hand. Radio is described in text.

FAMOUS R/C AIRCRAFT..... NO. 1 Walt Good's 'RUDDER BUG'

PHOTOS FURNISHED BY WALT GOOD

The expression "going *DOWN* in history" just doesn't seem appropriate for famous R/C model aircraft. We intend to keep them *UP* in the air by bringing them back to you, one at a time, in this interesting series.

• In the months to follow, **Model Builder** intends to present a series of famous, pioneer R/C aircraft. This presentation will include background history on the model . . . and its designer, and also a complete set of construction plans, which may be purchased through **Model Builder's** plan service. When possible, we will publish photos of the original model, and will also give brief building instructions, particularly in areas that may need additional clarification.

Many of the very early R/C models, which were designed in days when the rudder was the only moving control surface, were so inherently stable that, if left alone, they would keep on flying until they disappeared . . . which was very often the case . . . as a result of the crude, tempermental, relay-operated, rubber band powered, control mechanisms! Because of their stable flight characteristics, most of these famous, historic R/C aircraft would still make excellent trainers, and with the matter-of-fact reliability of today's radio equipment, could give even more pleasure to modern day builders than they did 15 to 25 years ago.

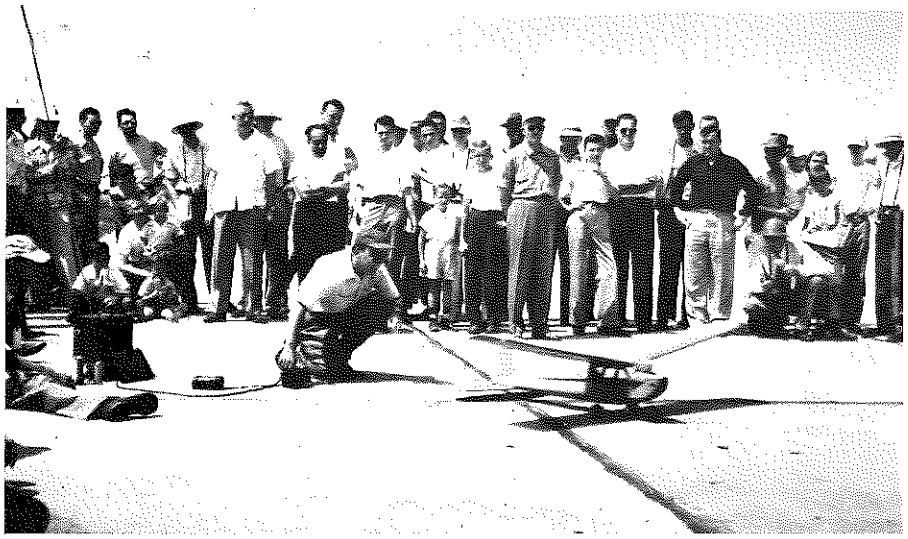
There were a few famous R/C model aircraft prior to the "Rudder Bug", but the "Bug" represented the first departure from the 8 to 12 foot, load-carrying behemoths that came before it. Perhaps it is time to let its designer, Dr. Walter A. Good, pick up the story.

"The Rudder Bug was designed especially for radio control rudder flying . . . in 1949. This six foot giant was considered small at that time, but large enough to carry the one pound *(Yes, 16 ounces! wcn)* of single-channel equipment.

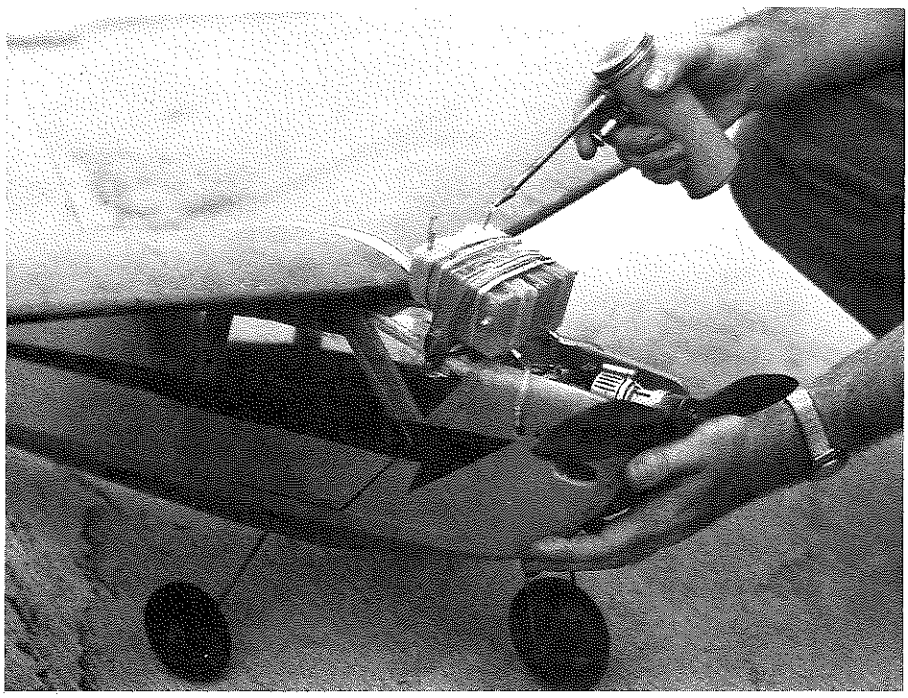
"The radio was the Good Brother's single-tube receiver and escapement, put out by Beacon Electronics, in Pittsburgh. The ground-based transmitter gave 2 watts at 54 MC, and was push-buttoned on and off to give right, left and neutral rudder. Incidently, in those days, we tuned the transmitter to the receiver!

"The engine was a deLong 30, which was later replaced with a Forster 29. Both engines were about as powerful as today's 19's, but the ignition system gave good long flights on a few ounces of gas/oil mix.

"Basically, the plane design came



Three attempts were required to accomplish takeoff for the June 25, 1952 record flight. Same model won the 1949 Nats R/C event. Five foot span version kitted by Berkeley.



Tank filling operation for the 1952 duration record flight. Extra tanks simply strapped to outside for the flight. Note cabin door for convenient access to radio system.

Armin Roethlisberger launching his Rudder Bug for the flight that won the 1962 Swiss Nats. Snow covered Alps form beautiful backdrop. This may be Royal Rudder Bug from kit.

strongly from free flight . . . note the large dihedral and small fin for good spiral stability. However, several features were especially for R/C. The very small rudder was remarkably effective . . . one-eighth inch deflection was plenty for a tight turn . . . and resulted in a tiny torque load on the weak escapement actuator. By placing the center of the fin area on the level with the thrust line, good power-on to power-off characteristics were obtained.

"Spacious cabin doors on both sides gave easy access to the temperamental R/C gear which usually required attention before every flight and sometimes during flight!

"Overall, the Rudder Bug turned out to be a very stable and docile model, thus providing a good platform for newcomers and the then not-so-reliable radio gear.

"The Rudder Bug was first designed, built and flown during 1947 and '48. By 1949, when the plans were published in Model Airplane News (May-June '49) the original had made almost 100 flights.

"It was surprising to see 11 Rudder Bugs at the 1949 Nationals (considering the plans came out only a few months before the meet), out of a total of 31 entries! A Rudder bug took first place.

"Within a few months, the British published the Rudder Bug in "AEROMODELLER" (Jan./Feb. 1950), which started an overseas interest in the model.

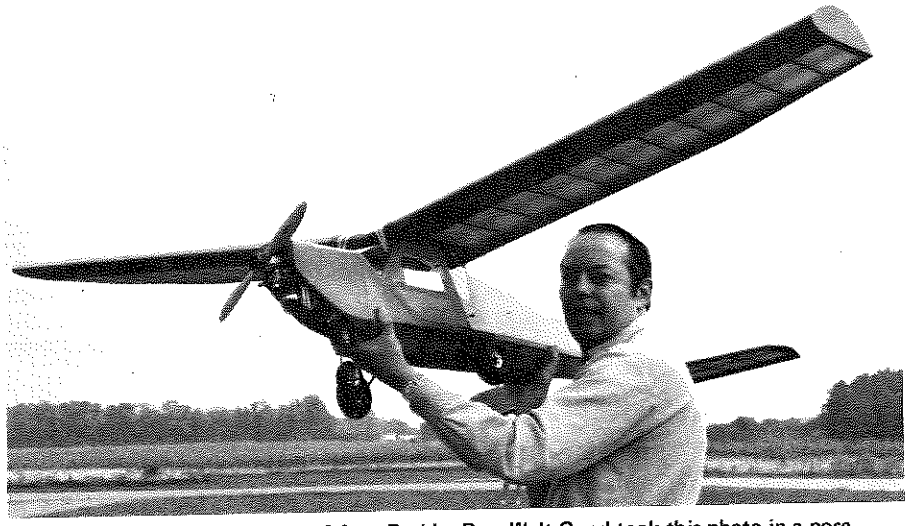
"By strapping extra tanks on the Bug, still using the ignition Forster 29, an FAI World's Record for R/C duration was set in June 1952, with a flight time of 40 min., 28 secs. The previous record was held by the Russians with 23 mins., 8 secs. The escapement rubber band was still only half wound down after the 40 minute flight. It started with over a thousand turns.

"In order to obtain a smaller Rudder Bug, the original was scaled from 6 feet span to 5 feet in 1954, and powered with a 19 engine. This version was dubbed the 'Royal Rudder Bug.' Don Clark, of the DCRC, did the reduced version, and plans were published in "Flying Models' in Feb., 1954. Later that year, Berkeley Models kitted the Royal Rudder Bug and sold thousands throughout the world *(**MB's** editor built his first R/C model from one of these kits, in 1954. wcn)*

"One evidence of its international popularity was the winning of the Swiss Nats in 1962 by Armin Roethlisberger . . . with a Rudder Bug!

"Even in 1977, a Rudder Bug is occasionally seen at the model field. Billy White, of Washington, D.C., recently finished a six-foot Bug,

Billy White holding his 6 foot version of the Rudder Bug in 1952. Billy and Walt are long-time members of the famous DCRC club in Washington D.C., now in its 26th year.



Billy White's 1977 version of the 6-foot Rudder Bug. Walt Good took this photo in a pose similar to the 1952 picture taken by the late Fremont Davis in 1952.

complete with rudder, elevator, and engine controls. The engine is an OS40 Schneurle, with more than enough power. Less than 1/2 throttle simulates the flight of the original. (I flew this one just recently . . . very nostalgic, but I must admit I liked the addition of the elevator and engine controls!) No plane changes were made, other than the addition of a two-inch wide elevator to the existing stab. Bill says he liked his earlier, 1952 Rudder Bug so much he just had to build another one . . . just 25 years later!!!"

Of course, these articles are primarily intended to tell you about the historic R/C aircraft, but in the case of the Rudder Bug, it is not sufficient to say, ". . .designed by a well-known R/C modeler," and let it go at that. This quiet, unassuming gentleman, is really 'Mr. R/C' in person, and the following list of modeling highlights in his life represent only the R/C highlights, and even then, we note several significant items are missing, some of which we could account for personally (such as the Dahlgren, Virginia, Altitude Record Trials in 1963, 1965, 1968, etc.).

1936 — First R/C gear working on bench.

1937 — First controlled R/C flights with 8 ft. Guff, in May.

1937 — Fourth place in the first AMA Nats R/C event. Chet Lanzo was first place winner.

1938, 39, 40, 47 — First place winner at AMA Nats, with 8 ft. Guff. Most satisfying flight was 14 minutes long, in 1939 Nats!

1946-47 — Design of single-channel R/C gear, produced by Beacon Electronics. (Note: All of this was on technician's band. The examination-free citizens band, as we know it today, did not come into existence until 1953.)

1949 — First place in R/C event at AMA Nats . . . with the Rudder Bug.

1946 to present — Chairman or member of AMA R/C Frequency Committee.

1952 — FAI World Record for R/C Duration, with the Rudder Bug.

1954 — Design of WAG single-channel tone system (3-tuber).

1956 — Design of Two Tone Pulse Width (TTPW) dual proportional system.

1956 — Design of "Multibug" plane, for dual proportional and engine control.

1959 — Winner of LARKS (once-famous Los Angeles Radio Kontrol Society) pylon event, with Multibug and TTPW. This was proportional vs.

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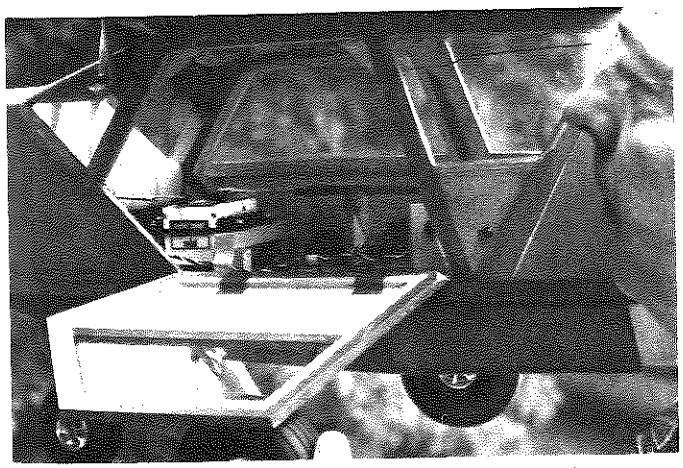
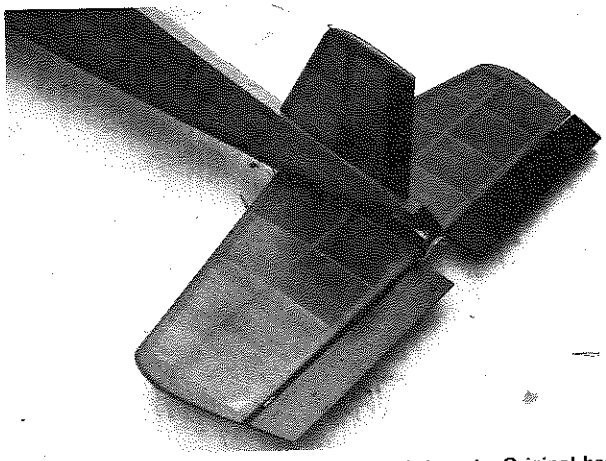


The huge cabin doors were necessary to service early cantankerous radios. Modern Royal radio is lost in all that space!



Billy's '77 Bug has elevator, rudder, and throttle. Original had only rudder. After flying Billy's, Walt admitted it was nice having elevator.

white), and any logos or sponsor decals. If you use slide-on decals that you soak in water, or rub-on lettering, put on a coat of clear Varathane or polyurethane plastic over the decals. Don't forget to put the cans in warm water first, to help the spraying and drying.

The wing is prepared and finished in the same manner as the body, but is painted on the outside. Again, if you use slide-on decals, or if the paint finish is not shiny enough, put on a coat of Varathane or polyurethane.

By now, all the body paint is dry, so you can put the silicone seal in the tail fin as described earlier. For competition bodies that get banged around a lot, I also recommend that you put a bead inside any sharp (small radius) corners, particularly on the front of the car. The silicone bead really seems to strengthen the plastic. If you cut straight back from the top of the front wheel well and bend it under the body, like in the old Porsche 917-10, then be sure to put a good bead (or blob) at the location where the cut ends. I usually drill a hole at these locations before making the cuts to eliminate stress concentrations. I mentioned earlier that a scratch on the surface of the plastic will probably develop into a full fledged crack, with any load or vibration. A cut or nick on any edges of the body where there is a vibrational load may develop into a crack. Take care to keep all edges smooth and don't knick them with your knife.

So far, you've heard the specific paints, etc., that Jerry Thompson and I use at the present time. Jerry has used duPont acrylic lacquer and I have used Parma Lexan paints (some form of acrylic). Hot fuel-proof dope can be used on lacquer base paints, but don't use it on enamel, as it will orange peel and lift the enamel. Several years ago, I only used enamels, but I like the lacquer-base paints better, especially the final fuel-proof coat. The enamels I used were Speedy Dry Rust-O-Leum, Flecto, and Krylon. These had a problem of not sticking too well to the Lexan, and a base coat of Krylon Crystal Clear, No. 1301, had to be used. The No. 1301 was the only Krylon clear recommended and used.

Now you know a couple of methods to paint a competition R/C car, either for straight competition or the competition concours event. But for the real car buff who might be interested in straight concours or true realism, the methods described above may not be satisfactory. For a top-notch concours car and true realism, the paint must all be on the outside. Plastic vacuum form bodies may not even be used, or there must be extensive additional work done. But that's not my bag. I'll leave that to somebody else. . . •

Rudder Bug . . . *Continued from page 63*

bang-bang reed radio models, at a time when there was much controversy between reed and proportional supporters.

1958-64 — Chairman of CIAM/FAI R/C Subcommittee.

1960 — Team manager of 1st FAI R/C World Championships, in Zurich, Switzerland. U.S. team was Ed Kazmirski (the winner), Bob Dunham, and Hal deBolt.

1962, 65, 67, 69, 71, 73 — FAI R/C World Champs, as jury member or official.

1969 — Chairman of DCRC 12th R/C Symposium (also the last one).

1968 to present — R/C Soaring enthusiast (winner of First Soar-Nats, Chicago, 1970).

1970 to present — Co-producer of thermal sensor for R/C soaring (Thermic Sniffler, by Soaring Products).

If you've had any scratch-building experience, you won't need a book of instructions to construct the Rudder Bug.

The fuselage is almost entirely built over the top view before removing from the board. The basic 1/4 x 1/2 crutch should be made from hard balsa, and if you're limited to 36 inch wood, make a neat splice, and double it with a scrap of 1/4 x 1/2.

The wing spars are first joined at the center, with the correct dihedral angle, and then the ribs and other parts are assembled. To produce the built-in tip washout, which is so essential to most all types of free flying models, except full-house pattern birds, build the entire wing flat, with "square" tips. Then slice off the angled trailing edge and

shape the bottom of the ribs to fair smoothly into the trailing edge.

The fin is symmetrical and is glued directly to the top fuselage spine. The rudder is very sensitive, and though it doesn't appear possible, a tight turn is produced by an 1/8 inch of deflection.

Believe it or not, the original model was test-flown *without* radio. The balance point is at 37% (4-1/2 inches back from leading edge of wing). Wing loading of the original model, without radio, was only 10 oz. per square foot. With today's lightweight gear, the Bug will be a real floater. •

Soldering . . . . *Continued from page 60*

hold things together in position, unless you have tough fingers and more than the average number of hands. The joint must be allowed to cool completely before it is moved, otherwise a crystallized "cold" joint occurs, lacking a great deal of its strength. Clamp the work in a vise or jig, or hold it down with some weights all placed far enough away from the soldering point so as not to sink off all the heat.

In the case of music wire junctures, such as struts on landing gear, bend the wires so as to have joint lengths running parallel to each other. This length is dependent on the overall size of the wire and the model, I never use less than half an inch. One inch should take care of the largest arrays that you might want to assemble. As mentioned, clean the wire, and wrap it with new, unvarnished, untarnished copper wire of approximately 20 thousandths diameter. Wire of this type is normally available in larger hardware stores, and is also conveniently packaged by Sig Manufacturing as its number SH-330 "Copper Wire" for 35¢ a package. Sorry, but our information does not list length.

This wrapping of your struts with copper wire is a good place to show off your fancy workmanship. Instead of jumble wrapping ten feet of wire around the struts in an ugly ball, wrap it neatly in a single layer of side-by-side turns. The final results will not only look better and weigh less, but will actually solder better and stronger. I find it easier to start at the center of the area to be wrapped, and work first in one direction and then the other. Wrapping from one end to the other is just as effective. The ends of the copper wire can be cut and left flush with the rest of the winding. They will be secured by the solder after it is applied.

We have now gotten all the petty details out of the way and have all our tools and materials in front of us, ready to silver solder! Apply a drop of "Stay-Clean" flux to the joint and let it flow all over the area to be soldered. It takes only a thin layer, any excess will flow off, so go easy. Apply the well-tinned and clean hot iron or gun tip to the juncture, placing it so the maximum possible tip area is touching the metals to be soldered. Place the end of the solder against the metals also, but NOT AGAINST THE TIP OF THE SOLDERING IRON! The best possible joint will occur when the material is heated to the melting point of the solder, and the solder is allowed to melt against it until the desired amount has liquified. The solder should never be applied to the heat source and carried to the work. After enough solder has reached the molten state to make the desired build-up, remove both the solder and the iron and let the joint cool.

You might sometimes run into a different sort of soldering problem, as when you are attempting to solder a rod or cable into closed end tubing. Since you have supported the assembly facing up, to allow the solder to flow down into the joint, the solder will sometimes immediately encircle the open end of the tube, effectively sealing off the air and flux inside. In most cases, if the parts are clean, the area is fluxed, and the parts heated sufficiently to melt the solder, the solder will "wick" into the tube. Sometimes, however, as there is no escape for the trapped materials, the solder cannot flow down as desired.

The solution is to drill a relief hole in the side of the tubing, almost all the way down to the bottom. A typical example of this type of solder joint is on an R/C boat flex-drive cable, such as those produced by K&B Marine Specialties.

Now, in my flying career in the USAF, I became familiar with a lot of things, one of them being crimped and swaged cable-to-fitting connections such as used on control cables in full size airplanes. My first thought on seeing the K&B assembly, which is heavy-wall tubing crimped on four places at 90 degree spacing was: "Hey, there is no way this can fail!" My boating friends confirmed that . . . there is no way it can fail . . . not until you drive through a buoy, or somebody's bathing suit that was left floating out there! Driving up on the bank could do it; anything that will cause sudden stoppage of the prop at high rpm's might leave you with a repair job on your hands.

Easy with silver solder. Clean it, drill it, carefully recrimp it with diagonal cutters, support it, and solder it!