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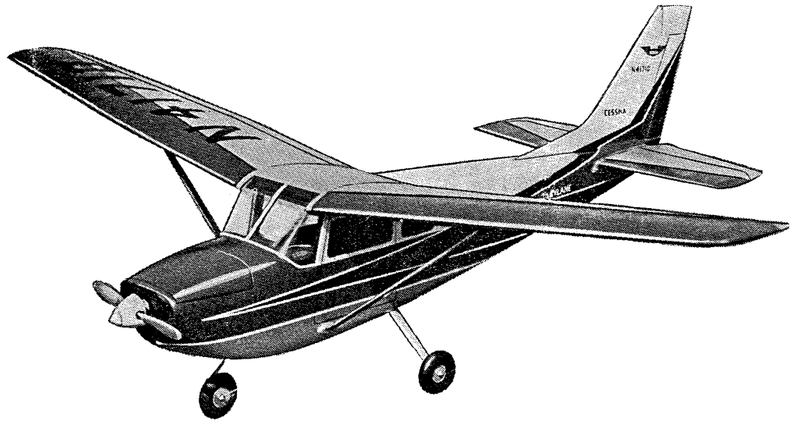

CESSNA "SKYLANE"

BUILDING INSTRUCTIONS

This graceful and modernistic American light aircraft, the CESSNA "SKYLANE" is an ideal subject for a 54" span model suitable both for radio control and free-flight. The "jet-age" type swept fin and streamlined decor makes a fascinating model as well as being a functional'y useful one with its commodious cabin and clean simple lines making for a robust yet easy form of structure.

Suitable for compact forms of beam mounted diesel and glow-plug motors of 1·49 to 3·5 c.c. (·099 to ·21 cu. ins.), 1·49 to 2 c.c. for free-flight and up to 3·5 c.c. with radio.

The design permits rudder, elevator and engine speed control with both single channel and "light" multi units. By "light" multi we mean maximum four channels (but possibly six with "relayless" receivers), dependant upon power used and experience.

For single channel we suggest R.E.P. "Mini-Reptone" (complete with actuator) or R.E.P. "Unitone," E.D. "Black Arrow 1," "Ultraton," etc., with commercial actuators such as F. Rising "Compound," Elmic "Conquest," Bonner "Varicomp" (Type R.E.), Babcock Compound — all rubber driven, also the electric Cobb-Hobby "Micro-4."

With single channel radio receivers, 2 position engine speed control (with suitable butterfly operated carburettor or exhaust choke) can be obtained with certain actuators by a "quick-blip" of the signal key. An "F. Rising" 2-pawl clockwork actuator supplies the action, the wiring circuit being given with most compound actuators such as F. Rising, Varicomp, Babcock, Micro 4, etc.

"Up" elevator control is given with the Varicomp, Babcock, etc., by selecting the third position by use of a trip-elevator action (full details on the instruction sheets).

The Micro-4 actuator not only gives rudder and quick-blip engine speed control but full up and down elevator by selecting third and fourth position, but this is best sorted out by using a Cobb-Hobby Control Box.

For Light Multi-channel, we suggest the E.D. "Black Arrow 4" for rudder and progressive engine speed control with a "variable" carburettor, using E.D. "Duramatic" actuators (Bonner "Duramites" manufactured under license in U.K.). Also suitable is the R.E.P. 'Tritone' 3-channel unit using "Mini-Uniac" electric actuators.

Detailed installation of all possible radio, battery, actuator combinations is not feasible, but details of "Reptone" and "Ultraton" with Cobb-Hobby Micro-4 actuator are given for suggestion only.

Wiring circuits of all commercial units are given with the individual instruction leaflets. NO PARTS are provided in the kit for radio installation.

Simple tools are needed. Use "BRITFIX" Balsa Wood Cement or "BRITFIX 55" White P.V.A. Adhesive; BRITFIX Clear Shrinking Dopes and thinners, or for glow-plug motor powered models, "BRITFIX" Butyrate clear and coloured dopes. Use a VERON Balsa Knife; modelling pliers; 1/16", 5/32", 1/4" and 3/8" drills with wheel brace. Grease-proof paper to protect the plan; tissue paste and garnet paper, medium and fine. Also use of a soldering iron.

For free-flight models fit a large upright "M.S." graduated or round plastic tank or a 10, 15 or 30 c.c. Davies-Charlton Metal C/L Tank, dependant upon power used.

For radio, a Nylon or Polythene 3 oz. "Clunk" tank can be fitt'd across and under the beams, or for larger Diesel engines, an oblong 37 c.c. "M.S." clear plastic fuel tank (not suitable for "glow" fuel).

The simple sequence of assembly is pictorially laid out in a diag.ammatic sheet, which if followed carefully with the corresponding paragraphs in these instructions will facilitate building. As it is assumed no novices will be building this model, the instructions are a précis guide to sequence only with unnecessary detail cut to a minimum.

1. BASIC LONGERON LAYOUT

1/16" (4·5 m.m.) pre-cut lower main longerons are checked over plan for accuracy, slots marked and cut for cross-pieces. Check also they match with 1/16" (1·5 m.m.) ply doublers.

Lay grease-proof paper over plan side view. Pin lower main longeron in place. Pin in place main 1/16" × 1/16" (4·5 × 4·5 m.m.) longerons.

2. ADDITION OF VERTICALS

Double coat all joints with adhesive. Apply first coat to surfaces, allow to dry, apply second coat and join. Add all verticals of 1/16" × 1/16" (4·5 × 4·5 m.m.). Basic structure is outlined over plan with heavier lines. Add gussets. Build two sides.

3. ADDITION OF PLY LONGERONS

Lower ply longerons are laminated to balsa longerons. NOTE — only starboard side is laminated OVER plan and 1/16" × 1/16" (4·5 × 4·5 m.m.) vertical doublers added. Port side must be raised and reversed before adding ply longeron and doublers.

4. LAMINATION OF BALSA AND PLY FORMERS

Die-cut 1/16" (1·5 m.m.) ply formers F.1 and F.2 are laminated to pre-cut 3/4" (6 m.m.) balsa formers. Trim balsa edges all round. Step and chamfer lower edge of F.1. See Diagram 4. Cut holes for beams.

Laminate 1/16" ply × 5 1/4" × 2" (1·5 × 134 × 51 m.m.) to rear of F.1 (See Diagram 4 and plan) with matching cut-outs.

Lay F.1 under plan; pin prick location of holes for binding nosewheel strut. Drill 1/16" (1·5 m.m.) holes through complete laminated formers. DO NOT locate wire nosewheel strut.

5. ASSEMBLY OF F.1 AND F.2 WITH SIDES

Liberally coat all jointing edges with cement. Locate formers F.1 and F.2 temporarily pinning to secure. Check for squareness over plan.

6. ADDITION OF CABIN CROSS-PIECES

Cut top cabin cross-pieces of 3/16" × 3/16" (4·5 × 4·5 m.m.) to lengths indicated in plan top view. Note lamination and "stepping" where joining longerons. Draw tail-bay longerons together, securing with clothes peg. Insert remaining cross-pieces top and bottom. Add top cabin longeron doublers on top and inside edges as indicated on plan.

At all times check for squareness and warps.

7. ASSEMBLY OF TAIL BAY

Add all cross-pieces and gussets for 1/8" (3 m.m.) round dowels.

8. SHEET SIDES

Cement on sides pre-cut 1/16" (1·5 m.m.) balsa sheet with top edge of lower side sheeting level with centre-line of middle longeron — thus permitting later joining of ply window frames.

9. REAR SIDE SHEETING

Add rear side sheeting to tail bay. Drill 1/8" holes and secure 1/8" (3 m.m.) dowels. Add two 14" (356 m.m.) tapered blocks, 1/4" (6 m.m.) deep at front, 3/4" (19 m.m.) at rear, to top rear of fuselage level with outer sheeting at centres to permit sanding to curve of fuselage longerons.

10. TOP SHEETING

Add 3/16" × 1/16" (4·5 × 4·5 m.m.) cross-piece at rear, 1/16" (1·5 m.m.) lower than rear end. Cut and trim tapered length of 1/16" (1·5 m.m.) sheet to fit inside and level with top edge of blocks.

11. NOSE WHEEL STRUT

Using waxed carpet thread (No. 18's) bind nose wheel strut wire to REAR face of F.1. AT LEAST FIVE LOOPS OF DOUBLED THREAD PER PAIR OF HOLES — coat with cement.

Cut two exhaust louvres through lower engine nacelle block as in diagram 11 and plan.

12. NOSE ASSEMBLY

Rub cement on to beams where jointing will occur with F.1 and F.2. Firmly locate. Add two side blocks (filling end grain with cement) against F.1. Check for squareness by temporary location of lower nacelle block. Drill two holes through 1/4" (6 m.m.) ply cowl, locate engine then check position of ply cowl and pin or screw into ends of beams — DO NOT CEMENT YET.

Whilst locating engine, mark four securing holes and drill 1/8" (4 m.m.) for 6 B.A. securing bolts.

Note "down" and "side" thrust on plan.

Cut 1/8" (4 m.m.) sheet supplied in strips and plank in top of nose bay between F.1 and F.2.

13. FURTHER NOSE ASSEMBLY

Cement in place two triangular balsa blocks in location permitting trimming of front face level with bearers and side blocks.

14. LOWER NOSE COWLING

Either spot cement or pin lower cowl in place. Carve and sand lower surfaces of cowl to streamline with front ply cowl, see Diagram 14. Enlarge hole to suit engine used.

15. TOP COWL

Locate top pre-shaped cowl, carve and sand to continuity with side and front. Sand round the edges of front ply cowl. Make two locating pegs of 1/4" (6 m.m.) dowel for top cowl which may be secured either by press studs sewn into ply reinforced strips or "Terry" clip engaged with stump of 3/8" or 1/2" (9 or 13 m.m.) dowel pinned and cemented between the beams (not supplied).

16. MAIN UNDERCARRIAGE

Laminate two pieces of 4 3/4" × 2 1/4" × 1/16" ply (121 × 57 × 1·5 m.m.) either side of 1/16" balsa 4 3/8" × 2 1/4" (4·5 × 112 × 57 m.m.). Locate wire strut, mark and drill 1/16" (1·5 m.m.) holes — see full size plan. Sew strut into place with carpet thread, five loops of doubled waxed thread per pair of holes.

With fuselage inverted, locate undercarriage supporting plate, trimming edges of ply to fit accurately down vertical 1/16" × 1/16" (4·5 × 4·5 m.m.) doublers. Add strengthening corner gussets of 1/16" (4·5 m.m.) balsa.

17. WINDSHIELD

Before adding windshield and cabin sides, paint all cabin struts and interior dark green or grey. Bend to shape 16 s.w.g. wire windshield brace — see plan top view. Point the ends by grinding.

Cut grooves in top cabin longerons at angle given in fuselage side view. Cement wire brace in place. If desired bind with thread to secure. Lay celluloid supplied OVER pattern on plan, cut out front windshield. Bend carefully at top edges to fit brace, cement in place, adhering to wire with rim of cement, roughen edges of celluloid when joining to wood.

18. CABIN SIDES

Use routed 1/32" (·8 m.m.) ply cabin sides to cut outline of matched celluloid sides. Where celluloid will join wood, roughen with garnet. Attach cabin sides (see Diagram 18). Only when set overnight, drill two 1/16" (4·5 m.m.) holes (see side view) for wing securing dowels, which cement in place. Make with notched ends to prevent bands slipping.

Having completed cabin, add underside 1/8" (3 m.m.) balsa cross-grained sheeting.

When completely set, lower edges of fuselage may be carefully trimmed to give a rounded section — see main plan — cutting across the diagonal of the main longerons and well rounding the lower corners of F.1 and F.2 to continuity of cowling. Similarly, carve and sand two top edge blocks to section shown. Sand all side sheeting.

19. FIN AND RUDDER

Mark 3/16" (4·5 m.m.) rib positions on front and rear 3/16" × 3/4" (4·5 × 19 m.m.) outline members of fin. Cut out slots and pin over plan (above greaseproof paper). Construct fin as shown.

For free flight models, add rudder. Sand whole fin to streamline. For radio, rudder is sewn in place ("herring-bone" stitch) using Terylene thread. Cement two 8 1/2" (216 m.m.) tapered blocks to lower edge of fin, cutting out slot to fit over 3/16" tailplane. Carve blocks to continuity with fuselage. Add only after covering, checking for uprightness.

20. TAILPLANE

Similarly mark and cut slots for 3/16" (4·5 m.m.) ribs on pre-cut leading and trailing edge of tailplane, also centre rib of 3/16" × 3/4" (4·5 × 19 m.m.). Pin over plan, add tips and all ribs and gussets. DO NOT remove from building board until completely set. Add strips of 1/16" × 1/16" (2·5 × 2·5 m.m.) balsa to both top and bottom surfaces and when set, sand in camber including nose and trailing edge to streamline.

DO NOT join fin and tailplane until after covering, but check fits over tail-bay.

21. WINGS

Cut 3/4" (19 m.m.) trailing edge supplied into appropriate lengths. Build left and right hand panels separately over plan. Scarf-joint trailing edges. Mark and cut rib slots. Partially cut leading edge on back as indicated, fill cut with cement and carefully bend to angle on plan. Strengthen bends with 1/16" (1·5 m.m.) ply gussets 3 3/4" × 3/8" (95 × 16 m.m.) chamfered in.

Pin in place trailing edges and lower 1/16" × 1/16" (4·5 × 4·5 m.m.) spars. Add ribs R.2 to R.10. Then add top spars, then slot leading edge on to ribs, supporting on 1/16" (1·5 m.m.) packing pieces whilst setting.

22. CENTRE SECTION

Chamfer underside of main spars to angle created when tip ribs R.10 are supported on 3" (75 m.m.) blocks to give dihedral. Join with large ply gusset, adding chamfered lengths of 1/16" × 1/16" (4·5 × 4·5 m.m.) between location of outer ribs C.S.1. See Diagram 22 and plan section.

23. CENTRE SECTION LEADING EDGE

Add balsa blocks to leading edge, 2 1/8" × 3/4" × 3/8" (54 × 19 × 9·5 m.m.), chamfering to contour of rib R.2 to permit flush fitting of 1/16" (1·5 m.m.) sheeting with leading edge. Make up leading edge joining-gusset of 1/16" ply (1·5 m.m.) over plan with 3/16" × 1/16" (4·5 × 4·5 m.m.) chamfered strips. Cement in place to leading edge blocks over plan checking for squareness of centre section. Add 1/16" (1·5 m.m.) gussets to butt-joints of trailing edge. Add front and rear parts of centre section ribs C.S.1, laminating outer set as shown.

24. CENTRE SECTION SHEETING

Add all 1/16" (4·5 m.m.) gussets and make slots for front securing bands through wing from 1/16" (4·5 m.m.) sheet supplied. Add leading edge sheeting 1/16" (1·5 m.m) as per section on plan. Also above centre section out to R.2 on top surface only and between centre section ribs C.S.1 on lower surface only. Finally, add tip blocks, carve and sand to streamline.

25. STRUTS

Wing struts are made of two 12" (305 m.m.) lengths of 16 s.w.g. wire with ends ground to points, bent and soldered into size "O" dress fasteners. Opposite parts of fasteners are sewn to triangular 1/16" (1·5 m.m.) ply off-cuts from die-cut sheet cemented to underside of wing spar adjacent to outer rib R.3. Lower end fastenings are sewn through lower longeron (use Terylene thread) with scrap balsa fairing. See plan side view. Size "O" fasteners not supplied.

Wire struts are streamlined with 3/4" (13 m.m.) sanded trailing edge bound on with doped tissue. Struts can easily be knocked off upon impact and facilitates wing removal.

26. WHEELS

Wheels are secured by soldered washers or commercial collets. Check for free running and lubricate. Front strut on prototype is "doubled" with a front wheel fork — this can be simulated by soldering on brass tube, but is not recommended. Main struts are faired with lengths of 5/8" (16 m.m.) balsa trailing edge section bound on with doped tissue after tapering and streamlining.

27. COVERING AND FINISHING

Cover all flying surfaces with "Modelspan" or Nylon as desired. Fin and tailplane are covered before being joined. ALL wooden surfaces (fuselage, etc.) are best covered with tissue or nylon, adhered with dope and banana oil mixed and sufficient coats applied — sanding between coats — to impart a gloss to the wood. Thoroughly proof the engine bay. If using a diesel, a mixture of dope and banana oil with top coat of "Aero-glas" fuel proofer. If using "glow" motors, apply "Butyrate" dopes all over (no banana oil) and only "Butyrate" coloured dopes.

An ideal colour scheme can be gleaned from the box lid. Silver wings, stabilizer and fuselage underside, red nose continuing along fuselage with red leading edges to wing and stabilizer, maroon flash along fuselage and up fin, white fin leading edge and rear top fuselage. Wing letters black. There are, however, many varieties of schemes and colours with prototypes.

Flight trimming tabs are thoroughly recommended. Cut off tabs where indicated on wing tips, elevators and rudder — attach with strip metal hinges supplied cut to size. THESE TABS ARE ALSO RECOMMENDED FOR RADIO MODELS ON ALL MOVEABLE SURFACES.

Wings are secured with two or more 6" (152 m.m.) rubber bands each side — feed with wire hook through wing slots. Tailplane is secured with two or more 3" (76 m.m.) bands.

28. ENGINE MOUNTING

Inverted engines are secured by lugs to underside of beams using 6 B.A. bolts with lock wires soldered through their head slots to prevent turning. Bolt heads are to underside with double lock nuts on top of beams. To remove engine, undo nuts, push bolts downwards and slide engine forwards and outwards.

NOTE. With bigger engines it is suggested that lower front of undercowling be grooved or even removed to permit fitting of diesel head.

The front ply cowl must be cemented in place after fitting engine to stabilize the beams. Removal is always easy by parting with a sharp balsa knife. The lower cowl block is cemented firmly in place.

A useful accessory with smaller engines is a piece of paxolin tubing 3/8" (9 m.m.) in diameter with a slotted end to fit over the vernier for adjustment of compression from the underside.

For those who wish, the engine may be mounted upright and a hole cut in the upper cowl — remember to mount with lugs UNDER the beams.

29. RADIO INSTALLATION AND OPERATION

Many combinations of transmitter, receiver and actuator are possible as well as those recommended in the introduction.

It will be understood that this is not a full "multi" model, but is large enough in internal capacity, wing area and loading to carry several intended fully transistorised light multi-channel units that will occur in the future.

Various "compound" actuators (rubber driven) have different transmission systems, rotary, torque and "push-pull" linkage as in Diagram 25, illustrations A, B and C. Compound actuators usually have vibration-proof ratchet governors and are recommended.

Actuators can be mounted on a 1/16" (1·5 m.m.) ply bulkhead across fuselage under trailing edge of wing. Rubber motors for actuators can be taken rearwards and access to winding loops made through a removable ply panel set under the tail bay, with an "S" hook on to a lower cross-piece.

For those requiring a Dural control horn as in Diagram 26c, one is supplied for rudder. Extra ones for elevators can be obtained from the manufacturers or your local dealer. Attach to rudders against 1/32" (·8 m.m.) ply backing with a short 6 B.A. bolt.

Compound actuators usually have "left" and "right" rudder selection with "flip-up" elevator and "quick-blip" engine control contacts. Most of these units have their own full installation, wiring and operation instruction leaflets.

Diagram 26 shows coupling system for push-pull rods (as applied to "REPTONE"). **NOTE —** The "throw" of the actuator arm on the "REPTONE" is rather too great for rudder operation on the "SKYLANE." Unscrew the nut securing the arm and drill a new hole in the middle of the arm to reduce the "throw" by half. Further adjustments may then be made to rudder movement at the rudder coupling.

In Diagram 27 will be seen a "yoke" system made of piano wire (18 s.w.g.) to reverse the action so that rubber drive and torque rod are both to the rear with compound actuators such as "MINI-REPTONE" and F. Rising.

Mounting of radio receivers, battery packs, etc., can best be made with Foam Plastic either cut from block or laminated from sheet with "CONTACT" adhesive. Batteries should always be hard against bulkhead F.2. The receiver unit can then be located in mid-cabin in front of the under-carriage bulkhead — see Diagram 27.

Foam plastic is resilient enough to prevent damage during impact but not resilient enough to cut out vibration if the unit is TOO TIGHTLY PACKED. The unit should be FREE ENOUGH TO SLIP OUT IF THE MODEL IS INVERTED BUT CLOSE ENOUGH TO PREVENT FORE AND AFT MOVEMENT WITH "REPTONE." A "lid" of foam plastic can be placed over the compartment to secure batteries and unit itself. Alternatively use "DUNLOPILLO."

Diagram 27 also shows installation of receivers such as "Ultraton" with Cobb-Hobby Micro-4. The drawing is self explanatory.

Also shown is the 16 s.w.g. wire torque bar linkage of two elevators through an aperture in the fin base. This wire is not supplied. No details are given to elevator operation, for where compound actuators permitting this are fitted, suggested linkages are given with the instruction sheets (Varicomp, etc.).

Engine cut-out or two speed control can be obtained through a "F. Rising" Clockwork 2 Pawl Actuator fitted behind bulkhead F.2, connected to the carburettor movement by wire running through brass or plastic tube through F.1 and F.2. Remember to fit "winding-face" up to permit access with key from inside cabin.

"Deac" cells may be built in permanently between formers F.1 and F.2, with access plugs underneath for re-charging, where possible to use them with "Ultraton," etc. Place "on-off" switch on port side of fuselage (starboard side if left handed). Solder snap fasteners to battery leads for ease of battery replacements, use multi-flex, not single strand, for all radio wiring.

30. FLIGHT TRIM

Correct balance is essential. The model should hang slightly nose down when supported under the C.G. balance point marked on the plan.

Balance with all radio and batteries in position adding ballast to nose or tail as required. Glide test thoroughly in quiet conditions, using tailplane packing only for incidence corrections, under leading edge if model tends to stall, under trailing edge if model tends to dive.

IT IS RECOMMENDED THAT MODEL BE GLIDE TESTED AND INITIALLY GIVEN SHORT TEST HOPS ON LOW POWER WITH RADIO RECEIVER REPLACED BY EQUIVALENT BALLAST. LOCK RUDDER AND OTHER CONTROLS. USE LIMITED FUEL FOR SHORT RUN. USE TABS FOR TRIMMING. ADJUST ENGINE THRUST LINE FOR COUNTER TORQUE AND DOWN-THRUST.

It is therefore assumed that modellists building the "SKYLANE" should not be novices to powered flight, so further flight trim details would be superfluous. The model has few vices, tracks well on take-off with the tricycle undercarriage, lifting its nose and "unsticking" on reasonable surfaces without difficulty. Its glide with average loadings, very flat but not unduly fast. A "flip-up" elevator for landing is all that is needed for perfect flight characteristics. The model should have sufficient motor offset to counteract torque to give straight, normal flight, so that rudder gives equal reaction left and right. Make all first flights on slightly reduced power.

The "SKYLANE" equipped with average 1·49 c.c. (·099 cu. ins.) motor weighs 42 ozs. Radio equipment, including batteries, can be carried up to 20 ozs. with 3·5 c.c. (·21 cu. ins.). It will be realised that this will make a fast high loaded model at a fraction under 4 lbs. 10 ozs. of lightweight single channel radio, including batteries, can be carried with impunity with up to 2·5 c.c. motors.

Let us know how you progress with your model. We are always pleased to hear of your successful models and see photographs — anywhere in the world.

Henbest, Bournemouth