SUPER CHANDELLE

A 69" wingspan semi-scale sport aerobatic model with 'Golden Era' appeal for .48 to .75 cu.ins. four stroke engines or similar power two strokes, designed by Mike Keay

The original intention in building this model stemmed from the need to have a flying test bed to sort out some wrinkles in a particularly difficult .48 four stroke engine that hadn't run properly in a previous model and was intended for something more 'grand'. Now I know that some .48s play up when new and require a bit of 'mothering' until properly run in (or maybe understood), so to overcome those tedious early days, a model was needed that had 'engine kindness' built-in. You know the sort of thing - engine upright, plumbing perfectly aligned, adequate cooling, easy access to the twiddly bits, etc. A simple plank and box model would probably have done the job, but I do have some Club 'Cred' to keep up!

What I wanted was a good looking low-winged model, with generous aerobatic potential, around 6 feet span, a longish tail moment to give a smooth flight performance and a tapered semi-symmetrical sectioned wing, loaded to about 18 to 20

ozs/sq.ft. for good 'dead stick' landings - just in case I hadn't designed out the previous engine problems! *"What are you up to now?"*, said the wife from the tele corner. *"Oh just designing a quick model - should have it finished by the weekend."*, I said - but she's seen it all before and you could see her thinking, *"Here comes another 3 months of solid concentration, silence and balsa dust!"* Well, she's right really. I start out with good intentions of building something quick and dirty, then muck about for ages tarting it up. The end product, however, looks pretty and flies great, so I reckon the extra work is justified.

After a few evenings of drawing and rubbing out (quite a lot of the latter), Super Chandelle was born. The Name? Ah, yes! You'll know that kit man, Howard Metcalfe, sells a quick-to-build ABS aerobatic model with a similar name! I built one some time ago and it flew a real treat, until it came to a premature and terminal end when it aimed itself unceremoniously at the only metal farm gate for miles around! The memory of its smoothness in the air, and similar performance, led me to name my 'Super' model after it. Hopefully Howard will consider this a compliment to the skill of his design, rather than outright plagiarism by me!

The notes that follow are rather more detailed than is usual to help the less experienced modeller get to grips with what could be their first plan built aerobatic aircraft.

Wings and things

Nothing at all unusual about the construction of either foam or built-up types. The chosen wing section is a modified version of the popular NACA 2412, which will give lift when wanted, especially for those dreaded 'dead stick landings' - I was still worried about that engine you see! Those who want more perfect aerobatics might consider an alternative symmetrical section by making the shape below the rib datum the same as that above, adjusting the woodwork accordingly. But for those of us who just sigh for good flight performance and a forgiving nature, leave well alone and stick with the plan! Washout of 1.1/2° is built into the wing to aid those using this design as an introduction to low wing aerobatic flying. This helps to avoid the tip-stalling problems usually associated with tapered wings, as will the inboard ailerons.

Foam wings are generally quicker to build, so let's start with them. The two blanks will arrive without leading or false trailing edges, so using 1/2" x 1" for the former and 1/4" x 1/2" for the latter, white glue these in place. When dry, shape with razor plane and a long sanding block to the sections shown. Prepare the 1/2" x 1.1/2" trailing edges at the centre section to accept the aileron torque rods.

Using the whole length of the trailing edge, epoxy the tip and centre sections to the false trailing edge, making sure that the torque rods are protected so they don't bind. Don't glue the aileron section! Hold the T.E. in place whilst the glue is drying with masking tape, making sure that the correct section is maintained. When dry, carefully cut away the ailerons and clean up any ragged edges, leaving a gap at either end so the covering material will not bind when assembled. Next shape the aileron leading edges, then temporarily fit them with your choice of hinges so that any final adjustments can be made to the aerofoil shape.

Use a long sanding block to sand both centre sections to give the required 1.1/2" tip dihedral. The angle template on the plan will help here. That done? Good, on with the joining. Firstly check that both wing tips have the same angle of attack (minus 1.5°). Make any adjustments at the centre section, otherwise the model will be the very devil to trim! Using quick setting epoxy, join the wing panels together, propping one tip up by 3". A good way to hold the horizontal panel flat to the building board is to weigh it down with a copy of Yellow Pages or similar. This follows the shape of the top of the wing and imparts an even pressure.

When dry, use a razor saw, or preferably a hacksaw blade ground to a fine point, to cut through the centre of the leading edge, then enlarge the slot to accommodate the 1/8" birch ply wing tongue shown on the built up drawing. Make sure that the slot is exactly on the leading edge centre line. A generous dollop of epoxy sets the tongue into the wing. After cutting away the trailing edge for the wing mounting plate, the centre section can be strengthened with the usual epoxy and bandage treatment.

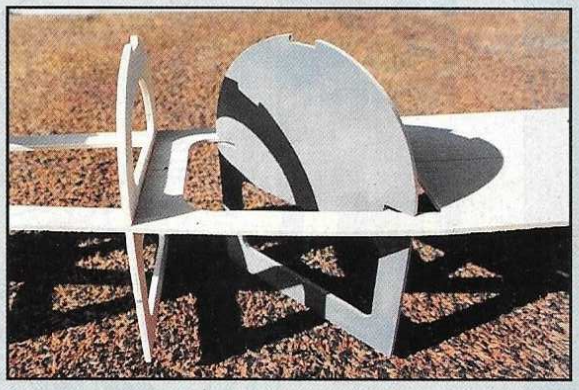
The wingtips are made from two laminations of 1/2" soft balsa sheet, white glued into place. Shape them carefully, so as not to sand through the wing skin. All that's left to do is to give the finished wing a thorough sanding .

Built up wing

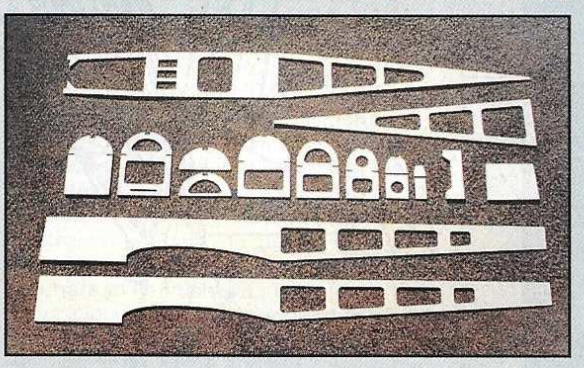
I must say that I prefer built up wings. They usually turn out to be lighter and better balanced. They also seem to absorb 'ground strikes' with less damage.

Super Chandelle's wing is very conventional, the only point to watch out for is to build in the 1.5° washout. Start by making the ribs by the sandwich method using either 1/8" balsa or liteply as directed on the plan. (Don't forget to make a left and right hand set!) Take pains to ensure a snug fit for the spars. The two R1 ribs need to have a slot cut out to accommodate the 1/8" ply tongue. These ribs (and R2 and 3) will be cut up later to fit around the dihedral brace. On with the construction!

Pin the bottom 1/4" x 3/8" spuce spar and the 1/2" x 1" leading edge over the plan, followed by the false trailing edge. This needs packing up by 3/8" at the centre section and by 5/16" at the tip to give the right angle of washout. When in place, it's a good idea to add further packing at points along the length to ensure that the trailing edge is built straight. The ribs, with the exception of R1, 2 and 3, can now be added, followed by the top spar. Use white glue. Fit the 1/4" ply dihedral brace, reshaping the taper as necessary to make sure you end up with the spar separation the same as rib R1. Epoxy glue the brace into position. Facing it up to the front edge of the spars will make the next job of rib-fitting a little easier. Ribs R1, 2 and 3 should now be cut across the front face of the spar slots and fitted into place with epoxy. R1 will need to be



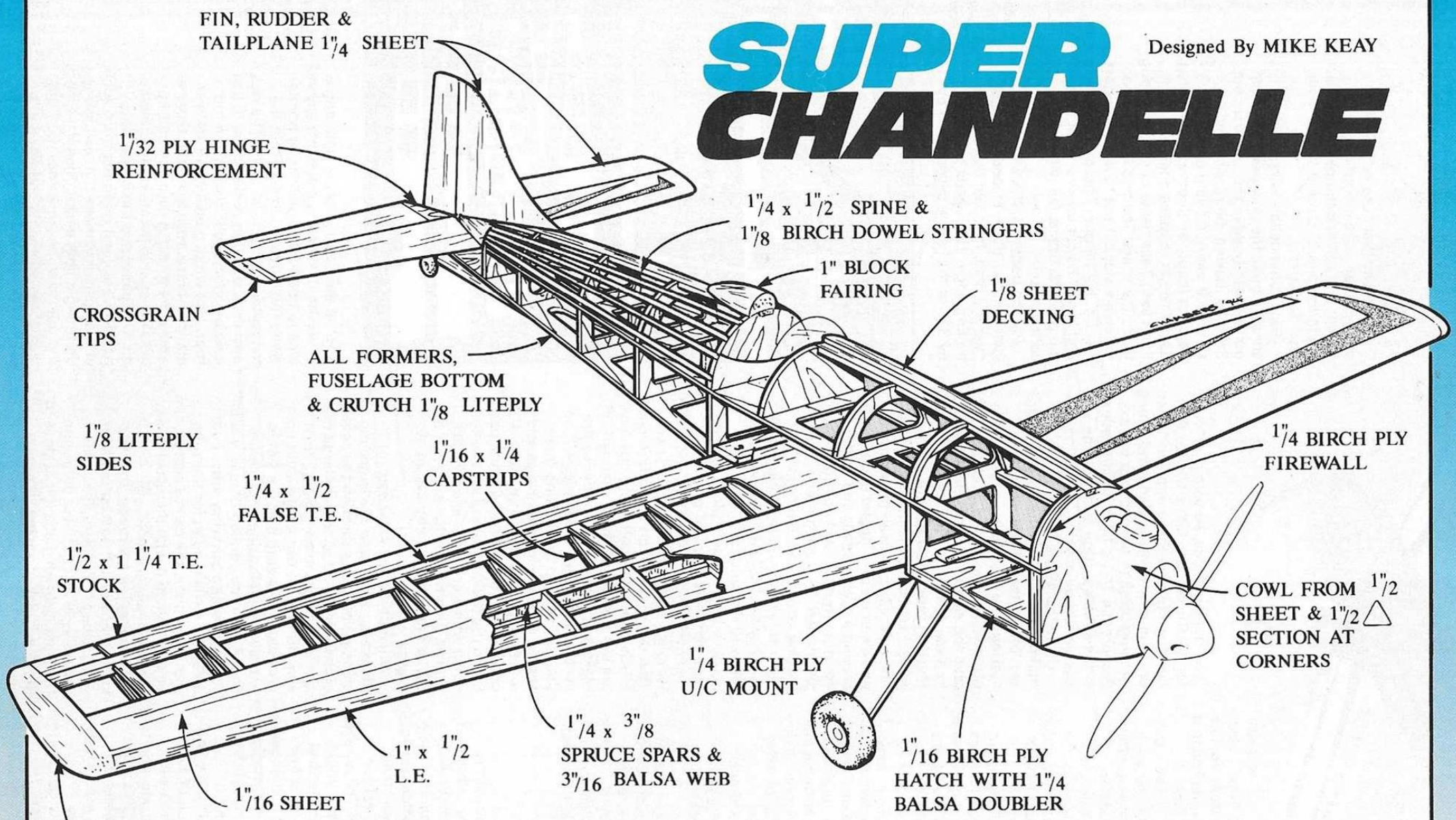
Fuselage crutch and formers. Note how the former rotates in the crutch aperture to locate in place.



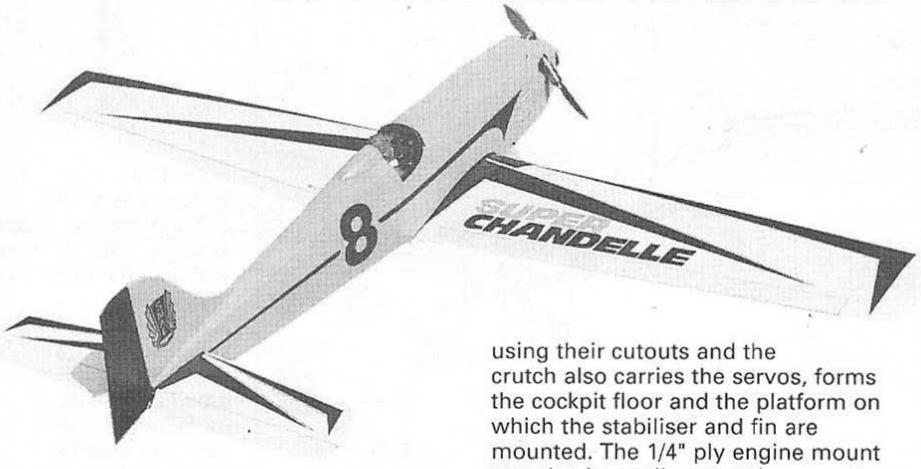
Principle fuselage components, with the crutch at top.

SUPER CHANDELLE

Designed By MIKE KEAY



A 69" SPAN SMOOTH SPORTS AEROBATIC MODEL FOR .48 - .75 FOUR STROKES & 4 FUNCTION R/C



set at the template angle shown on the plan. Shape the 1/16" leading edge sheeting to butt up to the balsa leading edge. Glue this, the centre section and tip sheets to the ribs and spar, holding them in place with masking tape. Fit the 1/16" x 1/4" cap strips to the top of the ribs with cyano, locating between the leading edge sheeting and the false trailing edge. Leave overnight so the glue goes off properly and locks the washout in place. Now we need to sheet and cap the lower side. Remove the wing half from the building board (keep all the packing you used) and reverse it. Pack up the false trailing edge by 5/8" at the centre and 3/8" at the tip, before sheeting the same way as the top surface.

Build the second panel as the first, using the original packing to maintain the same washout, joining the two halves at the appropriate time by epoxying in the dihedral brace. When completed, the trailing edge can be epoxied into place in the same manner as the foam wing. I fitted pin hinges for the ailerons, but Mylar, flat or M & M fabric ones can be used. The aileron leading edge will need to be modified if using the latter, as detailed on the plan. Don't forget to fit the aileron torque rods and guides!

All that's left is to shape up the leading and trailing edges to the right aerofoil section and give the whole wing a light sanding with a wide block. Leave the final fitting of the ailerons (with the exception of the M & M hinged version) until the wing covering is completed. Satisfied so far? OK - on with the fuselage!

Ever built a banana?

I guess we all have at some time or other! The results of even a slight bend can make all the difference between a model that flies on rails and one that tends to do its own thing in the air, needing constant corrective control. Reasonably priced jigs are available on the market and these help to prevent misalignment, but not everyone owns one. There has to be a different way!

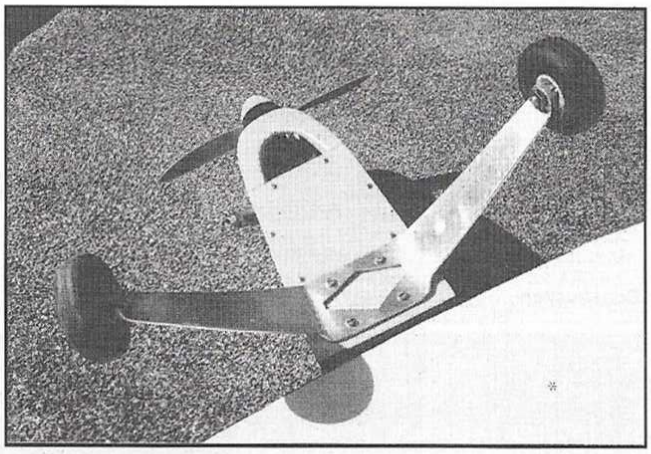
Super Chandelle's fuz is built on a horizontal 1/8" liteply crutch. The principal formers locate accurately using their cutouts and the crutch also carries the servos, forms the cockpit floor and the platform on which the stabiliser and fin are mounted. The 1/4" ply engine mount can also be easily set at the correct offset angle (2° right thrust). Note the crutch shape and how F1 is fitted. I guarantee that if built in accordance with the instructions, you will end up with an exceptionally strong, straight and light fuselage that will take a considerable amount of punishment - ideal for the newcomer to aerobatic flying.

With all my models, I like to design-in easy access to those areas that need servicing from time to time, like the engine, tank, electronics and undercarriage. There's nothing more irritating than to find the bit of plumbing you have to get at is inaccessible and the model needs major surgery to reach it! The fuselage bottom in front of the undercarriage removes for servicing and the whole cowl detaches for engine maintenance. There is plenty of room in various cavities in the fuselage 'loft' and the capacious tank bay to move the battery pack around for balancing the model when completed. Should the model turn out very nose heavy, additional weights can be stowed in the closed box beneath the stabiliser.

First make up a kit of parts by copying the crutch, formers, fuselage sides and bottom from the plan. Take time over this operation; it will save lots of frustration later! Make the holes in the crutch to suit the dimensions of your servos. Back these with hardwood strip doublers where the screws go, if you wish. The starboard fuselage side is 1/8" shorter at the front to allow for the thrust line offset. Mark the inside faces of the lite-ply sides to show where the formers will go and fit the 1/4" wing seat doublers. Add 1/4" sheet doublers where shown on F2 and F4. Check that the access aperture in F2 will allow the tank to pass through for future servicing. Use epoxy to glue F1 and F2 to the crutch. All main formers slip over the side rails from inside the lightening holes. Ease the slots in the formers to get a nice fit, making sure that any adjustments are made equally to both sides, so they fit squarely. Formers F3, 3a, 7 and 8 are white glued directly to the crutch. When all the formers are dry, glue the sides to the crutch using epoxy if you are impatient, or white glue. Ensure that the formers follow the lines previously drawn. Add the 1/8" tailwheel ply doubler to the fuselage bottom. Trial fit the bottom between the sides and check for fit. When OK, glue in place, fitting the 1/4" x 1/2" sternpost at the same time. Cut a 1/4" slot in the 1/4" x 1/2" rear top spine to take the fin, then fit it to the formers, extending to the rear of the fin. 1/8" x 1/2" strips are glued either side of the the spine and to the top of F4 to take the head fairing block made from 1" balsa block. This is fitted after covering the fuselage. Four 1/8" dowel stringers are fitted equidistantly between the spine and the top of the fuz on each side, running from the doubler behind F4 to F8. When the location for each has been assessed, it is glued into a slight depression in each former, made with a small round file, to about half its depth. After the glue has set, use a larger file or suitable Perma-Grit tool to relieve the former between the stringers so it will not make lumps in the covering. Leave the soft block infills at the rear of the fuselage until the tailplane is fitted.

Up to the front end now. Epoxy the 1/4" ply undercarriage mount into place between the sides and F2, and fit the reinforcement 3/8" x1/2" hardwood bearers. Add 1/4" x 1/4" hardwood strips between the u/c mount and F1 and across the back of the former, to take the small wood screws which secure the inspection cover. This is made up from a sheet of 1/16" ply, doubled with 1/4" sheet balsa to be a comfy fit into the aperture. Epoxy the 1/2" triangle section strips behind F1.

Now's a good time to consider any wiring for charging or plug leads and the battery switch. Fit the sockets into the lite-ply sides. The switch on the prototype was placed behind the instrument panel. The 1/4" x 1/2" top front spine is glued to the front formers to lie flush with their tops. Four pieces of straight-grained softish 1/8" sheet top decking are now fitted, joining at the spine and at F2 using the



Close up on the metal undercarriage, cowl cooling aperature and the forward inspection hatch.