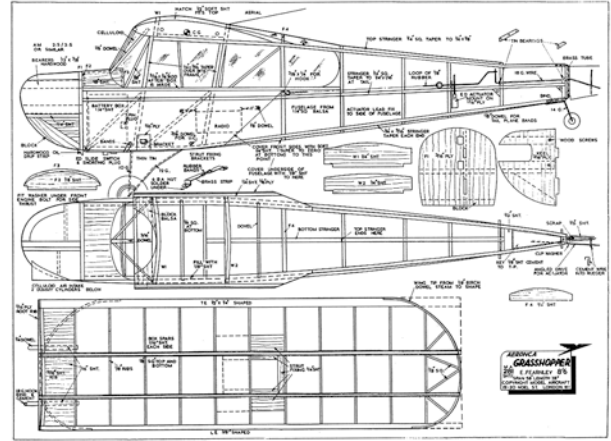


Aeronca Grasshopper



Flying Radio Scale spotlighting latest scale design for M.A. his by Eric Fearnley.

The A.M. 35 bursts into life, turning the ten by six nylon prop in hunting surges of power. I do not adjust the controls, knowing that the engine will come through with full power when it warms up. With a radio flight of several minutes, it is useless to tune the revs until the engine is fully hot. Switch on the radio, underneath the nose, and, holding the Grasshopper by the tail wheel, switch on the transmitter. Left and right rudder answer promptly, there is no chatter on neutral. I have run out of excuses so there is nothing else for it this is it, my first flight.

The Grasshopper is tough, very tough, and it is true and free from warps, for twenty years of scale modelling have taught me that trimming a model with marginal stability is easier if the dying surfaces are straight and true. The c.g. has been fixed where experience tells me it should be, taking into account the wing and tail incidence, and the thrustline in relation to the center of resistance. Test glides into the traditional long grass have not confirmed or denied my trim a 3 1/2 lb. model with a 16 oz. wing loading does not offer much indication of its ability, especially with a scale tail. I have done all I can, but sooner or later it has got to be flown.

As I let go I look on the bright side. The model is covered with nylon, so none of those annoying tears and scratches runways love to make in models will appear. The radio has been transferred from a model where it was working O.K., so I should get some "control over the flight, and I am an experienced "pilot.

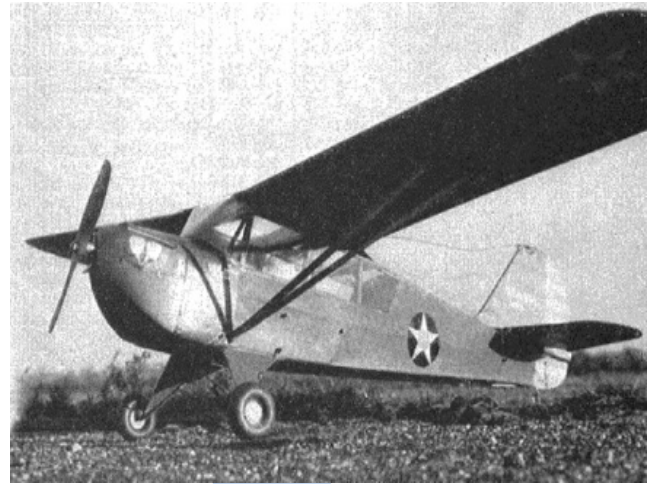
Down the runway the Grasshopper rolls, fast—too fast, and my heart slips! Wish I had put the 25 in instead, but it blew its cylinder liner off last week, so it's Hobson's choice.

We're going out of wind; I trip left rudder on: the tail skids round. Neutralise before it gets into wind, or we shall have an A. 1 ground loop. Tail is high now, and we're about to unstick, it's bumpy in that wind, nasty sort of January weather. We hit a tempo rare' lull in the head-wind, and don't lift quite as soon as expected. Ahead looms a large tuft of grass which springs between the joints in the tarmac. Right rudder, and we swing out of wind to starboard. Hold hard left rudder before the wind gets under (he port wing, 'I'he Grasshopper runs into wind, gives a last bump with the under- cart, and we are airborne.

The wheels stop dragging on the ground, and the model points its nose for the clouds in a tight climb. Is it going to stall ? So this is what a test pilot feels like with a brand new, million pound aircraft. I don't care for the thrill. We are quite safe, however; my trim appears to be reasonably right, and the power of the 35 is more than enough to keep it going skywards without any flattening off. I feel a little smug as I think of the advice about scale models and radio being too much at one go, about the " it won't fly with that small tail, old man." But we are not out of the wood yet. " You haven't landed it yet," my pessimistic inner mind tells me.

The aircraft is now building up a left turn. Not enough side thrust, or have I got a warp in after all ? I apply

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right rudder. Thank goodness for the Bonner-type selective actuator which gives me a positive right rudder at once. The plane lessens its turn, but it's not coming round any too fast. It's got into a side wind, and we all know they take the devil of a rudder to bring them round in this situation. Only one thing for it, I shall have to bring it right round on left rudder before it gets too far away, as it is drifting pretty fast.

A touch of left rudder, and an immediate 45 deg. bank. No shortage of left turn ! I pull out after a 270 deg. turn facing back to base, with the wind drift under the opposite (port) wing. With the natural left turn, the model crabs its way back 10 me. At the first sign of turn into wind I rudder right, keeping the nose about 20 deg. out of wind. This move has saved long " hold-ons " and run down actuator batteries.

Heading now in the right direction, the Grasshopper plods its way back, but in the high head-wind we are getting higher and higher rather than nearer and nearer, and I wish the engine would fade a little. After what seems hours the engine dies with the model about 400 ft. up and about 100 yards down wind. Ideal for a spot landing in this wind. Jockeying into position, it finally comes in over the transmitter about 30 ft. up. Left rudder to center it up on the runway for the touch down, and, calamity, it sticks on ! The model plunges in a tight turn on to the runway, and I know my nylon and tough construction were sound design.

Examination of the model reveals no damage. Check the radio. Perfect. Did I get a stuck rudder (for it won't stick now) or was I out of wind with too much left, too

near the ground ? Everything is working, so we have another go. Take off again, confidently this time. The model responds wonderfully. I have adjusted the rudder to give more right rudder and less left. I take off alter dodging a crowd in a 45 deg. bank, straighten out, and we are away. The model is really pleasant to handle. Leave it alone, and it behaves. Rudder it, and it responds at once without the jerky yaw one usually associates with a rudder-only kite. Which is not surprising, as it is an exact model of a very pleasant aircraft, specially designed to be thrown around in the air.

The engine stops with the plane well up, and I prepare for a long glide in again. A touch of left rudder, and down it comes in an almost vertical spin—400, 300, 200 feet, and I am wagging the control slick like mad to try and clear the stuck rudder. At 150 ft. it suddenly jumps out of its spiral into a flat steady glide. Thank goodness I had some space under me! I let the model glide its own way down, saving the rudder until the Grasshopper is about 20 ft. up. It answers perfectly. I decide this is my lucky day, and retire to discover the strange fault.

A thorough check on the radio tells me that all is O.K. and I transfer my attention to the actuator. A 100 runs on the rudder and it works every time. A new test—I blow hard on the rudder, signalling " on." It stops on after I neutralise. Stop blowing, and it flicks back to neutral. So it isn't powerful enough for the slipstream. While the engine was going the vibration kept it going, but on the glide it stuck, well twice anyway. Could have been once too many.

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The rubber is a little weak. Owing to bad weather, the model has been wound up ready to fly for several weeks, and perished. Replace it with a new loop of lubricated eighth, and it stands the blowing test. A mistake like that might have cost me my model, so I learn another lesson in the business of check, and double check.

This isn't my first radio scale model. I think it's my best, but it certainly won't be the last. I am sold, absolutely, on this specialised branch of modelling.

Build a scale model, and it looks grand in the air, but it lacks inherent stability, and down wind landings are hard on them. They usually fly off down wind before they can be appreciated anyway. And one speck on the horizon is very much like another.

Build a radio job, and it looks like a freak, but gives "piloting" pleasure. But combine the two! It's a logical thing that a model of an aircraft which has controls will behave well in the air. Manufacturers spend years adjusting flying surfaces for maximum response, and maximum recovery, the very qualities we need in a radio job.

The reason why so many radio jobs in Britain look like oil-soaked soap boxes with wings on I put down to two reasons. Firstly, few fliers are interested in the aircraft side at all. Most of them are really radio hams at heart, and find the model a bit of a nuisance. Secondly, the amount of time required to maintain a radio ship in going order means not so much time left for building, and there is a tendency to make last year's model do again.

If, on the other hand, cup hunting is the thing that matters, then the best way to win a comp, with a radio job is to stick to the same model and fly, fly, fly it until you know every move the model will make under all conditions. It doesn't lead to smart models, but it wins cups. So we don't get smart models winning very often.

I would like to see a contours marks system added to radio contests, as per super scale. We would then see more aeromodellers entering, and a better general standard of building all round. This is more important

than inverted flying and such, as a national contest is the shop window of aeromodelling, and our "stock" is a little soiled at the moment!

The whole idea of radio flying is following the well trodden road of starting with the idea of producing a realistic flight that would please, and ending with a functional monster that bears little resemblance to an aircraft, designed to perform' aerobatics impossible with a real craft.

This all too well-known pattern has appeared in the past in control liners, where stunt and combat models are utterly ridiculous in appearance, bowing to the god of the rule book and the tin trophy rather than to the rule of sound proportions and beauty of line. I had hopes of radio being a new outlook, where, as we fly the model, we can look to realism for winning marks; however, I know it will not be. In a few years we shall be flying models with little relationship to an aircraft. But will it be as satisfying in the long run as a really good take off, and a realistic spot landing?

Fortunately I am not under the spell of cup hunting (I grew up some time ago!) so I am able to devote my energies to simulating real flight — the cost of which is too great for me. In actual fact I get as much, if not more, pleasure in building the model, and a functional job can be knocked together far too easily to satisfy me. To answer the obvious question, why then Beep-Jeep? I had been having a good deal of trouble with my radio sets, mainly because the manufacturers were unable to furnish proper installation details with their products, and I was falling into pits which I shouldn't have, so I decided that it was too much to manage a prototype scale job and radio at the same time. I therefore built Beep-Jeep as an interim design to de-bug the radio, which I did.

The advent of the Transitrol set sparked off a desire to go back to the scale job, and as I was interested in a low wing model, I built a small, highly powered, low wing semi scale job as a test bed. Having one of the first sets, I got three months of teething trouble, and many crashes. E.D.'s were very helpful, and modified the set extensively. When the set finally emerged I got myself a very potent model that would handle like a Spitfire, and I was ready for a new scale project with a

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lightweight set, capable of excellent range, and not tricky on the tuning. Caution decided me against the scale namesake of the above, though I will be starting this model next, I have now decided ! However, I liked the cheeky look of the Grasshopper, and it seemed to have the qualifications necessary for pleasant flying and a simple shape.

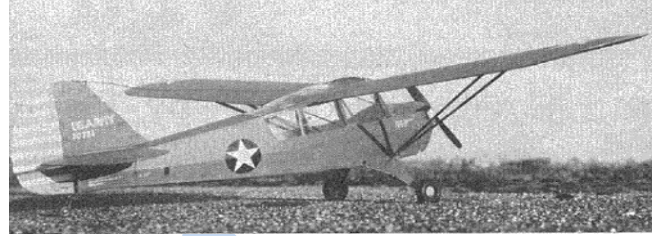
If you want to build the Grasshopper, plans are available from MODEL AIRCRAFT, and a reduced scale drawing appears on the opposite page.

This model is an expert's job, if you are going to fly it by radio, and some previous experience is advisable, although as a normal F/F scale model with a 1.5 c.c.-2.5 c.c. engine, it should prove very pleasant. As a radio job it is suitable only for lightweight gear, the Transitrol set being ideal. To get stability with this set, I would advise a slight change in the h.t. set-up. One 22 1/2 volt battery serves the transistor, out of which is drawn the full 4 mA to operate the relay. This is too much for the small B 122, and its life is so short that retuning of the set is necessary after almost every flight. I find it an advantage to double up this battery in parallel (that is: pos. lead goes to both pos. connections, neg. also to both neg.).

The second 22 1/2 volt battery is there to provide the 45 volts in series with the other one to feed the valve. As the current from this is only about 0.3 mA it will last almost for ever, so there is no need to double up this one. In effect, then, we have three B 122s, two of which are grouped together to supply one 22 1/2 volts and the other works on its own (detailed on plans).

As far as the other batteries are concerned, the total weight with switches, wire, plugs, set and batteries is limited to 1 lb., so we must use pen cells for the actuator. I find it advisable to use 6 volts with the standard E.D. type to allow enough spring tension to overcome chatter. So four cells are required. The actuator is modified to Bonner type by bending one arm out of line, and extending the top pawl. A delaying gear is added consisting of a "push and go" gear train taken from a toy. The flywheel is removed, and a solder weight added.

here are some points to note when building your "Grasshopper" ➤



The l.t. battery is a U2 cell which will last a good while, as the drain on the XFG valve is small. I do not advise overworking this on a soft valve set, however, so throw it away after a day's flying—it is a poor economy to risk a crash for a few coppers.

A really important point is to be sure to suppress the relay points. Last year I was using 6 volt ex-Government miniature accumulators, and after three months of fluttering rudder at range I found that owing to the terrific amps, these accs, can deliver, they were giving a spark enough to fire a piston in a gas job ! The suppressors were fitted at the 7-way plug. They were moved to the actual set, and it cured the fault at once. In the meantime I had had the model lost in a cornfield for ten days. One more lesson.

It will be noted that the batteries, furnished in a balsa box under the dashboard, are stored well away from the set. Avoid any set-up that calls for the batteries being near the set, or you may lose that valuable range. The Aeronca has a range to the limit of clear sight of it.

The set is fitted on rubber bands across two dowels. So neat is the fitting that the model has a pilot's seat, map table, aerial winding gear, headphones, throttle, trimmer, instruments, two-way radio set and maps. A pilot is now being made. The only visible sign of the R/C gear is the set in the place of the observer's seat. This fulfils a long standing ambition as even the aerial is in the scale position. It makes some of the ugly ducklings of radio jobs look a little hammish, and gives one a real kick to operate !

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You will by now have noted an absence of the customary load of building instructions. Let's make it clear here and now: if you cannot handle the plans as they are, then leave this model alone. If you are able to read the plans, then go ahead. I am not going to waste valuable space explaining how to build a traditional box type fuselage, with side stringers added; but I might say that the wing spars are unusual in that they are hollow box type, full depth, and that the wing ribs are, in consequence, in three pieces. This makes a very strong wing without great weight.

The ribs are made in the normal way, and cut tip into three after sanding to shape. This is one of the keys to the warp-free structure, as notches, unless properly made, make most of the warps in wings. Avoid warped wings at all costs, so don't use the strongest dope you can get. Choose the one that spreads smoothly. If the nylon is damped, and stuck on with strong glue such as Croid, it should be quite tight enough without the overtightening and warps the full strength dope produces. Banana oil will fill in the texture without tightening if necessary.

An R/C model requires care at every stage, but a scale radio job needs twice the care if you are to succeed. The reward, however, is that you are in a class of your own when you fly, and you will always be the center of attraction at a flying meeting. My parting shot—don't build it to look at. It's got its C. of A. with full honours, so build it carefully, trim it properly, solder the radio carefully, and FLY it!

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