

*The undercarriage in the wings helps with the scale appearance but no ROG tests have been made; if you do intend to ROG it might pay to move the U/C one bay in and make it a narrower track.*

as the sides are parallel from the firewall to behind the cockpit, you can cover it with one piece of sheet or plank with 1/4" strips. Behind the cockpit you can either use stringers or sheet. Add a bit of sheet strengthening where the front tailplane dowel goes through the fuselage. The engine cowl is simple and effective. The sides are from 3/16" sheet glued to the bearers and the detachable top has a semicircular former at the back with an inverted U-shaped former at the rear with planking between. The slot in the U slips down over the crankshaft of the inverted engine. Make sure the front of the cowling is a snug fit with the 1 1/2" spinner at the front.

### Inverted engines

Some people find inverted engines a bit of a trouble to start, but if you mount the F/F tank at about 45 degrees you can turn the model through 90 degrees to start it as a sidewinder.

# 55

# Special

**BUILD FROM OUR FULL SIZE PLANS!**

**Built by Don Knight and designed by the editor specially for the new PAW 55BR**

Your editor is better known in aeromodelling circles as a control enthusiast (pun intended) than for free flight, so I was surprised when he designed the 55 Special and asked me to build it. He wanted a good looking, low wing model with semi-scale appearance to be powered by the new PAW 55. He also decided to try to avoid the excessive dihedral that many sport low wingers have. Ah, I hear you say, what about stability? Well, the aim was not for a model that can be flown in a gale but for calmer conditions on low power. I'm sure most of us remember evenings when the wind has dropped, flying a model that climbs in gentle circles and changes to a slow flat glide when the power cuts. That is the sort of thing that the 55 Special is aimed at. Having said that, the model does have reasonable stability and can cope with less than perfect conditions mainly due to the aerodynamics of the constant thickness wing. Let me explain.

### The wing design

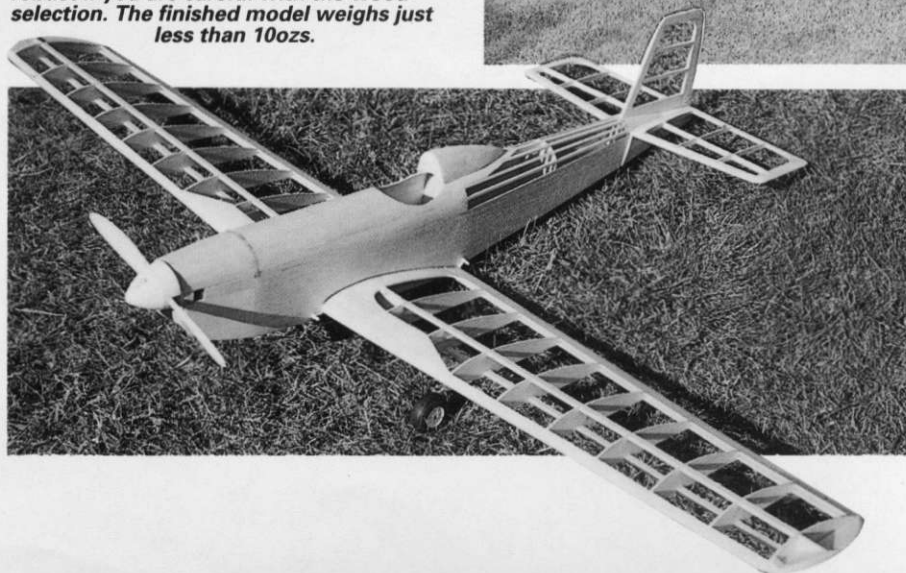
If you plot airflow over the wing from root to tip you will find that the path becomes angled outwards as it gets towards the tip, because air tends to slip off the outboard edge. This gives the airflow a longer path than if it went straight from the L.E. to the T.E. as it does at the centre of the wing, making the wing effectively a thinner section at the tip and thin sections tend to stall before thick. The deadly tip stall. Now to the clever bit of the design. If the wing has

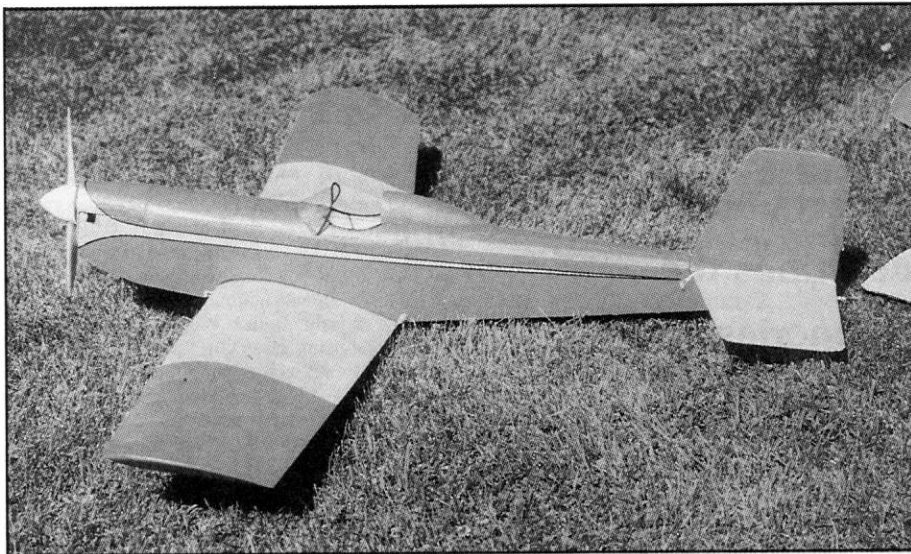
a constant thickness as the chord tapers towards the tip, the airflow is presented with a short, comparatively, thick section that will stall later despite the diagonal path taken by the airflow. This will avoid tip stall and aid stability. Other ways to overcome tip stall are wingtip plates, which don't look very nice, or the more common washout, which affects the efficiency of the wing. In practice the theory seems to work as the model has reasonable stability taking into account the low dihedral.

### Construction

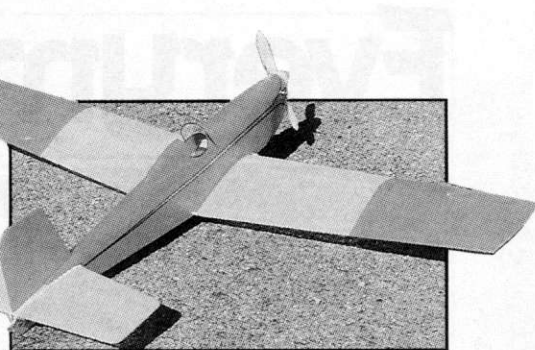
After all that, lets get down to some building starting with the fuselage. Cut the sides from medium hard 1/16" sheet balsa with the 1/32" ply doublers glued to the front. As these extend to behind the wing they add great strength. The tapered engine bearers are glued to the ply doublers and the motor mounting plate of ally or paxolin is screwed on top of them with small wood screws. After the formers have been glued in the top deck can be added. Note that

*Don Knight with the prototype 55 Special (right). Below, the airframe is light and robust if you are careful with the wood selection. The finished model weighs just less than 10ozs.*

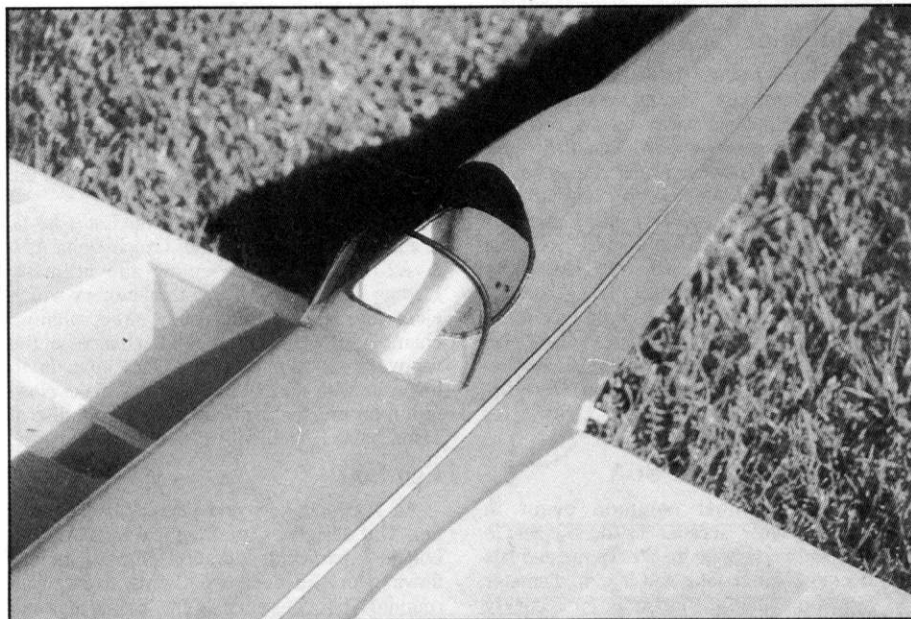




*The lines are similar to an unpublished R/C model by the editor called the Chiltern Charmer; it flew well but pilot error saw it off. This one would be suitable for lightweight gear if you have any.*



*The 55 Special was designed as a semi-scale model and it certainly looks as if there must be a full-size one somewhere.*



*The cockpit is greatly improved by the tubing trim but could also do with a pilot to complete the effect.*

Not only is this a bit easier, but there is less change in head of fuel as it runs through. Just one thought, do work out which way to slope the tank or you will fill your shoes with fuel as you turn the model horizontal!

The wings are straightforward. Make the ribs using the sandwich method between templates of the root and tip ribs. Slightly over size is better then you can lightly sand them after assembly using a long sanding block. The spars must be hard balsa and the dihedral is held by the 1/16" ply undercarriage brace. Add strength with a balsa web between the first couple of bays on the main spar. If you intend to fly in less than calm conditions it might be advisable to increase the dihedral a little. You could have another set of wings for rough weather flying, I suppose. The tailplane and fin are so simple I won't say anything about them.

#### Covering with Litespan

I'm a bit old fashioned when it comes to covering, tissue and dope are my scene, so I had some reservations when John said he wanted it covered in Litespan. I know all the

advantages of the modern-films, no dope smells for the wife to grumble about, heatshrink and fuelproof properties etc. but I admit I am a

beginner when it comes to using them. Armed with some red and yellow and a pot of Balsaloc I set to work. I found the open structures a doddle but couldn't get a wrinkle free finish on all sheet areas. The instructions say cover the whole surface of both balsa and litespan with adhesive but try as I might I kept getting small wrinkles. I got on much better just using adhesive around the edges as on an open structure. I think my problem was that I was using a domestic iron. I was offered a heatgun but it was all too late then. Still, practice makes perfect (or perhaps perfect is too optimistic in my case) and I got better as I went on. The final result is really most pleasing.

#### Flight tests

Well, the acid test of all that theory at the beginning is in the flying. My model was a bit nose heavy and I added a little weight to the tail to bring the C.of G. to the mainspar. The flying weight turned out to be 9 1/2oz. Test glides in less than the calm conditions I have been rattling on about, showed it was rather underelevated and needed a piece of 1/8" packing under the tailplane T.E. Stability was fine although it did need a bit more time to sort itself out when the wind got under a wingtip. Start with low power and build up aiming for a left hand power pattern which will probably turn into a right hand glide. Avoid tight turns.

The PAW 55 is a powerful little motor and you shouldn't need more than 3/4 throttle to achieve the good scale looking flight for which the 55 Special was designed. If you feel so inclined it would suit one or two channels of lightweight R/C as well with this motor. It certainly is a pretty sight in the air and I must get a pilot head fitted into the cockpit to finish off the effect.

