



26" of pure dynamite! Not for the faint-hearted but this model will provide you with a 'never to be forgotten' experience...

Shrike Commander

Regular readers may recall my Aztec Two-Step plan (Dec '91 **Radio Modeller**) which was inspired by Dave Wilshire's hairy little beast. It was a good model for a first small twin but I wanted something with even more performance and which did not break props quite so often.

Bob Hoover is an American pilot who flies a Rockwell Shrike Commander at airshows. His performance includes aerobatics on one and even NO engines with this Lycoming powered executive twin. The aircraft has a lot going for it as a small twin - large fuselage, high set engines, fairly simple colour scheme and a proven aerobatic performance.

The aircraft does have some snags as a model; the wing taper is pronounced which is an invitation to tip stalling but the full-size has no less than 6 degrees of washout on the wing; the tail has marked dihedral which adds complications and it is impossible to have strip ailerons the full length of the wing.

I obtained a set of photos from Jim Pepino at Scale Plans and Photo Service. (These can be obtained from Scale Model Research in this country) and a small three-view drawing of the Turbo Commander plus specs of the Shrike Commander from *Jane's All the World's Aircraft*. There was no intention of making this a perfect scale model so this material was adequate.

The outlines of the fuselage are accurate but the cross section has been squared up. The tail surfaces are roughly to scale. The wing has much less taper and a slightly over scale root chord; it has 5 degrees washout. Wing area is just over 100 square inches. With the small wing it is vital to keep the

model light - the grades of wood are specified in the text so please keep to them. The maximum weight should be 16 ounces, less would be better. Construction is quite simple but care must be taken as the model needs to be accurately built to fly well.

Fuselage

Start by cutting the fuselage sides from medium hard 1/16th sheet and then glue down the very soft 1/4 sq. longerons. Make saw cuts in the areas of bends to aid bending, fill these cuts with glue. Fit the doublers

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under the wing seat, noting that the part behind F-6 has the grain vertical to allow the fuselage to bend in that area.

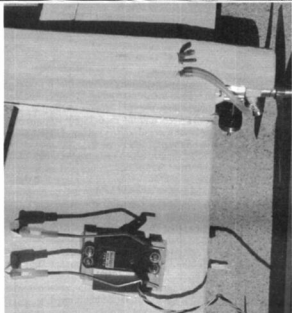
Cut out all the formers noting the grain direction. Fit the temporary cross brace to F-7 and cut the holes for the elevator push rod and the rudder snake in F-8, 9 and 10. The slots for the elevator push rod can be cut in the fuselage sides now. Join the sides with F-5, 6 and 7.

Make up the elevator pushrod. This is made from 10swg aluminium tube, the front end has a short length of clevis rod fitted and the rear has a 'Y' shaped fork bent from 20swg wire. Epoxy these into the slightly flattened ends of the tube and close the extreme ends to hold the wires even more firmly.

Make fresh saw cuts in the longerons to allow the sides to bend to match the plan view and, using F-3, 2 and 1 in that order, join the nose. Thread F-8, 9 and 10 onto the elevator pushrod and make a few dry runs for assembling the rear fuselage, checking that everything fits and the pushrod works freely. When satisfied with the assembly glue it together.

When the glue has dried, glasspaper the top and bottom of the fuselage with a sanding block so that the sheet will fit perfectly - this is important. Fit the snake outer now - it should be a small snake. The 1/16th sheet is applied with the grain across the fuselage. The portion from the nose to F-7 on the

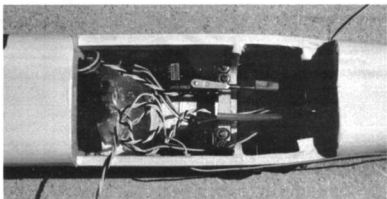




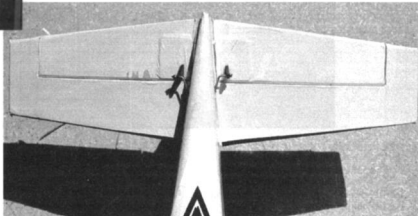
Aileron servo with output arms at 45 degrees and bent pushrods. Tank vents come out underneath, which helps keep wing structure free from fuel leakage.



Top view of nacelle. Half-cowl looks good in flight but gives easy access to engine.



Radio bay is surprisingly roomy; note end of elevator pushrod crimped down on clevis wire.



Underside of tailplane showing split elevator connections.

bottom is hard sheet as it is going to take the landing shocks. If one is flying over hard, stony ground a lamination of 1/32nd ply and 1/32 balsa would be a good idea. All the rest of the sheet should be soft.

Trim the sheet and sand until you have a dead square fuselage and then build the cabin area with very soft material, the softer the better. Now for the bit I love. Take your horrible sharp edged box and round all the corners. You can take these back until an 1/8th of an inch of the 1/4sq longerons is visible (see examples on the formers on the plan). When the whole thing is sanded smooth and round, the fuselage will look really nice. Do not radius the corners where the tailplane sits. Now add the nose block and the 1/8in ply plate for the wing retaining screw. The basic fuselage is complete.

Wings

Take great care building the wings and use the grades of wood mentioned; the strength and flying qualities of the model depend on accurately built wings. Having said that, they are quite easy to construct.

Take three sheets of hard 1/32nd balsa and trim the edges so that they are dead straight then join them to give a sheet 9in wide. This is best done by sticking them together with masking tape and then running CA glue into the crack. Mark out the wing skins with a pencil, make the top skin wider to allow for the curvature. Pin down over the plan.

The leading edge and aileron spars are cut from hard 1/8th sheet. The sub-leading edge is cut from 1/8th spruce or plywood, the leading edge cap from soft 1/8th sheet. Pin the LE down to the lower skin and add the sub LE using white glue or epoxy for this joint. Glue the ribs down using the extended lines to locate them. Glue R-1 down to one wing only at this stage, add the aileron spar,

then glue the hard 1/8th sheet dihedral braces to the wing which has R-1 fitted. When the glue has dried, take a long sanding block and carefully sand the whole wing so that all ribs and spars, etc., are even.

Remove the pins from the aileron spar on the side with the dihedral braces and fit the washout wedges under the skin so that the top is raised by 1/8th inch while R-1 is still flat on the board. This will give the required 5 degrees washout. Do not be tempted to prop up the tip without using the full-length tapered strip - if you do you will distort the wing at the next stage.

Using slow setting CA, apply glue to the LE and aileron spar and then take the top skin and align it with the LE. Hold it down until set and then slowly and carefully press the skin down, working back across the wing. Properly done, this will bond the skin to the complete structure to make a strong, light wing.

Now fit the washout wedge to the other wing and fit the completed wing against the root. Prop up the top of the complete wing at a height of 2.1/8in for the correct dihedral and glue down the dihedral braces and portions of R-1 to the incomplete wing. Fit the top skin as described above, lift the unit from the board and check that the washout is equal.

The basic wing is now complete. Fit the LE cap strip and sand to shape and then fit the TE and strip aileron horns. The front dowel should be fitted temporarily and a piece of 1/16in ply fitted over the TE of the wing to take the hold down screw. Screw the wing down and build the fairing over the top of the wing. Do not make it a tight fit as the wing has to rock forward for removal. When satisfied with the fairing, glue it in place, not forgetting to cut a hole to remove the screw.

The nacelles are started by fitting N-1 and N-1a to the LE. The sides of the nacelles are

cut out and glued in place with N-2 and N-3. Check that the sides are at right angles to the LE. Skin the bottom of the nacelle back from N-2 with 1/16in sheet with the grain lengthways and skin the top with 1/8in with grain crossways. Shape the corners before gluing down as sanding afterwards could weaken the wing skins.

The cowlings are very simple. Making detachable cowls at this size would be tricky so the engines are mounted pointing inboard and angled upwards slightly which makes access to the glow head easier and helps prevent the oscillations of the two engine mounting perfectly thus reducing vibration.

The cowls use the full length of the nacelle side with soft 1/4in sheet top and bottom and in the front. This is all sanded to shape and trimmed back to allow the engine to be fitted. One of the carbs has to be turned so that both needle valves are on the top. The effect is very convincing when viewed from the side or at a distance.

Tail surfaces

The tailplane and fin are cut from medium 1/8in sheet. Glue the dovetail dihedral joint with epoxy for strength and add the 1/64in ply plates each side of the elevators and rudder. These parts may be glued to the fuselage before or after covering - covering first is easier. The control surfaces are hinged with the covering material.

Covering

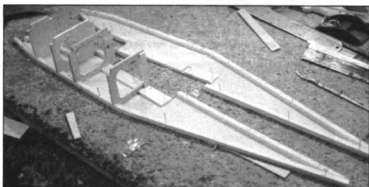
The model is covered with white Solarfilm. Covering the wing is diabolical with the nacelles and top fairing but, with a lot of care and a small tacking iron, it can be accomplished. The ailerons are hinged with the old 'clotheshorse' type hinges although very small Mylar hinges could be used.

Trim is done with Solartrim and the car

The wing structure ready for the top skin on one side. Note rising tide of debris on building bench!



Basic fuselage construction is simple. Longerons are from very soft wood.



stripping tapes from Halfords - the red is a pretty good match for Solartrim.

Covering round the fuel tank pipes is best done by covering from the rear of the nacelle to just in front of the pipes and from the front to just behind them.

Radio installation

There is plenty of room for small servos; I used one of my Fleet Micro airborne packs with three servos and a 250mAh NiCad. The NiCad goes right up the front under the cockpit, the receiver goes just behind that. The two servos for rudder and elevator fit close to the sides and about 1/32in above the bottom sheeting, while the aileron servo goes in the usual place. Fitting larger servos could be a problem, probably best solved by laying the aileron servo on its side in the wing.

Note that the ailerons have a lot of differential. I achieved this by using one of the four-armed outputs with two arms cut off, the remaining two arms pointing forwards. The pushrods will need to be cranked. The pushrod to the rudder is no more than a length of 20swg wire running in a snake out.

The horns are cut from 1/16in Paxolin. With the elevator pushrod connected to the servo and the elevators held neutral with clamps, slide the horns onto the pushrod and fix into the slots in the elevator with thick CA or 5 minute epoxy and leave to set. The rudder horn is fitted in the same way, some fine wire and a block of solder will complete the job.

I fitted the switch close under the trebler behind F-6 where I could see it before launching and my fingers should not flick it off as I heaved the model away although the shielded cover of the Fleet switch should prevent this.

Fit the engines and props and check the balance point. The model should balance 1in behind the L.E. A little lead can be added in the nose bay if needed. My model came out dead on 16 ounces ready to fly.

Hovering around

No, that does not mean that you will have to hover up the remains and it certainly doesn't mean that the model does anything

resembling a hover - it just means flying the model in the same way that Bob Hoover flies the full-size.

The traumatic part

The first flight was approached with uncertainty. I knew that Aztec Two Step had been a pleasure to fly but this model was different in many respects. Having run the engines up and paced up and down for a while I took the plunge, started both engines and my helper gave it a firm launch.

The model climbed away with alacrity or, in plain English, shot of like a scalded cat. Some down trim was needed and a little left rudder because the right engine was slightly off tune.

Loops and rolls were flown, the rolls were very nice and axial but the loops tended to screw out. Long dives with high speed passes were impressive to say the least. At the end of one of these high speed runs I pulled up to try a vertical roll. The model slowed down and then one engine cut. The model did the nicest stall turn that I have ever seen and flicked into a spin. Here I made my mistake - with Aztec Two Step I could stop the roll with aileron and then pull out but this was a true flat spin with incredibly fast rotation and low

rate of descent.

I was just beginning to hope that it would flat spin to the ground when the other engine stopped; now the spin became vertical at about 20 feet and the model went straight in. The nose was pulverised back to F-3 but no other damage was caused.

After repairs which consisted of a new nose made from four pieces of very soft 1/2in sheet which was grafted onto a new F-3, the model looked as good as new and so back to the flying field. The wind was blowing at about ten to fifteen miles an hour and I must confess that I was a little on the nervous side. I knew that there would be no problems with two engines running but I was not too sure about the single engine performance after the last flight.

I need not have worried. On one engine the model is still controllable but it must be handled with great caution. The speed must be kept up which means flying straight and level with no attempt to increase height. Use rudder and ailerons and go easy on the elevator. The model can be allowed to turn into the dead engine and, under some circumstances, this is easier than trying to turn away from it.

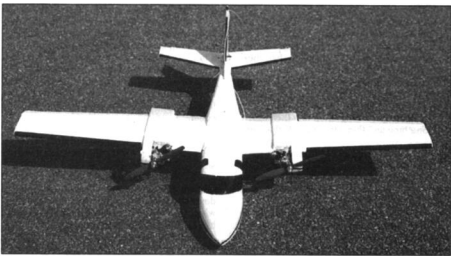
Once I was certain that I could handle the model on one engine I tried out its aerobatic capabilities. Loops and rolls are easy although there is a tendency to screw out of the loops. Cuban eights are also simple and the model does very nice four point rolls but you have to be quick on the sticks - my first attempts were three point rolls!

The Shrike Commander is very exciting to fly and would be an excellent low cost trainer for learning to handle larger models with twin engines as it really requires delicacy and quick reactions on the controls and it is remarkably tough and easy to repair in the event of a thump. I would suggest a progression from Aztec Two Step to Shrike Commander and then onto other twins - I shall certainly be building more small twins myself.

Health note

In these days of considerable concern about health with healthy diets, jogging, aerobics (a word created because a modern school leaver couldn't spell aerobatics) and all other forms of physical fitness, it is nice to know that flying the Shrike Commander really tones up the sphincter muscles!

Personally speaking, I always need a fag or two after a flight...



Bob Hoover flies the full-size version of this aircraft through aerobatics on dead engines. Model is tough and easy to repair if you try that!