



Manxman's generous side area will inspire you to try out knife edge manoeuvres.

MANXMAN

Build from our free pull-out plan your own version of Dr. Frederick Knox's 49" low wing sports model for a .40 size engine

Simple, yet strong structure built from lite-ply and



balsa.

The Manxman is a small, quick responding low wing sport plane which is easy and quick to build at a low cost. The original was built for about £20.00, including wheels, tank, engine mount and Solarfilm. The thick wing, large radius leading edge and washout make for a gentle, predictable stall, good low speed characteristics and general good manners. It is reasonably fast, quite aerobatic and handles windy conditions well.

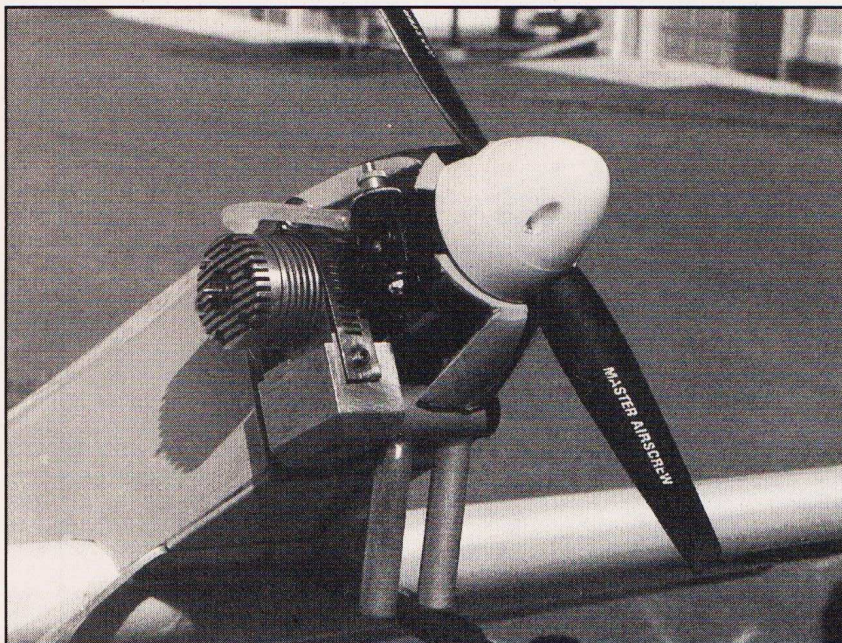
Tail first

The fin is, of course, built integrally with the fuselage. The tailplane and elevators are cut from hard 1/8" balsa sheet and the elevators are joined with a piece

of 3/16" dowel, which is then sanded on top and below to blend in with the 1/8" sheet of the elevators. When using 1/8" control surfaces, I prefer to make control horns from 1/16" ply which are then epoxied into a slot cut into the balsa. Some thin CA glue can then be applied to the balsa around the join, which also toughens up the wood. The surface of the horn then receives a thin smear of epoxy to make a strong set-up; stronger, I think, than the bolt through nylon type. However, this latter type can be used, in which case a plate of 1/32" ply should be glued to each side of the surface, as shown on the plan.

Fuselage

The sides are cut from 1/8" ply. This is quite easily cut with a hobby knife, using a steel straight edge and making several firm cuts. Lite-ply can be substituted, or, for those who prefer balsa, that's alright too. If 1/8" balsa is used, a 1/16" ply doubler from F1 to just behind F4 will be needed. No doublers are needed with the plywood sides, apart from a 1/8" balsa wing saddle to provide a wider seat for the

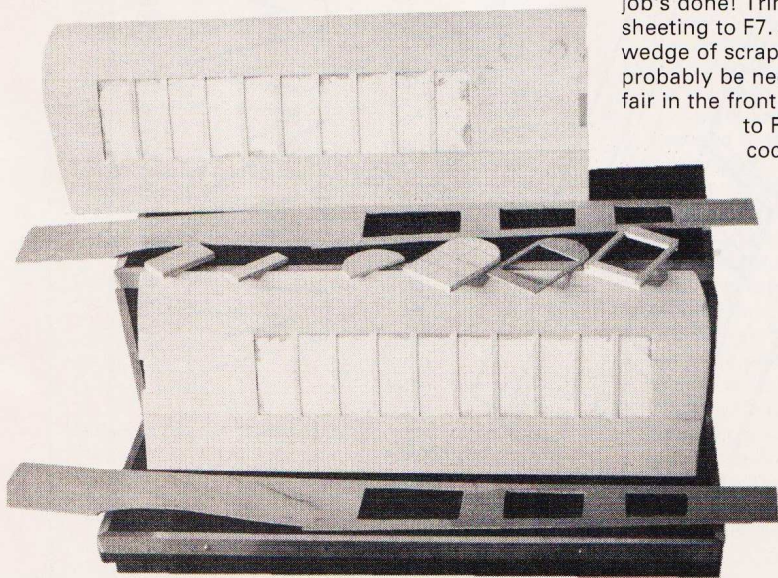


wing. In this part of the world (Canada), they build houses by the hundred and throw out enormous quantities of wood, including plywood of all thicknesses. The firewall was cut from such a piece of 1/4" plywood which was sanded and coated with 5 minute epoxy on both sides after drilling for the motor mount, fuel lines and throttle wire. As motor installation varies according to the motor used, no specific one is shown on the plan. A commercial mount is used for side mounting the engine. F1, F2 and F4 are epoxied to one fuselage side, using a square on each one. When dry, the other side is epoxied to the formers, squaring everything in the process. 3/8" triangular stock is added at the firewall. F2a should be drilled for the 3/16" dowel before gluing it to F2. The sides are then pulled in at the tail and glued to each other, being very careful to get them true. The 1/4" sq. spacers are added as shown, to stiffen the fuselage. Bolt on the motor mount and fit an 8 ounce tank and the fuel lines, as this is quite a close fit and can't easily be done later. Fit F3 and its two triangular braces.

The front deck is either

planked with 1/8" x 3/8" balsa strips, or a single sheet if you are feeling brave. Actually, if 4" wide soft balsa is used, and is kept wet on the outside, it isn't too onerous a job. Thick CA glue works well here. The rear sheeting is prepared by cutting the fin outline from 1/8" balsa and edge gluing to the lower sheet (note that this extends from F5 back; the side sheeting in the cockpit area between the front deck sheet and F5 is done as a separate piece) which is trimmed after it has been installed. F5, F6 and F7 are next to be fitted and then the tailplane is epoxied to the fuselage. This is a somewhat critical phase and needs care to get it aligned with the fuselage so that the fin will be vertical to it after the next stage. Glue in the 1/16" by 1/4" 'gluing strips and CA one side sheeting to the strip and to F5. When dry, attach the sheeting to F6 with thick CA. Repeat for the other side. Now pull the rear of the sheeting (previously cut to clear the tailplane) together and hold with clothes pegs. Align the sides cum fin very carefully and adjust until the tail components are at right angles to each other. When happy with this, drop thin CA

down the seams and the job's done! Trim the sheeting to F7. A small wedge of scrap balsa will probably be needed to fair in the front of the fin to F7. The cockpit floor



and sides can now be fitted.

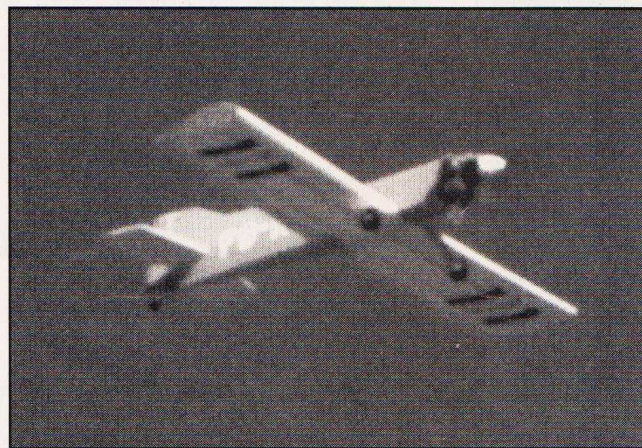
Hardwood blocks for the wing hold down bolts are epoxied in, as are the servo rails. The front rail is glued to the sides and to F4. The elevators are hinged temporarily, the rudder and elevator servos fitted and push rods made up. At this stage, I cover the sides beneath the tailplane with film. This allows the pushrods to be connected to the servos, prior to sheeting the bottom, when, of course, the pushrods stick out at the back, a situation which makes covering later difficult. Complete the bottom covering with 1/8" cross grain balsa. The fuselage can now be sanded to some sort of shape.

I prefer to place the servos behind the wing as there is not a lot of room above it and it is all too easy to have the aileron linkage bind on something or other. This way there is plenty of room for everything and the placement of the servos counteracts the long nose moment which would otherwise result in nose heavyness. I chose not to use a hatch, so that if access is needed at a later date, a square of wood can be cut out using a knife at an angle from without to within, so that it can then be glued back in place. The servos can, in fact, be checked visually from the wing cut out.

The landing gear block is drilled and

A good .40 will give a sparkling performance, whilst a Pitts style silencer minimises disruption of those sleek fuselage lines

Manxman is good at aerobatics, yet is docile at the stall.



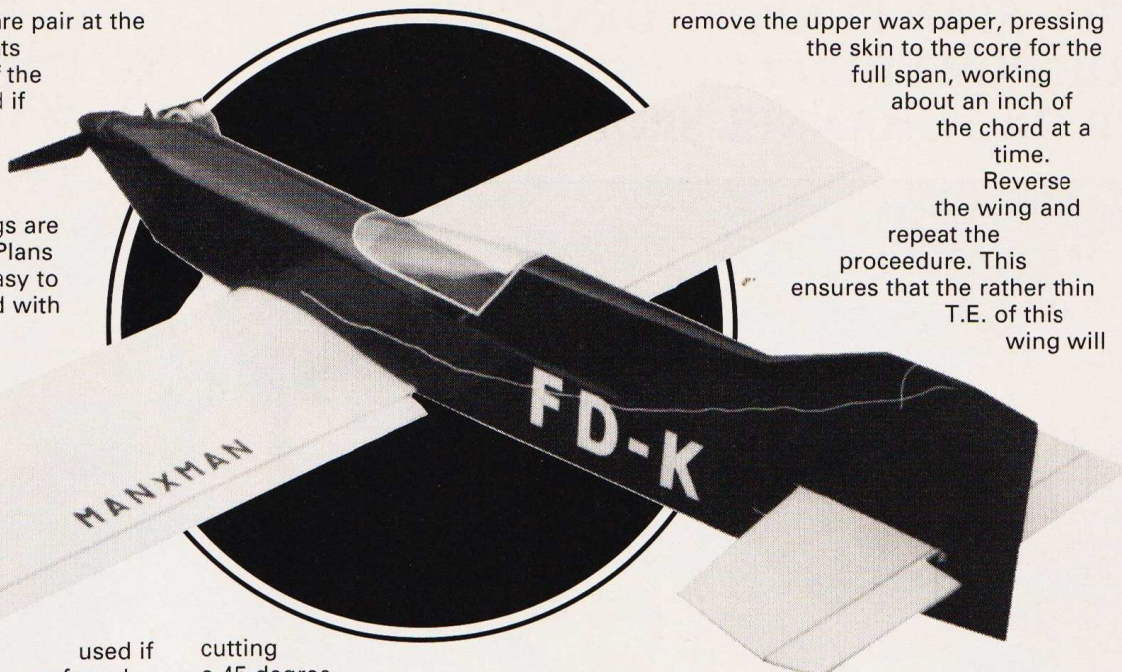
blind nuts fitted before epoxying in place. The fuselage bottom forward of this is 3/16" balsa; it is attached, after covering, with silicone sealant. This stuff makes a good fuel proof joint and can be removed for access by slitting it with a sharp blade. A thin smear of silicone will re-attach it. It saves a lot of messing with hardwood rails for a screw-down hatch.

The cowl is made up from block and sheet to suit the engine and muffler. The original uses a K&B 40 with a Pitts style muffler. This makes a change from a can hanging out of the side. Landing gear was made from a length of aluminum from the hardware store, bent in a vice. The tailwheel assembly is made and fitted and the fuselage covered. 2.1/2" wheels are suggested, though the pictures show 2" wheels,

which were the only spare pair at the time. A set of wheel pants complement the lines of the plane and are suggested if not flying off grass.

Wings

Obechi veneered wings are available from the ASP Plans Service, although it is easy to make your own, covered with 1/16" balsa as shown on the plan. Cardboard sheeting can also be



used if preferred.

With cardboard, 1/4" upper and lower slots are cut into the cores and 1/4" sq. balsa spars glued in with white glue. Spars are not needed with obechi or balsa skins.

The key to cutting wing cores is to have a flawless edge to the template, as the slightest nick will cause the wire to hang up and produce a ridge or hollow in the core. I use arborite - remember those builders? They chuck yards of it away too. Cut slightly oversize on a bandsaw and then sand to size. Washout is built into the cores by raising the trailing edge of the tip template 1/4" above the datum line drawn on the foam block. After cutting the cores, the wing tip is formed by

cutting a 45 degree angle at the tip as shown on the plan. Each tip has 1/4" of dihedral to obviate a droopy look, and this is put in by lightly sanding the root with a sanding block, with the tip raised 1/4".

A 3/16" balsa leading edge and a 3/16" sq. trailing edge are white glued in place and sanded to shape. Using cardboard, the wing is covered with one piece, wrapping round the L.E. Check the card for grain, which usually runs with the long side, though not always, in which case the card will tend to buckle at the L.E. Mark the borders of the core, rolling it over and around its leading edge. Mark a line to coincide with the centre of the L.E. and when using card, always start the gluing process at this point. In the

past, I have tried starting at the trailing edge and the results were disastrous when using wrap-around skins.

After applying latex type contact glue to the cores and skins, the core L.E. is put on the pencilled line and the core pressed down vertically to the skin. The skin is carefully pressed to the core on both sides, working about 1/2" of the cord at a time for the full length of the span. Continue slowly, allowing the unstuck part of the card to fall away from the core until the widest part of the chord is reached. Now put a piece of wax paper between each skin and the core. Lay the wing on a true bench surface and hold the T.E. on to the bench. Slowly

remove the upper wax paper, pressing the skin to the core for the full span, working about an inch of the chord at a time. Reverse the wing and repeat the procedure. This ensures that the rather thin T.E. of this wing will

remain straight.

The card is trimmed to the trailing edge and to the tips. The tips are covered with card and trimmed to the airfoil section. Light sanding of the card tip will result in a tight seam. Join the panels with epoxy and a 4" wide piece of fibreglass bandage. Cut the servo opening and fit the aileron control linkage. Ailerons are made from 3/16" sheet and covered with film. The card can be painted, or if it's the white "chromecoat" type, it can be varnished with a clear plastic such as varathane gloss. Trim can be applied under the wing with a low heat film prior to varnishing, and a prominent colour scheme is desirable for visibility in the air. As the T.E. is thin, use plenty of epoxy in the hinge slots and pin each hinge. Use four hinges per aileron.

Flying

The aileron and elevator throws indicated produce quite a hot aeroplane, so if in doubt, reduce them a bit initially or, if you have dual rates, set the low rate to about 70% of the full rate and use that for the initial flight. The balance point is 2. 3/4" behind the leading edge.

The Manxman takes off easily with a short run and makes no attempt to ground loop. Ground handling is good, even in windy conditions when tail draggers tend to "weathercock". When taxiing downwind in a breeze, hold full down elevator. Numerous axial rolls can be done without adding down when inverted. If you time the down well, it will roll 'for ever'. Loops are rapid, knife edge and inverted flight very steady. Landings are not touchy and the plane can be slowed to a low rate of knots without dropping a wing tip. Stall speed is quite low and the stall is gentle, with no snapping tendencies. Hopefully you will enjoy the Manxman. It is a lot of fun for a small outlay of cash and time. ●

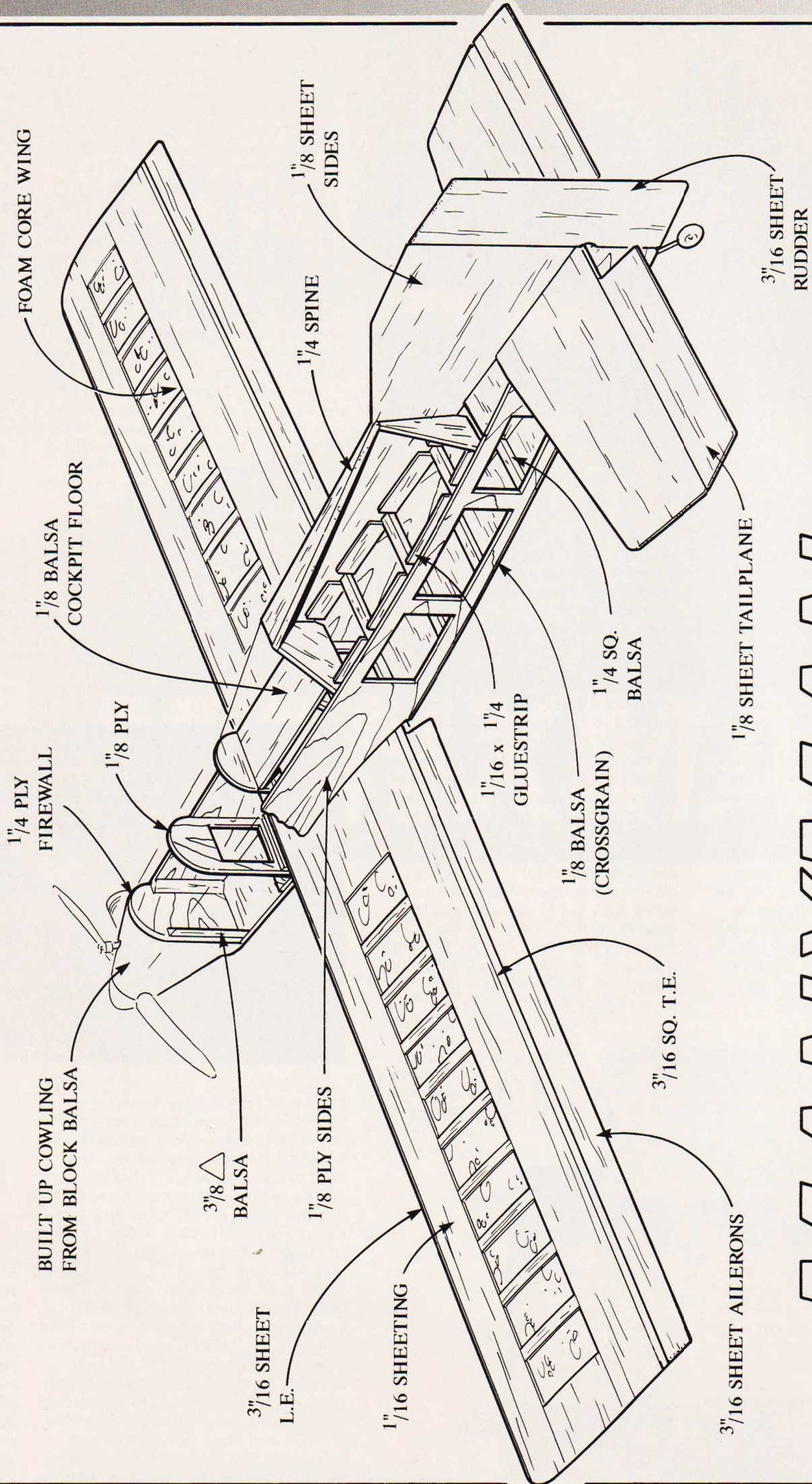
DATAFILE

Plan Specifications

Name.....	Manxman
Designed By.....	Frederick Knox
Aircraft Type.....	Low wing sport/aerobatics
Wingspan.....	49"
Wing Chord.....	9.1/4"
Wing Area.....	3.15 sq.ft.
Aerofoil.....	O/D
Dihedral At Each Tip.....	1/4"
Fuselage Length.....	37"
Tailplane Span.....	16"
Tailplane Section.....	Flat plate
Fin Height.....	8"
Engine Range.....	40 cu.ins.
Rec. Number of Channels.....	Four
Control Functions.....	Ailerons, elevator, rudder, throttle
C.G. (from L.E.).....	2.3/4"
Elevator Throws.....	+/- 3/8"
Aileron Throws.....	+/- 1/4"
Rudder Throws.....	+/- 1.1/4"
Sidethrust.....	None
Downthrust.....	None

Materials Used in Construction

Fuselage.....	Ply, balsa
Wing.....	Foam core, with obechi, balsa or card skins
Tail Surfaces.....	Balsa sheet



Designed By
DR. F. W. KNOX

MAXIMAN

A 49" SPAN LOW WING SPORTS MODEL FOR .40 ENGINES & 4 FUNCTION R/C