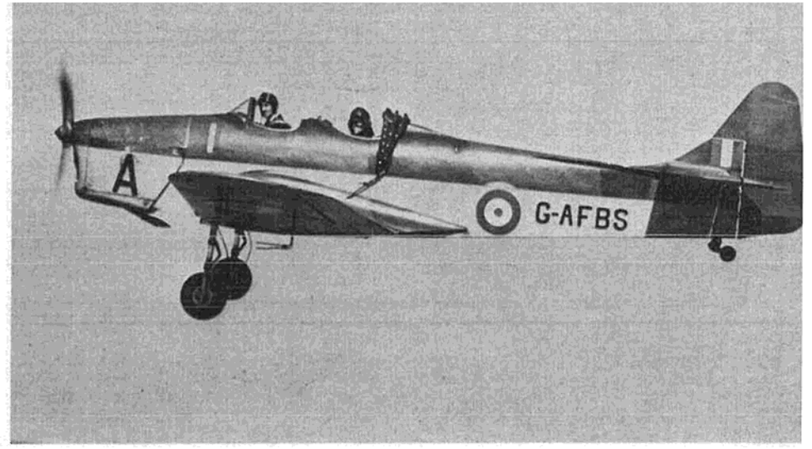
# MILES MAGISTER

**From England, Dave Platt's award winning Miles M14A Magister is an able competitor in R/C scale circles.**




PHOTOS AND TEXT BY DAVE PLATT

ONE of the surest things to happen to any RC'er is that, sooner or later, the bug to make a scale model will bite. With a great many flyers it never gets past this point due to the work involved and the slice taken out of the season's building time. This particularly applies if the model will be an original design as well. Nevertheless it's an undeniable fact that ALL modellers love to see a good scale ship fly, and even those with no time to build one are quick to stand and watch. The following remarks are applied to Multi Channel Scale models and will not necessarily hold good for single channel.

Just so we are on common ground as to the understanding of these terms we'll explain that, although any number of channels over two could be called multi, when we say Multi-Channel we mean at least 10 channels of reeds or 4 channels proportional. Similarly when we say Scale, we mean just that — not semi-scale with a tilt at one plane in particular.

Those who build scale models all have their own way of choosing a subject to model. This is how we work: —

First and foremost we are making a FLYING scale model and we need a subject to have good suitability in an aerodynamic sense. For example, we set a lower limit of 15% of the wing area for the horizontal tail surfaces. Lower than this we reject on stability grounds and look at other aircraft. Bearing in mind our previous remarks about scale, we **don't** alter the areas to suit.

The difficult problem of undercarriages comes in here. If the subject has a retracting gear so should the model. If this is impractical the design is rejected. Fixed-gear aircraft are obviously easier and conform to our principles. Balance is another number one consideration. Many exciting airplanes are difficult or impossible in this respect. The Sopwith Camel springs to mind. To get the CG in the right place with so short a nose would be a miracle without 3 lbs. of lead in the cow!

Next, we need to consider the availability of good accurate information on the subject. A good scale drawing, several photos, and details of construction and cockpit detail will be needed. Without them we cannot make a start. A bit of patient hunting through authoritative books could be necessary. Museums may assist. A letter to the manufacturer screaming for help is often well worth a postage stamp.

Another consideration is the 'appeal' factor of the subject. We all have our favorites among full size airplanes. Some fellows go for jazzy-colored subjects, others for struts and rigging wires. Some for military planes of the wars, others for pretty home-builts. A Curtiss P40 or a Stitt's Playboy? The choice is all yours and there are thousands upon thousands to look at.

We chose the Magister for many good reasons. It has fixed gear. The layout of the plane is perfect for a flyer, with ample wing area and a generous tail moment. The tail area is quite adequate and the nose length gives a correct CG automatically. The UC is well placed in a useful forward position. It would be hard indeed to find a feature of the Magister which could be put in the 'Disadvantage' side of the scales. While we're about listing the virtues we nearly forgot the totally enclosed motor in a deep cowling, a big help in the U.K. where we have to use mufflers (You, too, in U. S. soon?)

The full size machine has a span of 33′ 10″. Scale chosen was 2″=1′ or 1/6th full size. This gives a span of nearly 68″ and an area of 726 square inches.

In many ways the Miles M14A Magister could be called the British equivalent of the PT19. It was an attractive two place inline **ab initio** trainer of all-wood construction. Provision was made for instruction in blind flying in the shape of a pull-over hood for the rear cockpit. Designed a few years before WW II the Magister taught thousands

of pilots to fly during the entire period of the war. It was also a delightful machine to fly, and after the war the surplus aircraft found ready sales on the civil market, going to flying clubs and schools. It will be seen that a great variety of paint schemes can be used to personal preference. The one we chose is the military scheme used on the wartime aircraft, as follows: —

Undersurfaces and fuselage sides up to demarcation line — Trainer Yellow, Wing undersurface Roundel is red, white and blue.

Upper surfaces in standard camouflage, Dark Earth and Dark Green.

Roundel on upper wing surface is Red and Blue only, no White. Notice how the yellow continues round the red, white and blue fuselage roundel, cutting into the camouflage. The flash on the fin is also red, white and blue.

Serial number on fuselage side aft of roundel is Black, as is the letter on the cowl.

Individual aircraft number on upper decking is white and should be painted rather streaky.

All divisions between the brown and green of the camouflage must be sprayed soft lines — not hard paint lines. Another common mistake often made with camouflage is to spray haphazard shapes. It is not always realized that camouflaged aircraft has a definite pattern of shapes. Thus, all Magisters will be alike, all Spitfires alike and so on — a scheme being worked out for each type of plane to conceal its own particular shape. The divisions for this airplane are shown on the plan.

The shade of red used on the Roundel is a rather drab color, more like tan brown. The camouflage shades are drab also, the green containing a good deal of red, making it a "greeny shade of brown" to be exact.

The model is not hard to build. Construction-wise there are no irregular or difficult features, and anyone who could build a Candy can make this one. Therefore only those points needing care will be discussed.

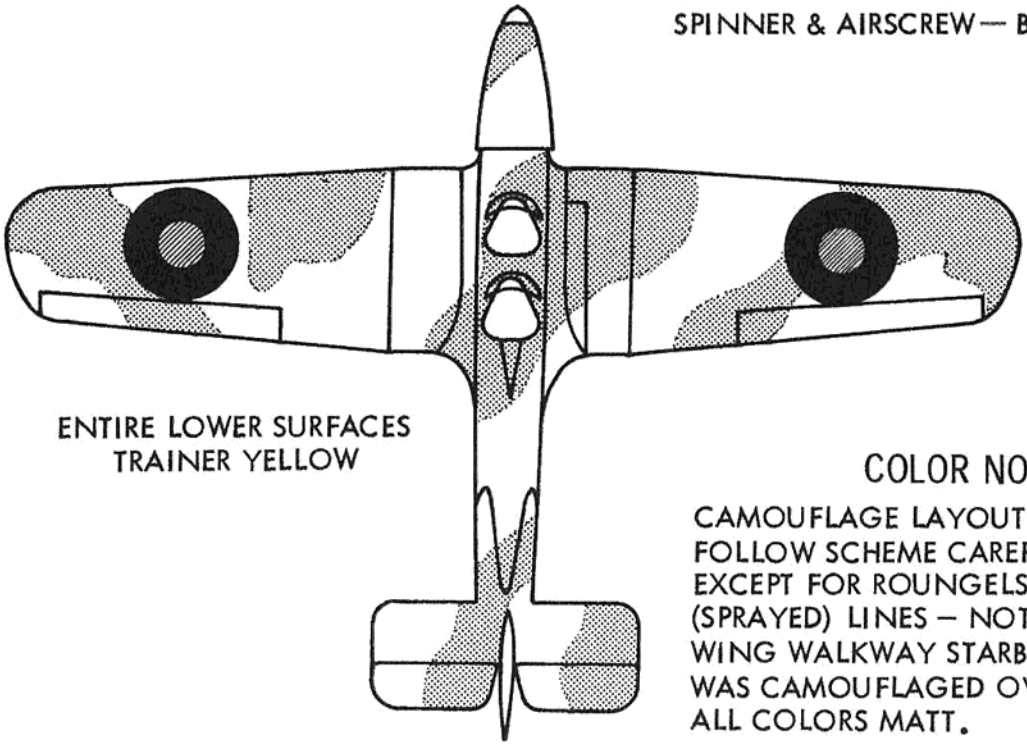
The wing is made first. This is not only preference; the wing will be needed at a later stage in fuselage construction. As with any multi channel RC model, only the very best workmanship of which the builder is capable will do. Most importantly, the wing MUST be free of any warp or twist. On an all-sheet covered wing of this type it will be found that the wing can be twisted slightly by hand **until** the point where the last sheet to complete the box is added. Therefore when you have just one 3″ or 4″ width of sheet to add, carefully inspect the wing and make any corrections required NOW, because when the box is complete it will be a more irksome job to remove a warp.

For the benefit of those who, by accident, do build any fully sheeted wing complete and then discover a twist, here is the way to correct it:

Make an incision into the sheet of either the upper or lower (preferably lower) surface of the wing. The cut should run at about 50% chord for the entire length of the incorrect panel. It is essential to run the knife along a straight edge, say a metal rule. Now it will be found that the wing can be twisted by hand with the forward and rearward sections of sheeting skidding against each other. While holding the wing in correct alignment by some means, run cement into the incision to stick the sheeting together again. Keep the wing firmly held, in the correct position, for AT LEAST six hours for the cement to thoroughly set, before removing the device you are using to hold the wing.

The undercarriage assembly is now completed with all the small details which add refinement to a model of this type. On the original model a section of chromium tubing (actually a bit of an old transmitter antenna) was slipped over the UC legs before the wheel forks were soldered on. This tubing was then

SPINNER & AIRSCREW — BLACK



ENTIRE LOWER SURFACES
TRAINER YELLOW

PLAN VIEW

## COLOR NOTES

CAMOUFLAGE LAYOUT DOES NOT VARY. FOLLOW SCHEME CAREFULLY. DIVISIONS EXCEPT FOR ROUNGELS ARE "SOFT" (SPRAYED) LINES – NOT HARD DIVISIONS. WING WALKWAY STARBOARD SIDE ONLY WAS CAMOUFLAGED OVER. ALL COLORS MATT.

NOTES:
SPAN (FLAT) IS 68" PROJECTED SPAN 67 - 5/6"
SPAN OF FULL SIZE MAGISTER 33'-10"

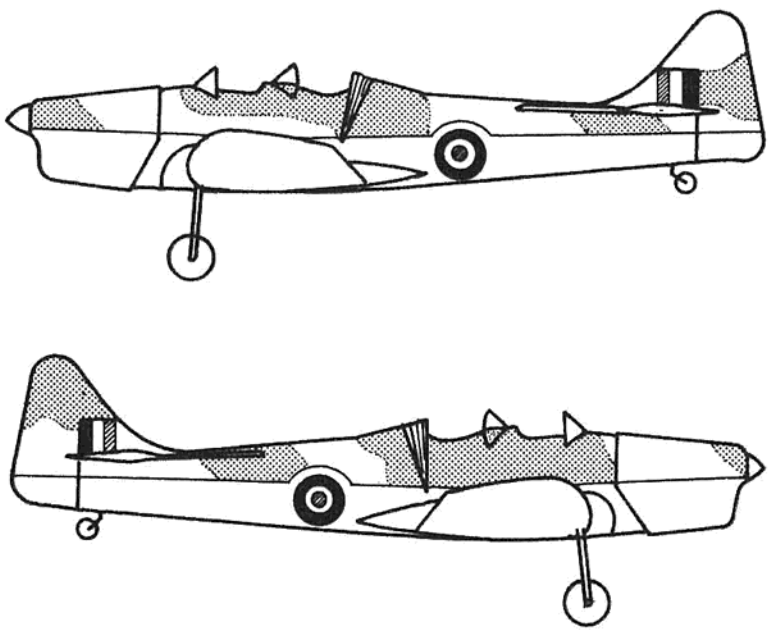
## COLOR KEY

DARK GREEN

DARK EARTH

IDENTIFICATION RED

IDENTIFICATION BLUE



FUSELAGE CAMOUFLAGE PATTERN

(Flat) is 68" projected span 67⅝" span of full size Magister 33'-10" presenting an exact scale model to 1/8 full size. (2"=1') of the Miles M.14A Magister. For 8-10 CC motors (.45 to .60) and multi channel radio control (10 channel reeds or 4 channels proportional). Information for scale judges: There is only one slight deviation from full scale and this is that the wing incidence of 2 deg. in the full size Magister has been removed. All areas and sections throughout are correct as designed.

painted black everywhere except between the V-shaped dummy shock-absorber. This section was left in bright polished metal, giving a remarkably realistic effect of a working shock-absorber. Dummy brake cables are of ordinary black RC hook-up wire of a rather thick variety.

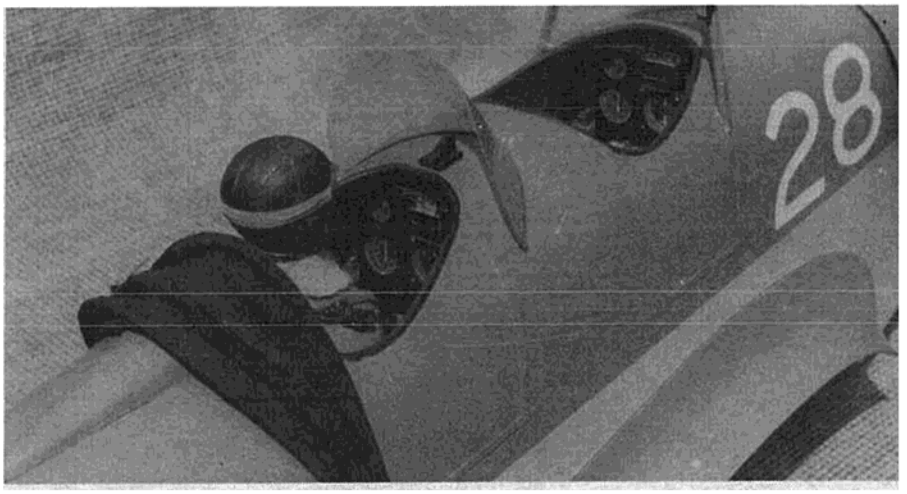
The ailerons, which, of course, should be very free-moving as on any other RC model, are only worthy of comment in one area — that is, like the tailplane, elevators and rudder, they were built up and fabric covered on the real job. We must represent this, and after a good deal of experiment involving genuine built up replicas of the original construction and a couple of other ideas, the best and most realistic way get the required effect was found to be to make the ailerons etc. in conventional sheet construction, then after the two coats of primer (see later for fuller details of finishing process) strips of thick paper (try blotting paper) 1/16" —3/32" wide are cut and gummed to the surface in the scale rib positions. The aileron is afterwards covered with model tissue. The usual further finishing is continued over the paper and the final effect is so lifelike you'll chuckle with glee!

When the wing is completed, give two coats of auto primer. When thoroughly dry, **at least** 24 hours later, sand smooth and cover with heavyweight Silkspan, applied wet, using clear nitrate dope as adhesive. Let this do for the time being.

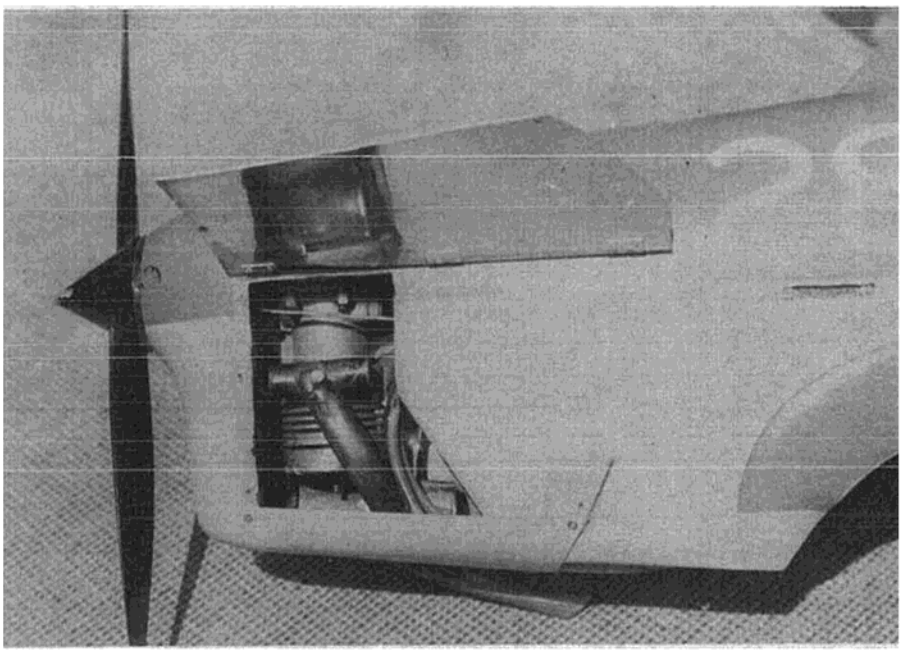
While that primer was gassing off we weren't watching the Telly! It is a good idea to get the tailplane and elevators built. These are simple structures of no artistic merit. Don't forget the "ribs" of gummed paper.

The motor used to power the original model was a Merco .61 which was very suitable. The Super Tigre .56 will provide somewhat more power if this is needed — say if the model gets well overweight. A good .45 will do the trick on a light version. The weight of the finished model can range from 7 lbs. or so which is the lightest it could be built, to about 9½ lbs., above which it could be a bomb. Ours weighs 7 lbs. 13 oz. and this includes 3 oz. for the muffler. Obviously a .45 motor can be used in the model regardless of its weight, but the guide given is right if we presume the builder wants fully aerobatic performance.

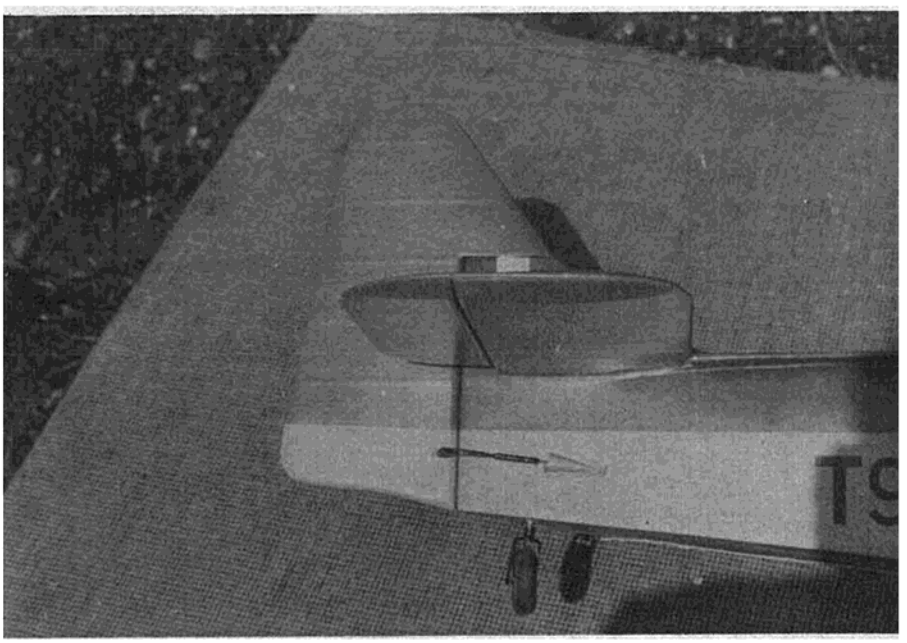
Mention of the muffler is in order. Quite apart from the fact that they are obligatory here in England, a muffler can help in another way. Glow engines are likely on occasion to spit flames and set light to loose fuel in the vicinity, and in short order the airframe is well under way. The muffler is especially useful in the Magister in preventing this from happening, since the cowl would prevent the flyer doing the usual hefty



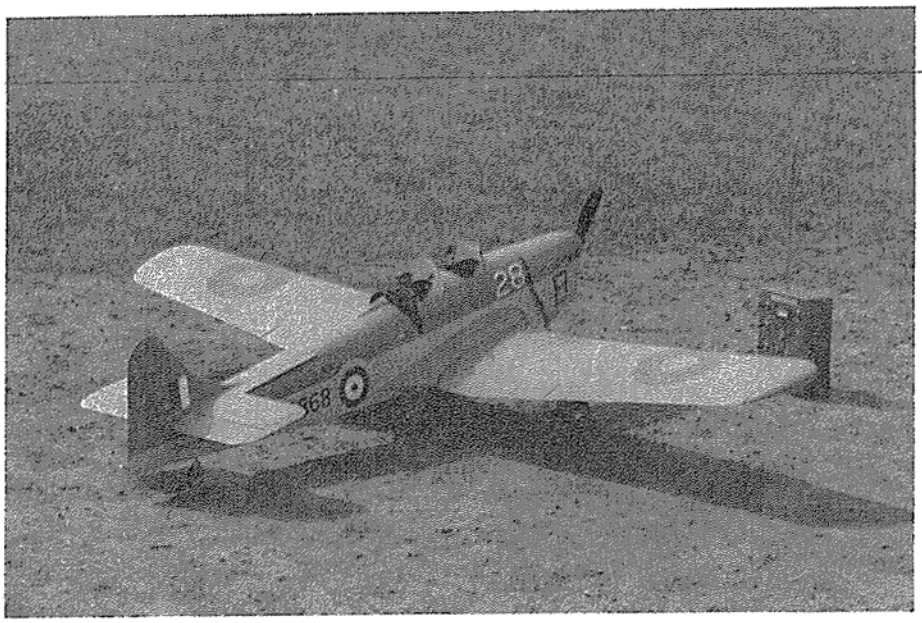

Cockpit view. Note rear view mirror on front strut and blind flying hood behin rear cockpit.



View of engine and internal silencer. Metal cowling.



Tail assembly showing rib tapes and rudder pushrods.



Gear installation. Cut-off legs visible.

blow-out. It's certainly worth the consideration of anyone making this model to fit a muffler, even if only as insurance against these fires. The one we made was of brass tubing in two sizes, ½" O.D. for the pickup on the motor and the outlet pipe, and 1" diameter for the expansion chamber. The chamber fits inside the cowl against the starboard side and below the motor. The outlet pipe from the chamber is exactly scale. The muffler also keeps the model clean and very little exhaust is found on the bottom of the model after several flights.

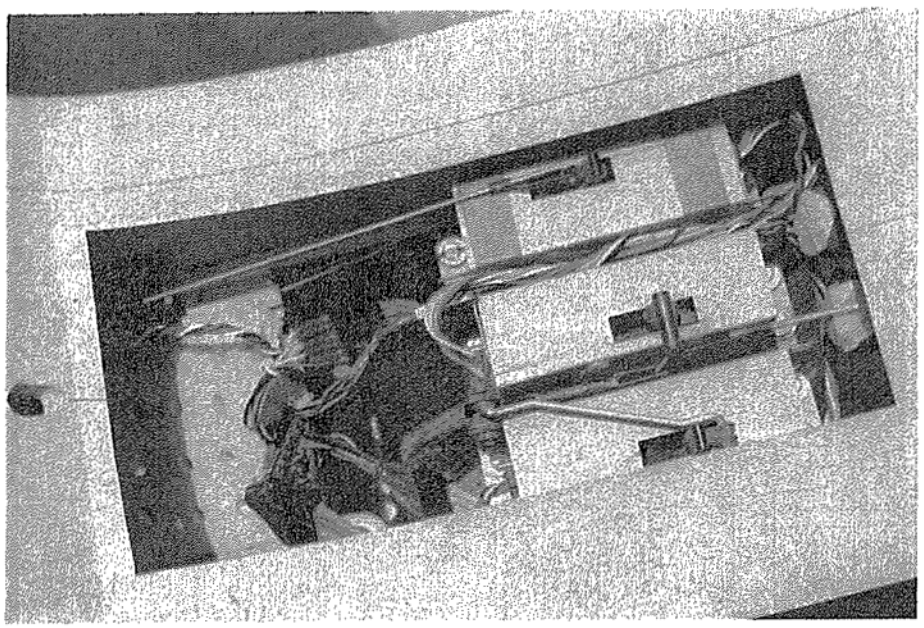
Radio gear was F&M Matador/Midas 10 channel using Bonner servos with home-made amplifiers. All have functioned perfectly and reliability is of the highest order. If the reader will bear with me I'd like to have a little moan. Along about the time when we were bringing models home in one piece after several flying sessions, a couple of mystery crashes occurred to consecutive models, after they had been flown for some time. No cause could be found. Curiously, though, both crashes occurred while the model was flying straight and level inverted about 6-10 feet altitude and only some 5 yards away. What happened both times, was that, suddenly all contact was lost and the models went in—hard! Two Candies in three weeks!

The gear was working perfectly after the prangs. Batteries were not flat or even down. Pilot error was not a factor.

So what the hell?

Eventually a more knowledgeable clubmate provided the answer. We were holding the transmitter flat in the hand so the antenna was paralleled with the ground. Seems there's a dead spot from the transmitter out in a line with the antenna. Now we hold the box so the antenna is at about 45% with the ground, a good compromise between comfort and reliable transmission. No more trouble has been had. The moan is this — why wasn't this in the instructions? And why is this point never put across in the mags?

RC equipment is F&M Midas/Matador, Bonner servos.



But we're supposed to be telling you about the Magister.

The points requiring explanation or instructions on the fuselage may be best dealt with by taking them in order from the front to the tail. A diagram of the spinner is given on the plan. Actually the spinner of the Maggie is a wooden arrangement blended into the airscrew, and this is the only point where our model differs from true scale. The metal one shown is a good compromise between scalish appearance and practical usefulness on the field. Get a lathe-owning friend to turn it up for you, or, as a last resort, use a normal bullet-nose type. If anything, to leave off the spinner altogether might be better than this, however.

An extension piece will be needed for the prop driver to get the engine far enough back to enclose the throttle assembly in the noseblock. This block must be of very hard balsa or even hardwood and extensively hollowed out.

The engine cowling is a good deal easier to make than it would appear to be. The thickness of metal we used was 24 swg (about .15"). Soft aluminum is ideal and can be easily formed in the fingers. No compound curves are present. The small hinges may be found in toy shops dealing in doll-house accessories.

One of the most difficult problems with a scale model is often to find room for the RC gear without encroaching upon the cockpit area. In this model, 3 of the servos were placed in the area between the two cockpits with the last (rudder) servo immediately behind the rear cockpit. You'll need your most trusted servo for rudder, since once the model is made it would need cutting the bottom open to service it.

A DuBro trim bar was arranged side by side for the elevator and trim servos — see photo. With the receiver in the front turtledeck and the DEAC (Nicad) pack below it, the balance worked out OK and the cockpits were left clear for pilot and detail. Remember that when the Magister carried one person only, he sat in the rear cockpit.

Sid, the pilot in our model, was made by using a 2" = 1' scale Granger Williams plastic pilot and completing his body with balsa block sculptured in our best Da Vinci style. It's well worth an evening's work for a good pilot. Certainly the model would look incomplete without him. Summon the nerve to go

into a ladies corsetry store and buy some ⅛" — 3/16" wide elastic. Painted, this makes realistic parachute harness. An old brown leather ladies glove can be cut into sections and glued to the head for a flying helmet. It's unfortunate for Sid, but unavoidable, that he has no legs below the knee. Otherwise his feet, inside the Bonners, might easily stop them working properly.

The rest of the fuselage construction is quite conventional and will give no difficulty. The wing root fairings are made by cementing the 1/32" ply base to the sides, using the wing in the correct position offered up to the fuselage. This is done so that the ply will exactly follow the wing upper surface. When this is dry the fairing parts are glued on in vertical laminations to the necessary width. When properly set the wing may be removed again. A ½" gouge is used to shape the concave shape of the fairings.

The wings of the original model were bolted up at the rear, with a ¼" dowel peg engaging the LE. Possibly Cam-Loks would be a better way of doing it, but these were hard to find at the time in Britain. The chicken-hearted may prefer to use normal dowels and rubber bands, but, although admittedly safer, the appearance of the finished model will suffer a good bit.

The tailwheel of the full-size Magister is fully castoring and so the model is likewise; details on the plan cover this adequately.

When the fuselage has been completed the usual auto-primer is applied, rubbed down smooth and paper strips applied to represent the pilot's entrance doors and the luggage trunk. After the tissue covering has been applied the finishing process is continued as follows: two or three coats of auto-primer or grain filler are applied with careful sanding between each. A good grain filler may be made by adding Boracic (Boric Acid) powder to clear nitrate dope to the density preferred. This powder is better than the more commonly used talcum since it is softer in texture and therefore cuts down more easily with the sandpaper.

When the whole plane is smooth the color is applied by spray gun, starting with the yellow, then the brown (take the brown all over the camouflaged upper surface) followed by the green. Finally the markings are applied, again using nitrate dope. When quite dry the model may be sprayed with fuel-proofing varnish and left to dry out for a few days.

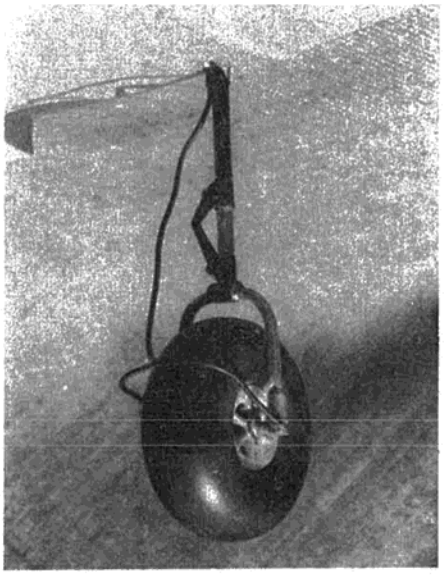
We now have an unwanted high gloss on the model. Wartime aircraft were painted in matte dopes and we need a way of killing the gloss. On our model we gave one thin coat of Eggshell Flat Varnish obtainable in home decorators' stores. This varnish takes about six hours to become touch-dry and it would not be advisable to fly the model for two or three days after its application.

Meanwhile the pilot, cockpit details and the rest of the R/C gear can be installed.

Now that the model is finished a pre-flight check must be made. (Now don't look away Joe — this is a damned serious business.) Assemble the model and pack up the rear of the fuselage until the wing is exactly parallel with the workbench, that is, equal measurement on the middle of the LE and the trailing edge point. At the middle trim position the tail and elevator should make another equal measurement, in other words a zero-zero alignment. It will help to have quite a large range of trim movement on the elevator at first until the model's trim is known.

The balance is now checked and the position given on the plan is regarded as a rearward limit. The CG may, however, stray forward by up to half an inch. It is not generally realized, but is logical if you think about it, that an aeroplane with a small tailplane needs a more forward CG to compensate and provide sufficient stability. Accuracy of balance on this model must be treated as **vital.**

Flying the Magister is very much the same as a regular multi R/C model. The two-wheel landing gear makes it necessary to apply pulses of "up" elevator during the take-off run, but once airborne there should be no problems at all. The full size plane is highly aerobatic and the model looks marvelous in maneuvers. My particular favorites with this model are inverted flight and the spin. I have an overdrive board in my elevator servo to assure the latter maneuver. The ground angle of the model, being quite high, means that landing approaches need a good deal more care than a contest multi craft. A really superb landing requires a high degree of flying skill, but the model is quite substantial enough to take the other sort of landing.



Close-up of landing gear leg showing dummy shock absorbers and brake cable.

This model has been a satisfying project. The accuracy and flyability of the design as drawn make it an excellent model for scale competitions. It's also quite possible that it could be far from disgraced in a Multi Aerobatics Competition.

Anyone care to try?



The Miles Magister, completed and ready for takeoff.