



TRIMMING AND FLYING YOUR MAGNUM



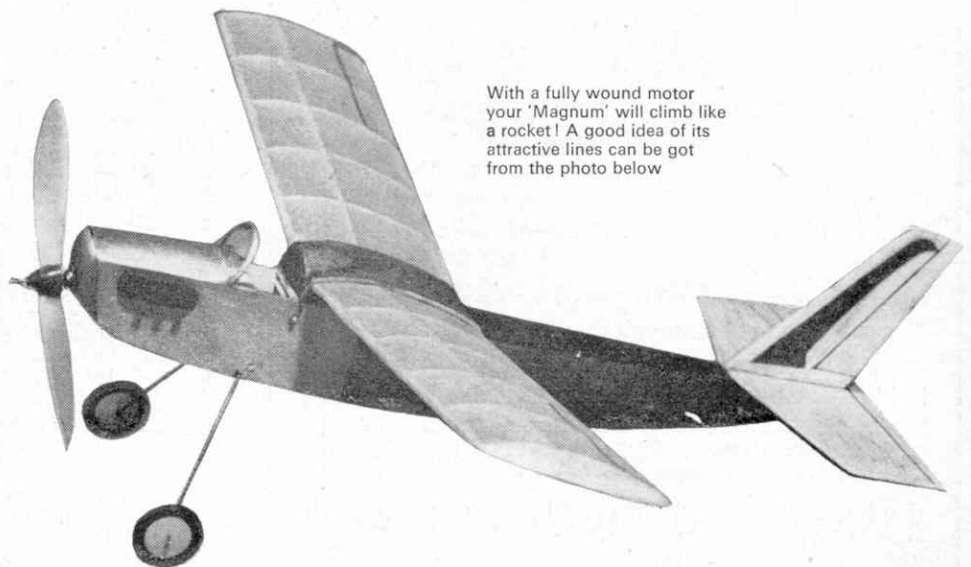
Last month we gave you full size plans and comprehensive building instructions for this super little flying model. Hundreds of them are now nearing completion or awaiting a calm day before that first exciting flight test. To make certain your test programme goes smoothly, designer Ray Malmström has prepared these really comprehensive trimming and flying notes—of tremendous value to all modellers who want to get the very best from their planes.

If you missed last month's issue with the 'Magnum' plans, a few are still available from our back-numbers department—price 2s. 6d., including postage.

HELLO again! With your 'Magnum' standing on the work bench ready for that exciting first flight, let's get right down to business.

An all-important first operation is balancing your model. For this 'Magnum' must be complete, with rubber motor in position. Although 'Magnum' has been designed with the balance point (or centre of gravity to use the correct aeronautical term) correctly located, the weight of balsa wood does vary quite a bit, so on your particular model you may need to add a very small amount of weight. Suspend your model by pushing a pin attached to a length of thread into the exact spot on the wing centre at the balance point on the plan (see sketch 1). Let the model hang free and see if it hangs with the fuselage parallel to the ground, (don't do this on the side of a steep hill!) If it does—excellent, no extra

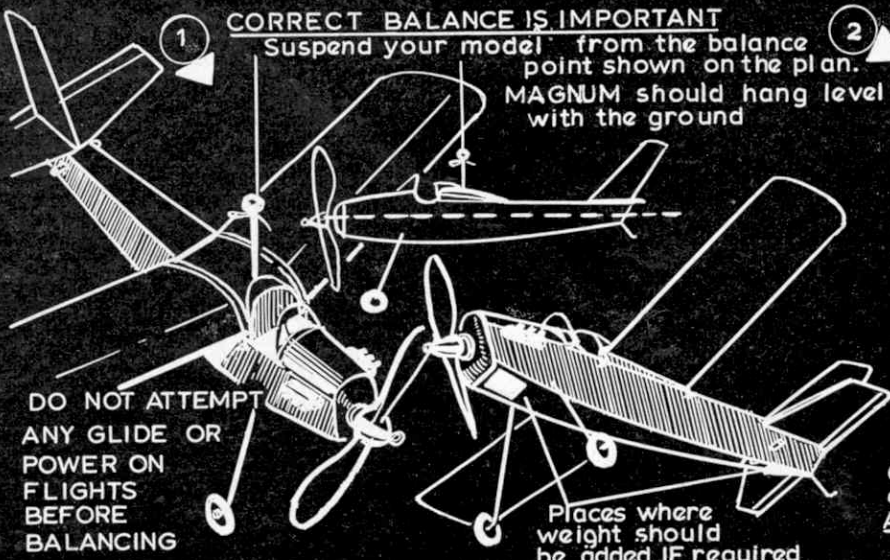
weight will be needed. If, however, the nose hangs downwards slightly, carefully fold up a piece of flattened old cement tube (or a small piece of sheet lead is perfect) and place it on the extreme edge of the tailplane. Add to, or take away, some of the weight until the model hangs level. Then cement it under the fuselage at the rear end as shown in sketch 1. Dope several strips of tissue paper over it to hold it firmly and neatly in place. If the tail hangs down add a small amount of weight to the nose in exactly the same way. Plasticine and drawing pins are often used for weighting models—and they do the job, but oh! how ugly they look, completely ruining a carefully built and decorated model. Having balanced the model, remove the rubber motor and rub on some rubber lubricant. This is a special formula and you must never use oil



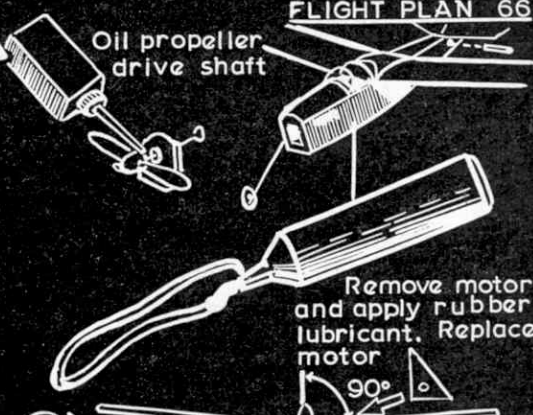
With a fully wound motor your 'Magnum' will climb like a rocket! A good idea of its attractive lines can be got from the photo below

CORRECT BALANCE IS IMPORTANT

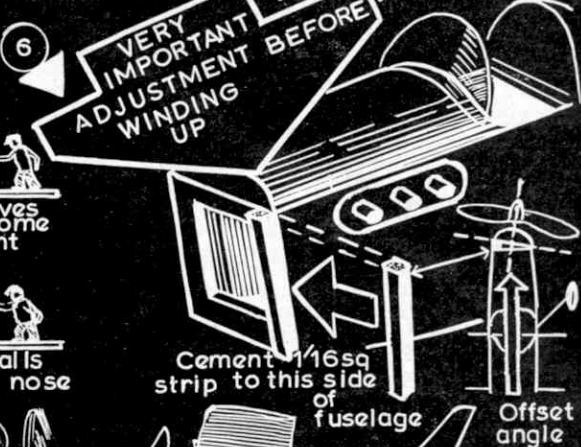
Suspend your model from the balance point shown on the plan. **MAGNUM** should hang level with the ground



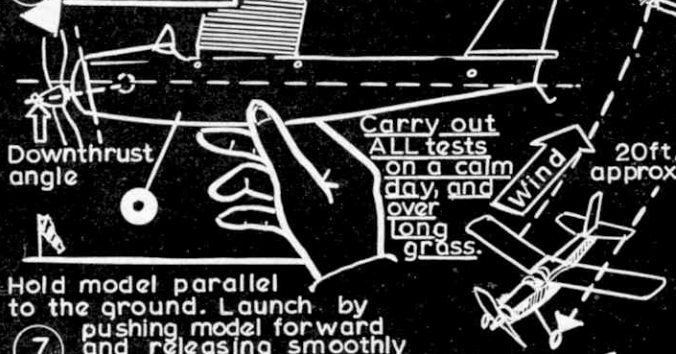
DO NOT ATTEMPT ANY GLIDE OR POWER ON FLIGHTS BEFORE BALANCING



Check alignment of flying surfaces **AVOID ALL WARPS**



4 GLIDE TEST



Hold model parallel to the ground. Launch by pushing model forward and releasing smoothly

5



7 DO NOT THROW



8



9

Model should climb, circle about once, and then glide into land smoothly.

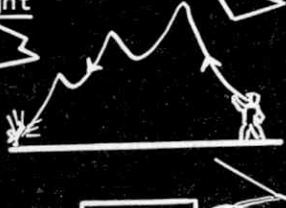
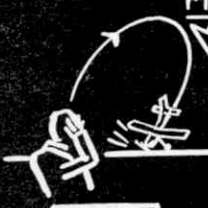
10 If model turns steeply to the left

If model turns steeply to the right

If model stalls

If model dives

Diving is also cured by moving the wing forward



Add 1/16-1/32 strip to increase offset angle

Reduce by about 1/32 the offset angle

Increase the downthrust angle, or move the wing back a little

Bend rear edge of tailplane up slightly

Fin rear edge may be bent slightly to give a gentle turn in either direction. RM.1966



A gentle test glide—the pilot looks apprehensive but his assistant is plainly delighted by the results!

for this job. Tubes cost 6d. from your hobby shop. Replace motor and put a drop of oil on the propeller drive shaft. See sketch 2. Now check that your model is accurately assembled, that the tailplane is at right angles to the fuselage, and the fin is upright. Make sure there are no warps in the wings, tailplane or fin. If there is a warp brush on a coat of clear dope, and hold the part near a fire, or electric lamp. With your fingers, twist out the warp, and hold the surface firmly until the dope has dried. This should remove the warp.

A calm day

Choose a *calm* day and a field with some long grass. You'll have to be patient here, as testing a new model on a windy day makes trimming very difficult, and in the process you will very probably damage your model—tough as the 'Magnum' is! Face into any breeze that may be blowing, and holding 'Magnum' about shoulder high, and level with the ground, gently push it forward into the air and let go. On no account throw the model, or it will most certainly stall, nose dive and crash. 'Magnum' should leave your hand, settle into a shallow glide and touch down on its wheels about 20-25 ft. in front of you. See sketch 5. If it turns to the left or right check the fin to see that it is upright and not twisted. You can very gently warp the fin very slightly. 'Magnum' is very sensitive to fine adjustment. If the model dives into the ground (unlikely if you have built it accurately and balanced it correctly) remove some of the nose-weight. If it rears upwards, and then nose dives (stalls) remove some weight from the tail, or add a little to the nose. Once you have obtained a straight shallow glide you can proceed to what is called a 'Power-on' test. But before winding the rubber motor, you must make the most important adjustment of all. Cement a strip of $\frac{1}{16}$ sq. in. balsa strip down the *left-hand* side of the front nose former (model viewed from the rear). This points the noseblock and propeller shaft to the right. This is called 'off-set' or 'off thrust' angle. See sketch 6 on page 29.

Winding several hundred turns onto a rubber motor is rather a wearisome business, so aeromodellers use a drill, which is usually geared in the ratio of 3½:1 or 4:1 (check the gearing of the drill so you will know how many *actual* turns you have put on). Into the drill chuck is put a hook, see sketch 7. This hook engages with the winding ring you made on the propeller shaft. Get a friend to hold your model as in sketch 7, and pull out the rubber motor to about twice its length (do not be afraid—if it is well lubricated, and the rubber is fresh it will not break). Then

wind on about 75 turns on the winder (250-60 actual turns). Holding the propeller, unhook the drill and carefully replace the propeller-noseblock, seeing it is the right way up. Now for your first 'power-on' launch. See sketch 8.

Holding the model in the right hand (or vice versa if you are left-handed) release the propeller first, and then with the propeller running, gently push the model forward and let go—just as you did for the glide tests. Sketch 9 shows you what should happen. If 'Magnum' completes this short flight successfully you can increase the number of turns by about thirty (100 actual turns) with each successful flight, up to a maximum of about 180 winder turns (630 actual turns). On these turns you will get some really high and long flights, starting with a really dazzling steep climb, and lasting for around 25-30 seconds. My own original 'Magnum' (featured in all the photographs) on a cold, sunny early-spring day did a best flight of 47 secs. If you can better this time, perhaps you would care to let me know, just write to me c/o The Editor, Meccano Magazine, St. Alphage House, Fore Street, London, E.C.2. I'd be delighted to hear about any successes you have with 'Magnum', and I'm sure the Editor will not mind (*agreed—Ed.*) Your 'Magnum' may be the first ever to fly for a minute!

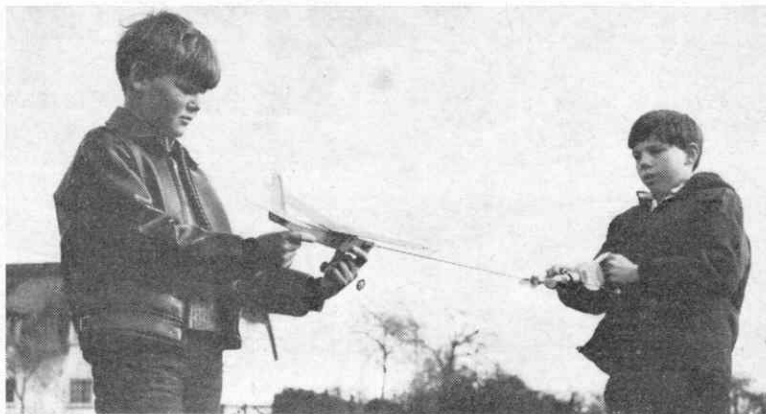
And now, if something does happen to go wrong—what to do? The series of drawings in sketch 10 will give you some remedies for various flight faults. If, by the way, you can interest an experienced aeromodeller enough to give you a helping hand—well a few words from the expert are worth a whole book of written advice—and

all aeromodellers being dedicated enthusiasts are only too willing to help the beginner—so do not be afraid to ask—politely of course! A steep left-bank which builds up into a spiral dive under power is best cured by *increasing* the offset angle. Reduce the offset angle if your 'Magnum' banks steeply to the right. Correcting a fairly steep turn can be done by bending the rear edge of the fin about $\frac{1}{16}$ in. to the left to stop a right bank, to the right to stop a left bank. If you breathe on the surface while bending you will help to avoid splitting the wood. *Please remember any adjustments made to the fin or tailplane must be small.* You will notice that 'Magnum' has a built in 'downthrust angle' (the inclination of the propeller shaft to a line drawn through the centre of the model see sketch 4), and because of this it is unlikely that a stall will occur under power. If despite this built-in downthrust angle, a stall does occur *increase* the angle of downthrust, or move the wing back a little. See sketch 10. A dive is corrected by bending up the rear edge of the tailplane slightly, or by moving the wing forward (about $\frac{1}{16}$ in.). It is important to remember that because 'Magnum' is a small model ALL the trimming adjustments must be very small too—that is why a movement of between $\frac{1}{32}$ in. to $\frac{1}{16}$ in. can make all the difference. Just be a bit patient with these, admittedly rather tiny adjustments, and you'll soon have 'Magnum' circling above your head on a most satisfying and rewarding flight. When you go out test flying it might be a good idea to take the page of trimming and flying sketches with you—for quick and easy reference.

Some hints

Finally a word about the rubber motor. Keep it *well lubricated*. You will find it necessary to lubricate it, by smearing on some of the rubber lubricant, after every two or three flights—at least to start with. This is quite simple. Just pull the rubber motor out of the front of the fuselage (without removing the rear anchoring peg) as far as it will come. Lubricate this portion of the motor. Then, with a pen, or piece of stick or wire, pull the other end of the motor out of the fuselage, through the rear opening in the bottom of the fuselage. Lubricate this portion—and the whole of the rubber motor has been lubricated without having to take out the rear anchor peg and remove it from the fuselage. This method keeps your rubber well lubricated—and saves time! Of course rubber strip does not last for ever, so examine your rubber motor from time to time. If it shows slight 'nicks' or tears in the edges, when you stretch it—discard it, and use a new one. A motor which breaks under full turns, in the fuselage, can cause you quite a lot of repair work!

Well that's about it—we do hope you've enjoyed Flight Plan '66, and that 'Magnum' will give you many happy flying hours—AND also introduce you—if you are not an aeromodeller already—to our great hobby of aeromodelling—Good luck—and Happy Landings.



This is the correct way to wind up a rubber motor—use a drill brace and stretch the rubber to at least twice its normal length. Walk towards the model as the turns are applied