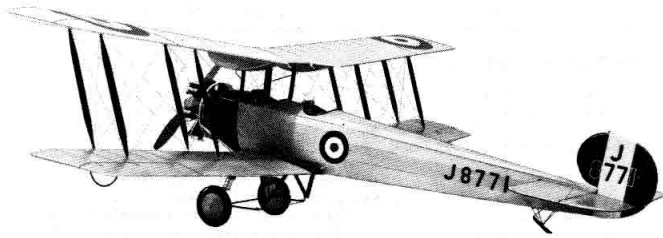


# VERON

## AVRO 504 N



### BUILDING INSTRUCTIONS

Produced during the 1914-18 Great War for the R.F.C. initially as a Scout-Fighter, this immortal 2-Seat Biplane earned a niche in the annals of Service and Civil Flying as one of the best loved Training and Sport flyers ever, culminating in this, the last and most famous form - the 'N', powered by the Armstrong-Siddeley "Lynx" of 180 H.P.

Such is the design and stability of the prototype that this model has a faithful scale outline without any engrossment of tail surfaces and has proved to be completely stable and controllable with just rudder and elevator with engine speed on 3 Channel radio control. For powering with Diesel or Glow-motors of .23 up to .36 cu. ins. (3.8 to 6.0 c.c.), the prototype model flew well on a "29" proving to be completely versatile. The all up weight proved to be 5 lbs. 8ozs. (2.495 kgs.), including ballast (less fuel) and 3 Channel Radio with 225 Deac, (894 sq. ins. (57.65 dms.) of wing area - 14 ozs. per sq.ft.loading.

Both wings on the model are fully cantilever and the box form of the wire braced centre section structure is amazingly rigid, so firmly securing the top wings with rubber bands greatly reduces any impact damage

Simple modelling tools are needed. Bead-headed modelling pins; White P.V.A. woodworking adhesive; Epoxy Glue; Polystyrene Glue; Banana Oil (non-shrink cellulose); Clear Shrinking Dope and Colour Dopes or Enamels (Silver and Black) sprayed or brushed on; Also Matt Hot-fuel proofer. Modelling pliers, round-nose pliers, 1/16" (1.5 mm) 3/32" (2.5 mm) and 3/16" (4.8 mm) drills with wheel-brace. Grease-proof paper to cover plan whilst building. Tissue-paste for covering; Garnet paper (medium and fine). 5, 15 and 30 amp fuse-wire for binding wire-struts on centre-section and undercarriage. Also use of soldering iron. Carpet thread for binding. Commercial control cable and links may be preferred to the 1/4" sq. (6.4 mm) balsa actuator rods provided. Recommended tank is a 4 oz Veron Clunk Tank. Items marked "N.S." in instructions are not supplied.

A good flat building board is essential. The general sequence of assembly is laid out in the following instructions and these, coupled with the numbered diagrams on the plan and photo-sheets will facilitate construction.

Study the plan and these instructions carefully before commencing and so familiarize yourself with the complete sequence of assembly. Note that numbers in brackets after "inch" dimensions are decimal millimetres. Identify (and mark) all semi-circular formers on 3/32" (2.5) die-cut balsa sheet from layout on Data sheet.

#### 1. FUSELAGE SIDES Fig. 1

Separate 2 plywood die-cut fuselage laminates. Glue on top longerons of 1/4" x 1/4" (6.4), also lower balsa laminates of 1/4" x 1 1/2" x 14" (6.4 x 31.7 x 356). Cut, trim and fit vertical laminations of 1/4" x 3" wide (6.4 x 76.2) sheet. Ensure that you do create a pair, left and right, and that slots for hardwood uprights of 1/4" x 1/2" (6.4 x 12.7) are a close fit. Cut out top 1/4" x 1/4" slots - ply laminate acts as a template - also cut out saddle area for lower wing, Fig. 2. Note that edges rearwards of top and bottom slots are cut away as a slot for joining on extensions of 1/4" x 1/4" (6.4) longerons. Build on rear longeron structure with verticals and diagonal braces. Note incidence of tail platform, parallel to upper longerons. See Photo No.1

#### 2. FUSELAGE ASSEMBLY Fig.3

Cut series of 5 equal lengths 1/4" x 1/4" (6.4) crosspieces to join two fuselage halves. Set in one side, glued, and checked for squareness. When dry, join two fuselage halves together with front bulkhead of 1/4" x 3 1/2" x 3 1/2" (6.4 x 88.9 x 88.9). Draw longerons together at rear, gluing and binding with thread. Add remaining crosspieces top and bottom. Photos. No.3 and 5. Check over plan for symmetry and squareness.

#### 3. FRONT BULKHEAD Fig. 4 and 5

Lay die-cut 1/16" (1.5) ply former over plan and by means of extension lines, mark on position of rectangular balsa former. Register and glue firmly to fuselage front as in Fig. 4. Cut slots through balsa for beams and gussets. See Photo. 4.

#### 4. CENTRE SECTION CABANE STRUTS Figs. 3, 4 and 6

Four pre-bent 12 s.w.g. wire struts are sorted - two longer at front, two shorter at rear, each left and right handed. Cut nicks at bottom ends of slotted hardwood beams, epoxy glue wire struts in place and bind with carpet thread. Note binding is located so as to be within cut-outs on die-cut ply fuselage laminates. Coat binding with epoxy glue. Now epoxy into slots in fuselage as in Fig. 4 and Photo Nos, 2, 3 and 5.

#### 5. MOTOR BEAMS Fig. 12

Laminate firmly with P.V.A. Glue two 3" (76.2) lengths of 1/2" x 3/8" (12.7 x 9.5) hardwood to main 6" (152.4) beams. Push into place through rear of front bulkhead to check their fit. If satisfied, glue very firmly in place, using angled die-cut plywood gussets to set the built-in down thrust - see nose side view and Photos 4 and 6.

#### 6. MOTOR MOUNT Fig. 12

2.

Check cut-out in 1/4" ply (6.4) mount to suit intended motor. It is suggested that bolt holes be drilled. Glue mount firmly to beams and against ply bulkhead. Photos. No. 4, 6 and 7.

#### 7. TANK LOCATION (See Sketch on Data Sheet)

It is best decided at this point of construction what tank is to be fitted. The prototype model had a 4 oz Veron Rectangular Nylon Clunk Tank and this just fits between the beams aft of the die-cut hole for the neck, resting on a ply platform glued to underside of beams, ply supplied - 1/16" x 3" x 3 1/2" (1.5 x 76.2 x 85.7). The tank may be pushed into place under the 1/4" x 1/4" (6.4) balsa crosspiece supporting the second half-former T.1. - see diagram on special sheet - and packed in place with foam. Alternative tank shown is a 6 oz. Note leads of Silicone tubing to engine carburettor, filler and vent through A.B.S. cowl.

#### 8. CABANE STRUT DIAGONAL BRACES Fig. 6

Having completed access to tank location, cut, shape and bend 18 swg wire crossbraces for sides and front only. TOUCH-SOLDER ONLY at tops. Bend accurately to shape two top supports of 12 s.w.g. x 6 1/2" (159), touch solder these in place, then bind with fuse wire both top supports and diagonal wires to make one neat joint. It will help to wrap fusewire around intersections of diagonal 18 s.w.g. wires and touch with solder. The completed structure may be seen in Fig. 6 and Photo. 6. Use 15 amp. fuse-wire for top and bottom binding.

#### 9. FUSELAGE TOP COWLING

Semi-circular formers T.1. may now be erected above cross-braces. Note extra cross-piece between top longerons in front of forward cabane struts - it is not slotted in but supports second T.1. This simplifies top sheeting around cabane struts. Rear T.1 is laminated with T.2. Then rear formers T.3,4,5 & 6. Join edge-to-edge two 12" lengths (305) of 1/16" x 3" sheet (1.5 x 76.2 x 305) Straight grained balsa. Dampen to roll and by test and trimming, cover top formers from side to side. It may be found best to cover in stages - former to former under cabane area. Photos 7 and 8.

#### 10. FUSELAGE SIDE FORMERS Fig. 7 and Photo 8.

Length of 1" x 1/4" (25.4 x 6.4) tapered section is glued along lower fuselage side, top edge level with edge of longitudinal lamination on inside face of ply (i.e. - 1 1/2" (30.2) from bottom edge at front - See Fig. 7.)

Semi-circular side formers X, Y and four Z's are added each side. Sheet over between 'X' and angled 'Y'. Add all remaining lengthwise stringers as shown - 3/32" x 3/16" (2.5 x 4.8), to top and sides. Again cut out lower wing saddle area.

#### 11. UNDERSIDE NOSE BLOCK

Tapered block, 3 1/2" x 2 1/2" x 1 1/2" (85.7 x 69.8 x 31.7) is now fitted and glued under nose and front nose former - shaded area on plan. When dry, lower front edges may be trimmed and sanded to conform to rounded lower edge of ply nose-former, and eventually to accurate contour of moulded A.B.S. Cowl.

A smaller tapered block is added to underside of rounded lower cowl, 1 1/2" (38.1) wide of 1/2" x 1 1/2" (12.7 x 38.1).

#### 12. A.B.S. NOSE-COWL (REAR PART) Fig. 8

The tapered cowl has its rear flash carefully cut and trimmed away so that it conforms exactly to the contour of the front plywood bulkhead, against which it butts - it DOES NOT fit over it. Four hardwood blocks 1/2" x 1/2" x 1/2" (12.7) are glued top, bottom and each side of ply-bulkhead, their edges chamfered to permit close fitting of cowl. Before this can be done however, a shaped slot must be carefully cut in front of the cowl for close fit over the beams and motor platform - so to facilitate marking out this cut-out, a die-cut ply pattern is provided of the cross-section of the beams and platform around which a pencil line may be drawn on the A.B.S., BUT NOTE ITS' LOCATION CAREFULLY IN RELATION (ABOVE-CENTRE) TO THE CENTRE POINT OF THE COWL. The shape of the cut out is shown as the inner dotted line in FIG. 8. NOTE ALSO THAT LOWER SIDE EDGES OF BEAMS NEED TO BE CHAMFERED SO THAT FRONT FACE OF A.B.S. COWL WILL NOT NEED TO BE CUT AWAY TOO NEAR THE EDGE OF ITS' FRONT PERIPHERY.

Two semi-circular formers of 1/4" ply (6.4) are supplied for re-inforcing top and bottom inner front surface of rear cowl. Pret out to create clearances for fuel tubing from tank etc. Roughen the inner edges of the cowl and glue in the ply USING BALSA CEMENT ONLY - DO NOT USE EPOXY (ON ANY A.B.S. JOINTS). These ply re-inforcings are seen quite clearly in Fig. 8. They also provide anchorage for three screws securing A.B.S. engine crankcase - also shown in Fig. 8.

#### 13. A.B.S. FRONT COWL (ENGINE CRANKCASE) ALSO Fig. 8

This is designed to fit closely over the front rim of the rear cowl and to be secured (for easy access and removal) by three wood screws. The cowl is large enough inside, when provided with cut-out, to house any engines up to .36 cu. ins. (6 c.c.) Cut-out should be made to a minimum just clear enough from any part of the engine and silencer to prevent touching, and can be slipped over the engine when in position - silencer usually bolted on afterwards.

#### 14. DUMMY ENGINE Fig. 9

Seven flats are provided on front crankcase for seven cylinders - only six are supplied in kit. Use ONLY Polystyrene glue for assembling cylinders with rocker caps and push-rods. Sand pieces of balsa dowel supplied to permit tight push fit into cylinders. Glue balsa dowel to A.B.S. with Balsa Cement, and when set, locate cylinders on dowel with Polystyrene cement.

Depending upon engine and type of silencer used, normally only five cylinders can be fitted. Collector ring and exhaust pipes ARE NOT SUPPLIED, but are optional detail - see Data Sheet, their locations as hatched lines are shown for location only. Ensure that front opening in engine crankcase is central with crankshaft and is the smallest hole deemed necessary for the driving collet clearance. Best seen in Photo No.17.

15. MAIN UNDERCARRIAGE Fig. 10, and Data Sheet

Pre-bent 12 s.w.g. Wires are provided. Please note that bends are jig located, but angles may need slight adjustment. Photo 13 and diagram sheet explains assembly of strutting, joins bound with 15 amp. fuse wire and soldered. See Photos No. 13 and 14.

NOTE - Photo 13 shows undercarriage structure assembled WITHOUT the oleo-struts detailed on separate data sheet.

Oleo-struts on front legs are created by drilling three equi-distant holes in laminated die-cut oval ply plates threaded onto front strut (BEFORE soldering to the remaining structure) with 16 s.w.g. wire side struts with rolled gummed paper tape, or robust paper strips (NS) rolled and glued onto wires to create the correct diameter oleo-struts. Alternatively, split balsa dowel (NS) grooved and sandwiched around wires and sealed with gummed paper tape. Rear struts are faired with balsa in rolled gummed tape.

Top crossbar of front strut is now epoxied into slot in 1/4" x 1/2" (6.4 x 12.7) hardwood crosspiece, and firmly bound with carpet thread, itself coated with epoxy. Crosspiece is then glued firmly across fuselage. When dry, epoxy may be cracked to permit undercart to swing out of way for positioning lower wing. Rear triangular struts only rest in slots in hardwood and are secured by rubber bands retaining wing - see plan side view and Photo 14.

Wheels are retained by soldered circlips of 30 amp. fuse-wire, or commercial collets (NS).

16. TAIL SKID Fig. 11

Sketch shows 18 s.w.g. wire structure is bent to shape - two side pieces with centre extension forming skid. All five ends pass through die-cut ply plate into longerons - drill holes using 18 s.w.g. wire drill Epoxy glue into place. Skid is strip of spare ply bound on with thread and glued.

17. WINGS Figs. 13 and 14

Make two halves of top wing first directly over the plan. This wing has the shorter leading edges at the centre (in the kit, both top and bottom wings have leading edges supplied same length, both slotted for ribs, so trim as required).

Building sequence of both wings is:- trailing edge sheet, trailing edges, rear lower spars, ribs, leading edges (ensuring that all ribs are set centrally in slots in shaped leading edge to permit sheeting above and below, then top front spars - with extensions into centre-section, and top rear spar. Add 3/16" (4.8) tip sheets against outer ribs and between leading and trailing edges, with triangular scrap gussets, Fig. 16. Allow to set, remove from the board, add between-spar blocks (extending into the centre-section) Fig. 17, 3/8" x 1/2" (9.5 x 12.7) at front and 1/4" x 3/8" (6.4 x 9.5) at rear. Spar blocks have their edges chamfered slightly to allow for angles of top and bottom spars. When set, chamfer under-side of bottom spar extensions so that each wing root rests flat on building board (tips supported on blocks 2 1/2" (57.1) to give dihedral each side.) Join the wing halves with die-cut plywood dihedral gussets at main spar, rear spar and trailing edge. Add cut and laminated ribs between gussets. Deep-section shaped leading edges are added, Fig. 18, to front of main spar and two lengths neatly angled and butt-jointed between this and outer leading edges. At rear spar, a piece of normal section leading edge is added, outer diagonals being laminated with 3/16" (4.8) sheet 5/8" (15.9) wide, trimmed and sanded to contour, Fig. 22.

Use die-cut ply template to shape the wing tips. Lower wing construction is precisely the same, except that leading and trailing edges of centre-section are built in as per plan - See Fig. 13. Photos Nos. 10 and 11 show construction.

Only at this stage should leading-edge sheeting be added with individual sides pinned firmly to the building board. NOTE that sheeting should ONLY be added to top of upper wing and underside of lower wing before adding interplane strut clips - and then adding the remaining top or underside sheeting, See Fig. 14. Finally, sand all surfaces and edges. Note on Photo No. 11 that scrap plywood plates are glued to underside rear edges of lower wing at the centre-section trailing edge to strengthen against tension of rubber bands.

16. CLIPS FOR INTERPLANE STRUTS Fig. 15

Clips are made of 20 s.w.g. wire, left and right handed, bound to small scrap ply plates (from die-cut sheets) and secured by blocking in with 3/16" (4.8) balsa riblets (cut using ply template) for front clips. Top should only be 1/4" (6.4) long. Small slots should be cut in top or underside sheeting when applying to pass over the clips, so ensure that clips are protruding above (or below) the rib edges sufficiently to clear the eventual top (or bottom) sheeting by 1/16" (1.5) to allow positioning of interplane struts.

17. LOWER WING UNDERCARRIAGE SUPPORTS Fig. 13

Slotted hardwoods, 1/4" x 1/2" (6.4 x 12.7) are set into slots neatly cut into underside of centre-section ribs as in Fig. 13. Front one is glued hard against the front blocked-in spar; rear one located as shown, and in Photo 11.

Centre section of both top and bottom wings are sheeted with 3/32" (2.5) cross-grained balsa SET LEVEL with edge of ribs, top and bottom surfaces - see plan and also Photo 11.

18. TAILPLANE, ELEVATORS AND RUDDER Fig. 19

Sequence of assembly is:- 1/16" leading edge sheet, with 3/16" x 3/16" (4.8) laminated along it's front edge. Laminate rear spar 1/8" x 1/4" (3.2 x 6.4) and 1/8" x 3/16" (3.2 x 4.8) - see cross section of tail - erected on it's edge. Add ribs of 1/16" x 3/16" (1.5 x 4.8) with end outline pieces of 3/16" x 1/2" (4.8 x 12.7) with scrap corner gussets. Centre ribs are laminated 3/16" x 3/16" (4.8) sheeted over with cross-grained 1/16" (1.5) balsa; small ribs are capped with 1/16" x 3/16" (1.5 x 4.8). When set, raise from board, add opposite leading edge sheet and cap strips. Photo 12 shows general construction. Front wing tips are trimmed using same ply template as wing.

Elevators are made up of 3/16" x 3/8" (4.8 x 9.5) leading edge, 3/4" (19.1) sectioned trailing edge, with ribs, and tip pieces of 3/16" x 1/2" (4.8 x 12.7). Sand all edges to contour, nicely rounded and streamlined. Make 14 s.w.g. torque-link, recess into two elevators and epoxy. Fit hinges - nylon tape 1/2" wide (12.7) and join elevators to tailplane - AFTER covering.

Join front and rear 1/4" (6.4) sheet pre-cut parts of rudder either side of hard balsa 1/4" x 3/8" (6.4 x 9.5) spar. Inset stiffener as shown. When completely dry, sand all edges round - see plan and Fig. 20.

19. RADIO INSTALLATION

Before covering model, Radio Installation must be anticipated and fitted. Prototype model flew well with full control on Rudder and Elevator only. Ailerons are not allowed for in this design NOR ARE THEY RECOMMENDED OR REQUIRED. Engine Speed, however, is optional.

Hardwood crossbeams are supplied to sit across the fuselage located by two die-cut ply plates glued to inside face of the area above the wing cut-out. These support a ply plate on grommeted screws into which may be cut slots to hold radio receiver and/or Servos. In each case locate Servo's (lengthwise to the rear) dependant upon size and convenience, all as far forward as reasonably possible. Deac set in Sponge Rubber, or Hairlok under the beams against the front bulkhead. Suggested linkages from Servos to rear are shown with 16 s.w.g. wires with 20 s.w.g. keepers bound to hard (but light 1/4" x 1/4" (6.4) balsa push rods to rear. 2 K-links only are supplied. Remember that access to Servos will be from underside of fuselage (wing removed) so that disc rotation for linkage with rudder and elevators will be with inverted servos. Alternatively, Veron or commercial nylon tube controls may be fitted.

Aerial on model may be passed through cockpit to fin or through lower wing saddle and permitted to trail. Nylon tube and cable controls are recommended for linkage to engine, and must pass through front bulkhead and rear cowl to one side of fuel tank dependant upon throttle design.

20. INTERPLANE STRUTS AND RIGGING

Use fine round-nose pliers to bend small loops on ends of 20 s.w.g. wires, ensuring their exact length between end loops, as per dimension on plan - Fig. 21. Clips are stationed on wing camber so that all struts, front and rear, are same length. Wires are epoxied into grooves in edge of tapered section balsa, wrapped with tissue for strength and doped.

Struts will be retained on clips by tension of nylon (fishing line) interplane bracing or better still, very fine elastic cord ("Sheering-elastic" - available from good haberdashery stores) with wire S-clips. Details on plan show 20 s.w.g. wire S-clips on top struts of cabane (soldered in place) and looped clips glued to pieces of dowel and pushed into 3/16" (2.5) holes in fuselage sides - Fig. 22. Use only two lengths (per side) of elastic cord - from, say, cabane top to bottom middle strut - to top outer strut at front, then diagonally to bottom rear outer strut - to top rear middle strut - to bottom rear fuselage clip. And the opposite way for second length - both sides.

SPECIAL NOTE - SEE DRAWING TOP LEFT CORNER OF PLAN. FIG. 8

On the prototype aircraft, and on this model, a bracing wire extends each side from the nose cowl to the top of front middle interplane strut. On the model, Light Laystrate wire was used, but Nylon Fishing-line is satisfactory. It's point of attachment at cowl is through holes drilled in ply backing to inside face of rear cowl at point marked 'R.P.' in Fig. 8 and nose side view.

It will be understood therefore that this bracing wire is removable with the cowl. It is secured by knotting inside the cowl and anchoring with epoxy. Upper ends of braces have extended S-hooks to loop over middle front underside clip of top wing, when wing is being located - sketch of these is in Fig. 8.

21. ENGINE INSTALLATION

On the prototype model, a "29" cu. ins. engine was fitted with Spinaflo silencer. This engine is AMPLE in power for all modes of flying - in fact, was throttled well back for cruising. Downthrust is built in but 2" right side-thrust is needed by "swinging" the engine mounting bolts. There is ample room within the A.B.S. plastic engine crankcase to encompass R.C. Carburettors and linkage to throttle control. Filler and vent tubes of silicone can be passed through holes drilled in upper surface of rear A.B.S. Cowl. The engine fitted complete with a Spinaflo silencer only permitted five model cylinder units, as shown in Photo 17.

Secure the engine with bolts and blind nuts (NS) epoxied into place on underside of ply mount, or bolts (NS) with heads to underside with 20 s.w.g. wire keepers soldered into slots in head and double lock-nuts on top to secure motor - with adequate washers.

Use fine pitch props for scale flying speeds using diameters recommended by engine manufacturers.

22. COVERING AND COLOUR SCHEME

"Modelspan" is provided for covering, but Lightweight Nylon or close weave Chiffon-nylon will give a far more authentic "fabric" finish. Mylar iron-on coverings are permissible - but hardly authentic in their colour range except silver. If these are used, the wings MUST be re-checked EVERY FLYING SESSION FOR 100% TENSION. REMEMBER THAT IRON-ON COVERINGS WERE NOT REALLY DESIGNED FOR USE WITH "OPEN-FRAME" WINGS.

Use Photo-mounting paste for adhering nylon or "Modelspan", or Banana Oil (non-shrinking dope) onto rudder and balsa sheet areas of fuselage. Spray shrink with water and dope until slightly glossy. Only AFTER covering and doping should cockpit apertures be cut out using die-cut plywood template for cutting around, and tailplane glued into fuselage slot. Also 2 A.B.S. fuel tanks cemented to underside of top wings.

Extra coats of Banana-oil may be applied to balsa sheeted area of nose to simulate smooth metal-clad area when eventually coloured. Overall silver is best sprayed on whether cellulose or enamel. Engine