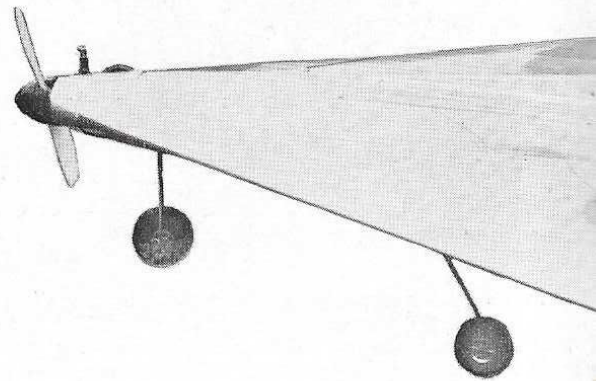
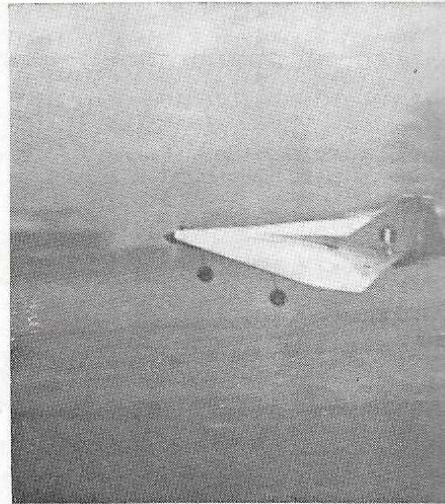


Here's a 40 $\frac{1}{2}$  in. span, compact one-piece model that won't break the bank to build. It suits 3.5-5cc. motors, will fly on any 2-4 function radio and will reward you with a good

aerobatic performance

# 362

By  
Peter Russell



### Background

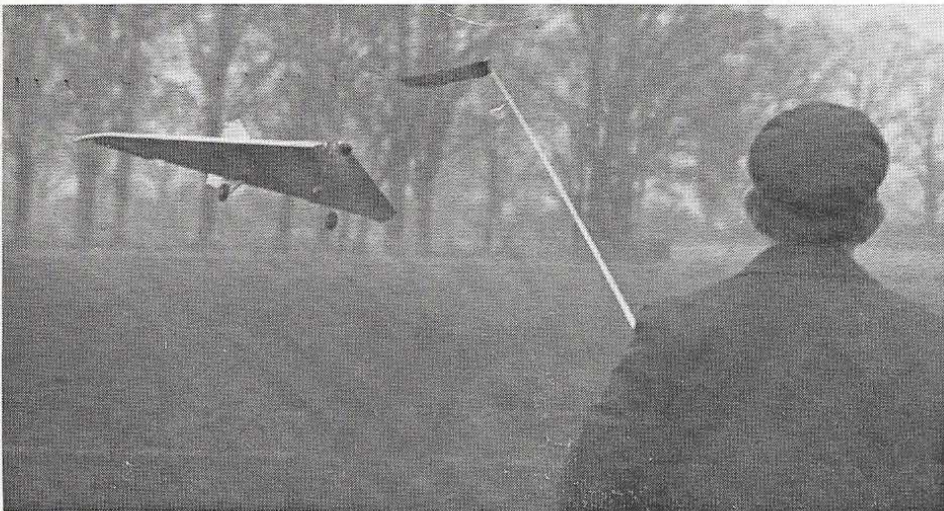
The story of most deltas currently flying goes back about 14 years. The rule makers of the time, confronted with the problem of working out a set of viable pylon racing rules, decided, in their wisdom, that a 'free-for-all' situation would inevitably result in the evolution of high-powered 'bombs' that would be potentially lethal. Maybe they weren't so stupid. To avoid this, the first pylon race rules limited engines to 2.5 c.c. - .19 cubic inches in America - and required models to have a wing area of four square feet. This didn't look

too bad in print, but when we came to actually *build* wings of this area, they looked *enormous*, and early pylon racers were rather bizarre 'pencil bombers' with long, thin bodies and huge wings. Nevertheless, some were quite fast. Suddenly, however, some bright Herbert (sorry, Herbert, nothing personal, you understand) hit on the idea of bending the four square feet into a more or less equilateral triangle. The resulting aerodyne was much more compact, span about 40 in. and length about three-quarters of that, giving an aspect ratio of about 2.5. The thickness of

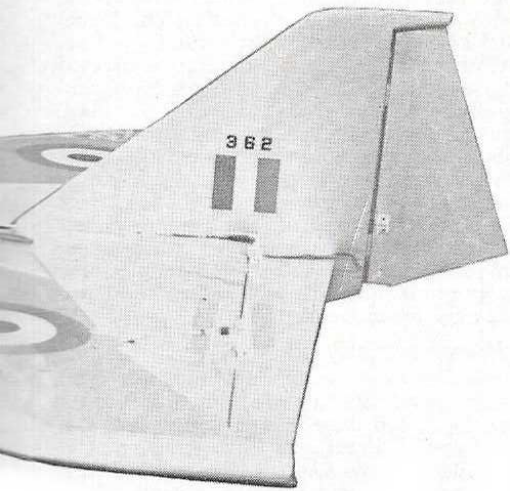
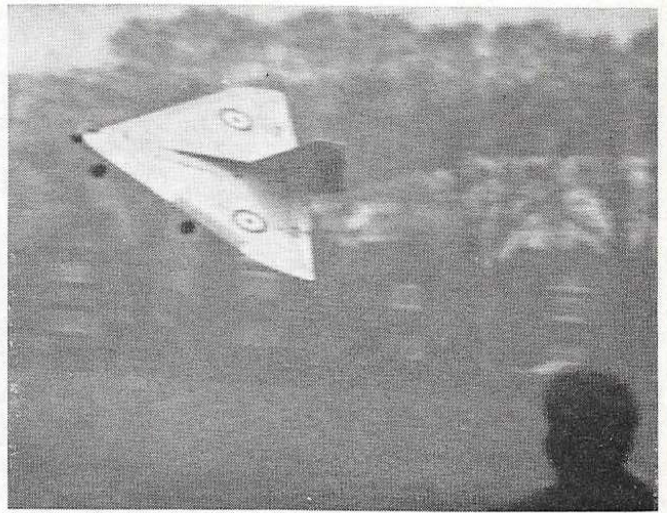
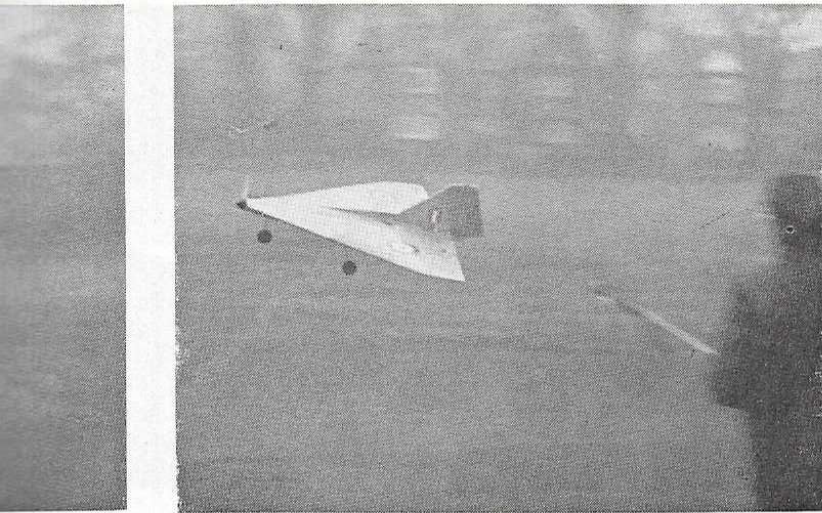
the wing root was enough to enclose the gear, making the fuselage redundant, while the back end of the 'wing' replaced the tail. Sounds like the birth of the blues, doesn't it?

In time, the deltas so dominated the pylon scene that they were banned - a fine example of negative thinking!

This writer started on the delta trail by building a near-reproduction of one of the successful American pylon deltas. 'Experts' all seemed to think that a reflexed trailing edge wing section (turned up at the back) was necessary for longitudinal stability. These sections are supposed to reduce or even eliminate the de-stabilising effect of centre of lift movements due to changing angle of attack, but their queer shape reduces lift and increases drag, rather like a flap going the wrong way. After some flying time with this early model, however, it was obvious that, since the model was just as stable inverted as right way up, the reflex was contributing nothing but drag. Consequently, a second, slightly smaller delta was built, this time with a thinner, symmetrical section and the engine, instead of sticking up like the proverbial



Left-hand down a bit! Pilot does not normally line up quite as close to his head as this! Here, the model is on finals with quite a high rate of sink, but there is still a bit of up elevator left for the flare.



sore thumb, was tucked neatly away, on its side, into the root profile.

And this is it, the 362, which first flew in 1963!

In its pylon racing configuration, weight was kept down to 38 oz. by limiting control to two functions, aileron and elevator, the nose wheel was fixed, and, of course, the Cox T.D. 15 Special was not fitted with a throttle. In spite of some trepidation about longitudinal stability, the fact that it looked very small – most of us were flying five or six foot R/C models in those days – and the fact that deltas were considered very daring, the first flight was completely satisfactory with no surprises except the speed. It was about twice as fast as anything this pilot had previously flown! At a 1964 race meeting, it was officially timed, average of six runs up and down the then-standard 528 foot pylon course, at 92 m.p.h., and even on plain fuel it would do nearly 80!

Years later, long after the 'four square foot' formula had given place to the now defunct (in U.K.) Formula One, the 362 was re-configured to a full-house sport

**Zooming around the driver's head, the 362 shows off its planform. Big sweep and low frontal area gives low drag at low angles of attack, but big increases if you start to haul on the 'g'.**

model. The nose was modified to take a 'cooking' engine with a throttle, while the nosewheel was made steerable. Experience with the 363, which was virtually a scaled-up 362 for contest aerobatics, had shown that, with the very short moment arm, a *big* rudder was needed to produce acceptable yaw response for stall turns, spins and so on. For this reason, the re-hashed 362 was given a big rudder located as far back from the c.g. as reasonably possible. Apart from this, the only other alteration was that the 1 in. streamlined nylon racing wheels were replaced by bigger conventional airtraps. All this put the weight up to about 50 oz., still not heavy for this type of model, and this, with the loss of power due to the engine change, brought the performance down to something like a

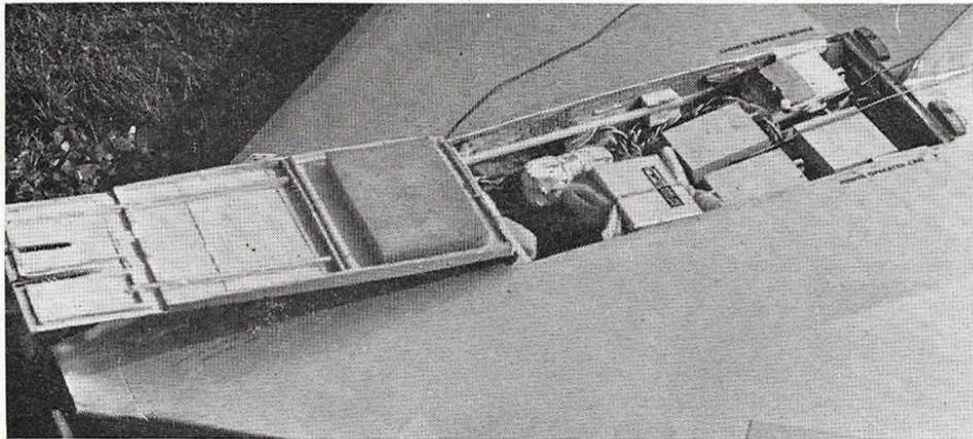
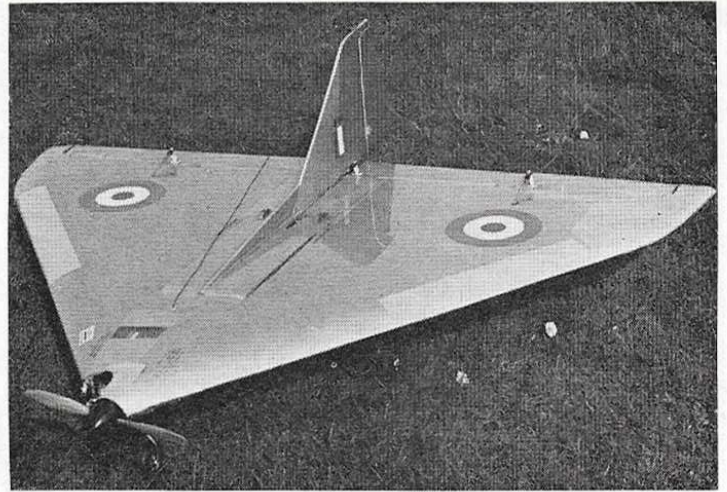
reasonable 'sport' level, though it is still quite fast, about 65, and the control responses are a good deal more positive than most sport models. It is not a contender for top aerobatic competition, but it will perform all the manoeuvres in the schedule, and is ideal for practice.

As far as the power is concerned, I consider the O.S.19 to be *minimum* power (in practice, the 20 and 25 can be taken to be in the same category) so if you have a more powerful engine of similar size and weight, use it. There is nothing more depressing to fly than an under-powered delta!

### Cutting wood

If you are interested in building a 362, consider first if you are ready for it. If you are still flying rudder/elevator, you might find it a handful, so you could say that minimum experience requirement is compet-

The 362's engine is accommodated within the wing section for minimum drag, but side mounting also minimises vibration in delta layout. Dorsal fin serves double duty as side area provider and hatch cover stiffener. No difficulty getting the gear in, but keep it to the rear. Hatch size regulated by type of gear in use, this one could be 3 in. shorter.



ence in handling fairly lively trainers with ailerons. Some people have a bit of trouble converting from rudder to aileron control, and the 362 with its powerful 360-degrees-in-one-second ailerons is not the ideal model to use for this purpose. Otherwise, apart from the speed, it is quite easy to fly, and landings with that wide-track undercarriage are particularly easy.

So, if you are satisfied that you aren't going to break it in the first few seconds of the first flight, this-is-what-you-do . . .

Mark out the basic shape on the building board - you don't need reminding that it wants to be a perfectly flat board - and, centred on the outline of the plan, stick three full-lengths of one inch square balsa. This is the basic jig on which the whole airframe is built. You now pack up the leading edge members up about 1/4 in., using scraps of sheet, and leaving gaps where the ribs go. Then similarly pack up the lower trailing edge member by the same amount, only this time it's a bit more complicated because the packing has to be slightly tapered to make the T.E. conform to the rib section. If this all sounds a bit tedious, well, perhaps it is but it's well worth taking the trouble to get it just right, because once you've got the jig set up, the rest, fitting the ribs and spars, is plain sailing. Complete the upper surface structure entirely on the board, sheeting and all, then when it has had time to dry out, turn the whole thing over and complete the underside. The main undercarriage legs are fitted before the bottom sheeting.

The 'twiddly bits' are much simplified in that you don't take the wing off a delta, so the aileron controls are built right in like the rest of the controls. Note that all the bellcranks are set up 'square', i.e. aileron differential is zero. Likewise the engine is installed with zero offsets. For centre of gravity location purposes, on this model you reverse the normal procedure

of keeping the tail light and not worrying about the nose. The 362, because of the sweep angle, tends to be a bit nose heavy, so try to keep the front end light. By way of confession, it must be admitted that this particular sweep angle was chosen purely for appearance, in spite of an awareness that it would give this tendency to nose heaviness. It must be appreciated that there are some of us old-fashioned enough to require that a model must *look* right as well as fly right.

For the same reason, when you are planning the layout of the avionics gear, put all this as far rearward as possible - it's easier to get at it anyway and it keeps the push rods of the primary controls efficiently short. The original had the hatch hinged at the front and held down by two simple wooden 'turn buttons' of the type once used to hold cupboard doors shut. A bit olde worlde but they are simple, light and they do the job. There's no reason why you shouldn't use something more in keeping with the rocket-firing-awe-inspiring-seventies, if you are that way inclined. Note that the nose wheel leg does not incorporate the usual coil spring. Long experience has taught that these are complete waste of time and weight. With this type of aeroplane you *must* land main-wheels-before-nosewheel. If you do it this way, a coil in the nose leg contributes nothing. If, on the other hand, you hit the nosewheel first, it's going to be a lousy landing and you'll probably break something anyway, coil or no. The control surfaces were hinged by the 'stitched' nylon thread system which was popular in 1962. They are simple, effective, light and cheap, as well as trouble free. Other types could be used, but the ones involving bending bits of plastic are *not* recommended.

### Finishing

The prototype's first covering was model-

span paper. This was given about five coats of clear dope, first coat full strength, subsequent ones thinned 50:50, followed by one thin coat of silver dope, sprayed on, with a final coat of fuel proofer. This lasted six or seven years, which can't be bad. After the full-house re-build, it was covered by a mixture of 'Super Monocote' and 'Solarfilm'. This gives a realistic 'textured' look. Paper or film, the weight seems to be about the same, and they are equally effective, so take your pick. All the writer's models have dayglow panels, about 12 in. x 1 1/2 in. on the tops of the leading edges. These help a lot, particularly when flying in poor light, and, since some people have orientation problems with deltas, these are strongly recommended.


### Now the tricky bit

Having got the model finished, you might think that there is nothing left to do but fly it, but there is one thing yet to do. You spend about one hour *looking* at it and double checking it. Things like c.g. positions, full and free movements of all controls with no chance of stalling any servo. Check that the control surface deflections as follows: aileron, 3/8 in. each way (gear it for a bit less if you are not experienced), elevator, 1/2 in. each way, rudder, 5/8 in. each way - all measurements taken from the tip trailing edge of the surface concerned. With the c.g. shown on the drawing, the elevator will want to be 'up' just a few degrees for the model to fly level.

Right then, when you get to the field, first check the engine, make sure it is giving full power, reliably, and that it has a safe, rather than slow idle. Use a prop that will let the engine rev. freely, an 8 x 4 has proved best, with both the Cox and the O.S. 19/20 engines. Take-off presents no problems at all, if you pull it off too soon it will not flick roll. If you are not facing the wind, the model will gently weathercock itself into wind during the take-off roll. Normal take-off run, on runway, no wind, should be about 75 ft., and you can then climb away at more or less any angle you like. Go easy on those ailerons though, they are *powerful*. By comparison, the elevators are quite docile. This is intentional. The reason being that these low aspect ratio flying machines suffer disproportionate drag increases in high angle of attack situations, so nearly all deltas, model and full-size, are given this 'light aileron/heavy elevator' set-up to give good manoeuvrability without the danger of accidentally pulling too much 'g' and, consequently, drag.

If you aren't too sure of your ability to orientate accurately with a fast, sensitive Toblerone shape model, keep it reasonably close until you feel a bit more comfortable.

## DELTA '362'



then take it up fairly high and practice some slow flying. Being very clean, it takes quite a time to slow down after you've closed the throttle, but when it does, you'll find you need quite a bit of up trim as well as power, to keep it level. Fly it slower and slower until you stall it, or as near a stall as you can get. You'll find it doesn't have a clearly defined stall, like 'ordinary models', even if you get the nose right up. It is possible, in fact, to get the nose so high, still flying level, that even full power won't make it accelerate. In other words, putting the nose down is the only way to pick up speed, and you won't need telling that ten feet up on finals is not the place to find out about these curious phenomena! So give the slow, nose high flying a pretty careful scrutiny before you try that first landing.

## Getting it back on the ground

Like so many other things, it's really quite easy if you go the right way about it. Standing close to, but just clear of the bit of runway you are going to land on, take it overhead, in level flight, at about 100 ft. Let it go about 300 ft. upwind, then do a medium 180 degree turn - a rectangular circuit takes it too far away for comfort, so use the 'race track' circuit - then when it is about level with you on the down wind leg, throttle back enough to start a gentle descent, and at the same time start slowing down. The finals turn wants to be about 2-300 ft. down wind. If you have to tighten it up much, add a bit of power too, to take care of the drag. When you've lined up into wind (if you can't get a good run *into wind*, don't worry, pick a good run anyway) throttle back a bit more and start slowing down again. By the time you get down to ten feet, the nose should be quite high with the engine at somewhere between a quarter and a third power. Use the throttle to vary the rate of descent and the elevator to control the speed, as all good pilots do. If you've got all this more or less right, the landing is simplicity itself, as long as you keep the nose well up. At landing speed, the elevator is not at all sensitive so there is little danger of ballooning.

When you get a bit more ambitious,

you'll find that standard operating procedures apply to aerobatics. In spite of the lack of side area in front of the c.g., quite good axial rolls can be performed; the trick is to use a *little* top rudder each time the model is on its side. If you use a lot of rudder, apart from twitching the model about, it doesn't seem to hold the nose up as well as small amounts. 'Ordinary' manoeuvres, like loops, eights and so on are perfectly normal, but outside loops tend to be a bit exciting because, with the c.g. position shown, if the model is trimmed for level flight, the 'down' elevator has less effect than the 'up'. It will *do* the outsides all right, but make sure you start with plenty of height! If you find this idiosyncrasy irritates you, it can be completely cured by moving the c.g. a bit farther back and then re-trimming. Stall turns are normal but don't leave the yaw too late, and it helps if you leave some power on all the time.

So there you have it. An interesting, versatile model aeroplane that is cheap and quick to build, a model that can be used as a sport model for any pilot out of the beginner stage, or even for a bit of light-hearted contest participation. It even has STOL pretensions - it can take-off in about 40 ft., even on grass, and can be brought in a good deal slower, nose high and lots of power, than most sport models.

Like to try it?