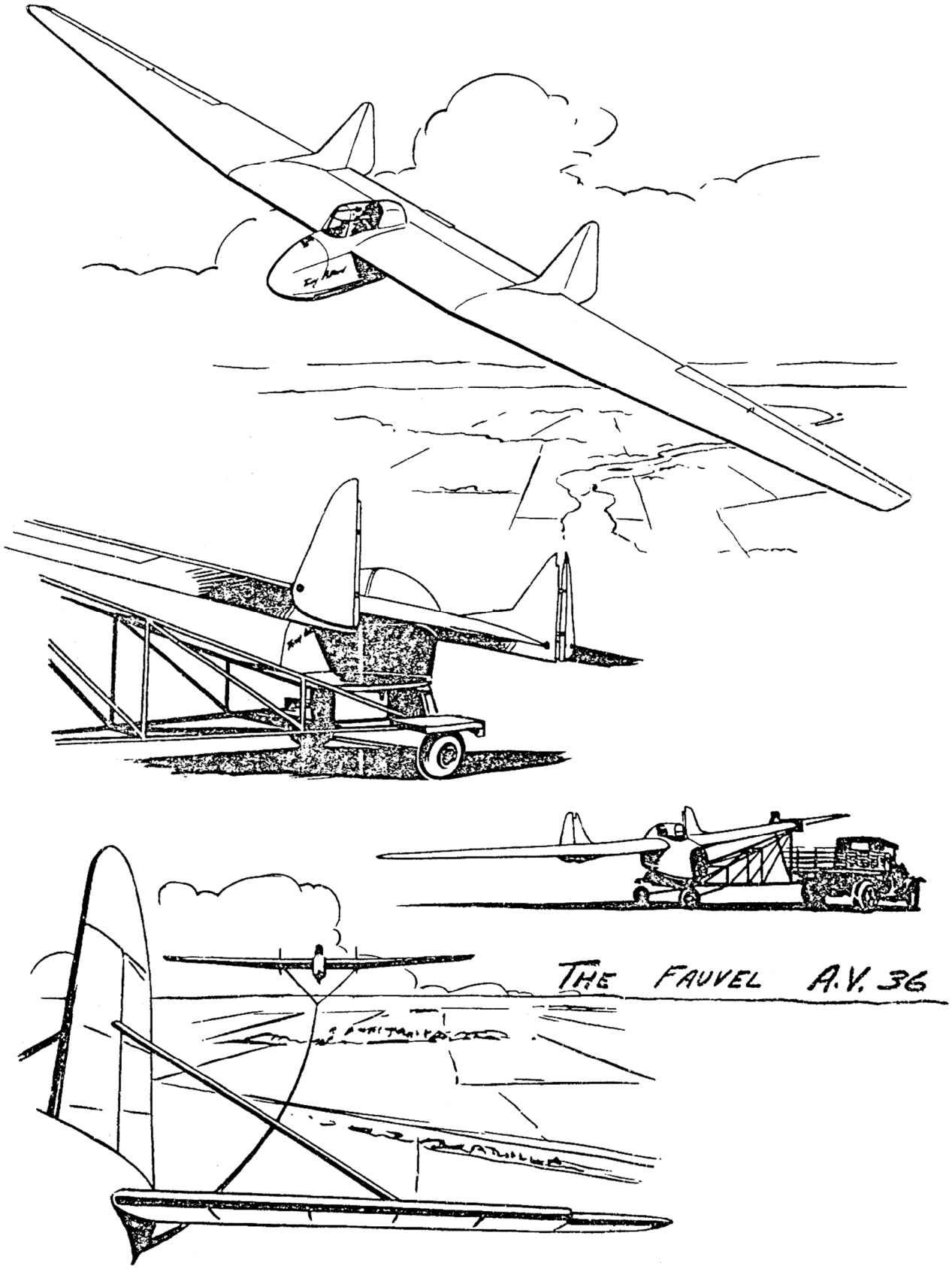
AV-36 Builders Manual

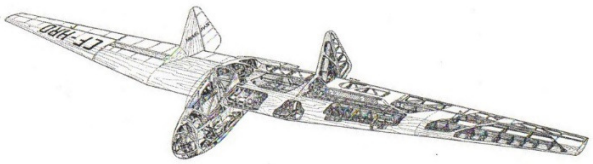


Fauvel AV-36 PLANS LIST

1. Wing assembly
2. Rib section
3. Fin and rudder
4a. Fuselage (built-up canopy, A & bubble, B)
4b. Landing skid & tow line FN
5. Fuselage frames
6. Controls
7. Controls details
8. Accessories (trailer)
9. Air brakes (lower surface style)
10. Corrections: Deleted – changes incorporated inn Legacy prints
11. Mod for construction in Canada and USA : Deleted – Incorporated in Legacy prints
12. Quick dismantling wing fittings A
13. Quick dismantling wing fittings B
14. Cockpit type C - Blown
20. Coordinates – No longer supplied. Use full size templates.

FAUVEL AV-361 PLANS LIST

31. Standard class sale plane sailplane
32. Main spar and false spar
33. Ribs
34. Fuselage bulkheads
35. Fuselage longerons
36. Ribs 8, 10, 12, and 14 & 16
37. Air brake box and
38. Airbrake control arm
39. Formers and canopy frame
40. Canopy faring and rib #1
41. Pylon assembly
42. Airbrake control
43. Elevator
44. Nose ribs (oxy. Bottle/battery)
45. Fin mounting
46. Fin and rudder assembly



FAUVEL AV-36 & 361

DATA

Type - Single seater training and performance sailplane. All wood construction.		
	AV-36	AV-361
Category	Aerobatic	Standard class, aerobatic
Wingspan	39.4	42 feet
Wing area	153 sq. ft.	157 sq. ft.
Aspect ratio	10	11
Overall length	10 feet	10 feet
Empty weight	235 - 258 lbs.	260 lbs.
Flying weight Gross (AUW)	495 lbs. Max.	570 lbs.
Wing loading, min.	2.45 lb/ft^2	
Wing loading, Max.	3.24 lb/ft^2	2.67 lb/ft^2
Ultimate stress factor	12 G	10 G
speeds - Max. Dive	137 mph	137 mph
- Aerotow	112	112
- winched tow	57	57 mph
Max. Glide Ratio	25	26
Gliding ratio	23 between 43 & 58 mph	
Sinking speed	2.7 ft/sec. min. 4ft/sec. @ 62 mph.	
Flaps down	39.3 ft/sec. @ 80 mph	
Airbrakes open		No data

SPECIFICATIONS

Designer:	Mr. Charles Fauvel		
Model:	AV-36 Single place performance sailplane		
Type:	Class 4 glider as per Norme 2104		
	Class – Aerobatic, as per B.C.A.R. Section E		
Airspeed Limits:	Glide or dive: calm weather 137 M.P.H., rough weather 98 M.P.H.		
	Airbrakes open:	81 M.P.H.	
	Airplane tow:	Calm weather – 112 M.P.H.	
		Rough weather – 79 M.P.H.	
		Very rough weather – 65.2 to 68.3 M.P.H.	
C.G. Range:	Front limit – 18.4% - 180mm (7.08”) fwd. of front face of wing spar		
	Rear limit – 24.0% - 95mm (3.74”) fwd. of front face of wing spar		
Leveling Means:	Wing spar front face and fuselage main bulkhead are vertical		
Max weight:	AUW: 225 Kg. (496 lbs.)		
Number of Seats:	One		
Baggage:	None		
Ballast:	Zero to 16 lb. in ballast box on nose pylon. See approved ballasting chart		
Control Surface Movement	Elevator	-	26° up 16° down
	Ailerons	-	22 ½ ° up 14° down
	Rudder	-	45° outward 15° inward
	Airbrakes	-	0° up 90° down *(AV-36 style, NOT Schemp Hirth)*
Serial Nos:	CF-36-001 and up		
Required Equipment:	Minimum – Airspeed indicator		
	Altimeter		
	Compass		

Certification Basis:	French Norme 2104 and comparison with B.C.A.R. section E
Landing Gear:	White Ash skid
Note #1:	The following placards must be installed in full view of the pilot: MAX. PILOT WEIGHT: 95 Kg. 209 lbs. MIN. PILOT WEIGHT: 57 Kg. 125.5 lbs. (These weights apply when no ballast or additional equipment is carried. Departure from this is covered by ballasting chart)

Speed Placards:

		SPEED – M.P.H.	
Weather:		Calm	Rough
Glide or dive		136	987
Airbrakes		81	81
Winch tow		56	*Don't*
Aero tow		112	79
Aero tow	Opt. climb	56	66 (very rough)

Note #2:	Ballasting chart to be placed on the front face of canopy fixed fairing.
Note #3	Empty weight 235 lbs. To 258 lbs. If empty weight exceeds 258 lbs., special consideration will be required.
Note #4	Sailplane is to be built in accordance to the drawings and complementary manuals.

INSTRUCTIONS FOR CONSTRUCTION
GLIDER FAUVEL A.V.36

The time spent in studying drawings and instructions represents a greater time gain on the construction.

General

The general structure "Monobloc" of the AV-36 is composed of the following elements: wing, two fins and fuselage, which can be constructed separately and simultaneously and then assembled according to the possibilities of each component.

All pieces used in the fabrication will be carefully varnished, except for the surfaces which will be glued at any stage of the assembly. All frames and spars box sections will be vented by holes of 4 m/m at the minimum. Drainage for the lower sections which may be filled with water, will be effected by holes of the same size. With the exception of all spar web covering and of all pieces in contact with the exterior, the birch plywood when 12/10 and 10/10 may be replaced respectfully by plywood "Okoume" 16/10 and 12/10

As for the leading edge:

The birch plywood 12/10 may, as a result of provisioning difficulties be replaced by birch 15/10 with a slight increase in weight.

The Birch plywood 15/10 – 5 plies and 20/10 – 5 may be replaced respectively by plywood 3 plies to the same thickness, but the leading edge profile may not be as respectively outlined or remain so as long. The fuselage sides between frame 0 and frame 2 may also be more easily damaged.

Wood - Epicea aviation or spruce-aviation can be used indifferently as long as it's compression strength is 2.5 KG/m/m^2, straight grain, regular and without knots. (5000 PSI)

Glue – Cassein – Use but the best approved aviation quality recently fabricated and well preserved. Prepare in small quantities, exactly as it should be and do not hesitate in throwing out if not good, especially during the summer. Conserving it would be uneconomical since it would not glue properly anyway. Do not forget to clamp any glued pieces with C clamps or would jig. It is preferable to use many small clamps adequately space than a few large clamps improperly spaced and too firmly tightened. In any case, the glue must flow freely from the glued joints.

The control panel in drawing 4 is drawn for guidance only, with minimum normal dimensions given, since the number and the dimensions of the instruments may vary according to their availability. Note that the venturi type speed indicator which is reputed to be more sensitive, is generally less accurate with an important lag of the indicating needle around 100 KPH (62MPH).
Use of a Yaw string is considered a normal sailplane reference instrument and is recommended over a ball type slip/skid indicator due to the lateral displacement of the glider when the rudders are used.

1 – Wing

Spars:

Main Spar - the assembly jig will be used for the gluing of the spar.

I - Wing (continued)

cap strips to the completion of the box leading edge. The rear surfaces of the spar being plain and used as an assembly reference plane, it will be practical to give the jig an appropriate shape. The jig may be built from a rigid plane surface to the spar dimensions. The sides of the jig will be made of small boards high enough to equal the cap strips with; these boards will be screwed to the sides of the jig plane surface. (Drawing No. 4).

If it is found desirable to obtain a thicker cap strip in order that it may be leveled to the proper size afterwards or again if it is desired because of the shrinkage or warpage of the jig plane surface, some plywood strips may be inserted between the jig sides and the plane surface. The jig will be shorter than the spar by 10 m/m. The epicea or spruce-aviation laminated (at least 5000 PSI in compression) will have a maximum thickness of 4.5 to 6 mm and be glued, clamped (see note 1) and blocked by wedges interposed on the mold sides. Varnish, wax or put cellophane sheets on the mold so that the glue will not stick to it. Where dihedral changes in the spar, the laminations will be simply folded and clamped to proper slant. The splices of the laminations shall have a slope of at least 1/20.

After they are dried and removed from the mold, the cap strips will be brought to their prescribed height and both front and rear surfaces will be made parallel over the full spar length; it will be brought to 30 m/m thickness.

(Note 1) - When “frame” clamps are used, it may be necessary to clip the clamp jaw so that it will not hit the bottom of the mold thus preventing an oblique tightening action that would be produced by a deformation of the clamp by the two generous tightening, thus causing an irregular gluing.

Then put the cap strips back in the mold. Put the blocks (web) 1, 7, 8, 22 and 30; the latter two being respectively 16.5 and 8.5 mm thick, it is not necessary to make them out of 30 m/m laminated, but the rear surface of the blocks 22 and 30 should be in line with the cap strip rear surfaces. Remove the jig sideboards, then turn the spar and installed the rear spar surface plywood on the spar full-length and install the gussets 30. Reposition the spar rear surface on the mold, slant the front surface regularly decreasing from the rib 8 to the rib 30 with the necessary diaphragms 1 to 22 in the spar front spar surface plywood.

Turn over and fix the diaphragms and gussets 24, 26 and 28. Trim off. Verify the dimensions and position the fixtures.

If fixtures (return pulleys) are installed on the spar at this stage, used back plates with ordinary nuts and fan-type washers. If the D box spar is closed (covered) before the pictures are installed, drill holes accordingly in the spar and install with wooden screws back plates for Simmonds nuts (see drawing 7). To obtain a perfect alignment of the pulleys, drill a hole corresponding to one end bolt of the pulley support, and with the help of a cable or a string, the pulley will be aligned so that the cable direction is that determine by the fuselage pulley or the control surface horn. Then Mark the 2nd hole and drill. In any case, the release hooks will have to be installed prior to the covering of the box spar.

False-spar - The fall spar is composed of three elements, put together during the assembly only.

Prepare the webs, glue the cap strips, trim off. During assembly; position on the wing, marked the places of the wedges or blocks, uprights, gussets, etc. Glue these pieces.

RIBS

The rib structure is Orthodox. However, note that:

N0 - Solely a trailing edge rib, full web control surfaces type, with emplacement for the tab and a 25 m/m block on the central surface spar.

N1 - The nose section of N1, following the special drawing, is not similar to others in structure. It's covering on the fuselage side is interrupted, at the bottom, (see drawing), the two splices are arranged to receive the interior fuselage gusset during wing-fuselage assembly. The temporary N1 nose section cross-bars, dash-lines on the drawings, held by the lightly glued gussets were simply nailed, will be only removed after the box spar (leading edge) has been covered. Along the upper curve, some web plywood can be left on the sides and be used to hold these cross bars. This edge will be cut and trimmed off when the temporary strips and uprights are removed.

Ribs 3, 5, 7 and 8 jig will be modified to build the N1 mid-section, these being longer but their thickness at the spar is the same. The front and rear uprights 6 x 9 of these mid-sections will facilitate adjustment during assembly of the spar. The plywood webs will be on the fuselage side of the ribs. The ribs trailing edge sections are of the control surface type with emplacement for the tab.

N3 and N5 Ordinary ribs. Trailing edges sections control surface type.

N7 - Special configuration (see drawing), web on the fuselage side. Ordinary trailing edge section fixed with plywood web on the fuselage side.

N8 - Special configuration like N7 but with web on the fuselage side. Ordinary trailing edge section fixed with plywood web on the fuselage side.

During assembly, the ribs 7 and 8 are joined to make a rectangular box 80 mm wide, by rectangular diaphragms glued on the uprights of N7 and N8, and by stringers (cross pieces) 6 x 7 between the rib cap strips at the edges of the diaphragms. (Note could also mean right of these uprights, although it does not seem logical). Similarly the forward diaphragms will be placed inside the box spar so as not to increase the length of the rib sections between the spar and the rib. At the rear, a cross-bar (stringer) and a gusset will be fixed on the upper part of the rib and on the lower part of the rudder horn support block will be placed, its upper surface at 7 ½° in relation with the section reference line and at 38 mm from the under surface, dimension being taken from the rudder horn centre line. Drill in the block, before its installation, the holes corresponding to the horn support.

N10 Ribs with emplacement for air brakes in the midsection. Trailing edge section of normal design.

N12 Ribs with Airbrakes emplacement and blocked for eye bolt for return spring of air brakes.

N14 - Ribs with air brakes emplacement. Normal trailing edge section.

N16 – Normal ribs with plywood lower strip increased to receive air brake box end. Normal trailing edge section, plywood on the wing side

N16 - trailing edge section control surface type, plywood fuselage side.
Bis

N18
and - Normal ribs. Control surfaces type trailing edge section.
N20

N22 - Normal ribs plywood web. General surface type of trailing edge section with block for installation of 3 horn bolts, plywood on the outside.

N22 - Control surface trailing edge section with block for installation of 2
bis upper horn bolts, plywood on the fuselage side.

N24, N26, N28 - Normal ribs. Control surface type of trailing edge section.

N30 - Nose rib section and midsection are made of one piece and are closed by plywood on the outside surface. Control surface type of trailing edge section, plywood on outside surface.

Leading Edge Box "D" Nose

Once the spar is put back on the jig, which will have been carved at appropriate spots to receive the fixtures or bold heads in order that the rear surface may rest evenly on the jig surface, install the nose rib sections and the ribs 30.

Install the leading edge stringer even at the fuselage emplacement.

Install on the spar rear surface, the ribs midsection 7, 8, 22 and 30 in order that the spar upper surface can be slanted as required by the airfoil section.

Adjust and install the blocks for the hook cable horns (or pulleys).

Between cable sheet support (N7-8): plus block, should be given the same necessary slant (either HCO3 or by adding a wedge) so that the cable will come out of the sheet in alignment with the mid-travel position of the hook lever.

Bowden cable sheet support (N1): when the support block is positioned such that the sheet is aligned with the sheet of rib 7-8, rib 1 will be drilled in such a way that the cable and sheet are tangent to the inside of the fuselage towards the control lever. If necessary the appropriate curvature to the sheet channel can be given with a small rasp and then the sheet can be immobilized with glued wedges or filler and rings.

Carefully check the hook functioning before covering the leading edge.

Where lateral control type of hooks are used, the rib 7-8 sheets is unnecessary in the N1 sheet outlet must be aligned with the hook control lever.

If Aerazur 11B2 type hooks do not spring back satisfactorily, at a supplementary spring as convenient between the release lever attachment in the lower attachment of the hook support after having chipped the “U” piece hook attachment and having ensured that the spring will not get caught. This is to avoid the safety (piece) which in this hook depends on the closure, will not open to easily.

Drill venting holes. Varnish the structure accepting the surfaces to which the covering will be glued.

Before any covering adjustment and sanding is affected (the piece of wood on which sandpaper is a affixed should be straight, and it is recommended to have various sizes of the sanding blocks). Do not forget that the straight-line points are according to the generatrix lines, to the points of the same percentage of cord.

Covering:

Start by the centre, wet and shape the day before the covering components which have a strong curvature. Prepare and glue accurately the scarfs (slant 1/20).

Use of Nailed Strip:

This system carefully used is one of the best to give an even covering structure (“horse ribs”). When used on covered surface, tact the nails to the strip without letting them go through and progress on the plywood covering well shaped and well set. Cut the strip if necessary in curve sections and where the curvature is such that the strip would not rest evenly, you strips of plywood of 2 mm with 5 or 3 plies (nail at 12 mm pitch in 0.8 millimeters thick or 16mm in 1 mm). Use the advice of experienced people in the matter or refer to books on the subject (for example: ”La construction dee Planeurs” by J. Cabane).

After having covered both halves of the wing, nail lightly a plywood 12/10 or 15/10 on both ribs N1, on the leading edge strips, on the upper and lower surfaces of the spar, to stiffen the wing, until the midsection has been covered.

Wing Assembly:

Jig: take advantage of the fact that the air foil shape has an under surface perpendicular to the spar in order to align the wooden horses and block them solidly, or make a jig with a horizontal surface for the centre air foil section and raised to the corresponding dihedral from rib N8.
Ensure that the rear surface of the box spar is vertical.

The following components being assembled:

(a) Box Spar (the opening in the wing corresponding to the pilot location is temporarily closed by the plywood covering nailed on the leading edge strip, the spar in the ribs as mentioned above).
(b) Midsection and trailing edge ribs.
(c) False spar in 3 elements.
(d) Box ribs of the Finn 7 and 8 joined by their diaphragms, strips and rudder bell cranks.

Install the box ribs on the spar.

Install the 3 elements of the fall spar, resting on the ribs 30, 7 and 8 (see detail splices N7-8 are on drawing 1).

Install the other rib midsections between the Main spar and the false spar, correcting as necessary to produce a perfect alignment of the false spar.

Join these elements by gussets, strips, the inspection doors plywood frames. The inspection doors are left to the builders discretion. However, a model is shown on drawing 4. The building will carefully reinforce the openings in the plywood. The inspection windows are made of Plexiglas or “Rholdoid” discs glued in openings similar to that of the inspection doors. They can be removed when greasing or a repair is necessary and then replaced.

After having removed from the lower surface of the spar between N1, the temporary plywood cover the centre portion of the wing between the spar, the false spar and ribs N8 midsections, on the wing under surface, leaving 30 mm edge of plywood over the N8; the covering is extended over the fuselage emplacement.

Outline, according to the fuselage details, (drawing 4) the N1 midsections position between the spar in the false spar. Adjust these midsections.

Install between the ribs 8, 10, 12, 14, and 16, the components of the small rear spars for air brakes boxes, these components should be made to long, and adjusted to fit. Install the plywood bottom. Install the small front spar (which will have been preassembled) by inserting between its front surface and the rear surface of the upright at 51.4% of the rib, blocks 1.2 mm and 2.4 mm respectively to the ribs N12 and N10. These blocks are adjusted so that the small spar will be on a straight line. Glue the closing ribs at the ends. Then install the plywood contour and the reinforcement around the horn opening.

Follow this order of assembly at this stage. Install the fixtures for air brakes and aileron cable pulleys.

Install the control cables, verifying the pulley adjustment.

Cover the centre portion between rib 8 and rib 1. The opening left between the rib 1 midsection in the spars will be covered only after the fuselage installation.

Do not forget that the plywood edge over the under surface of the false spar at the elevator and aileron emplacements must exceed freely so that the adjustments may be facilitated after installation of the elevator and the ailerons.

The fixed trailing edge sections of the ribs in the trailing edge between the ribs 8 and 16 can, if convenient, be assembled at this stage or after the assembly of the fins on the wing.

All trailing edges of wings, control surfaces and rudders are built the same way: between the ribs trailing edges, strip 5 mm thick and of height corresponding to that of the section. Covering of birch plywood 10/10 or 12/10 and 30 mm wide between this strip in the trailing edge where both plywoods are glued to one another over 5 to 8 mm wide. These covering strips are cut in gussets covering the point of junction between the oblique and straight ribs.

Same procedure for the plywood strips framing the control surfaces

II - FUSELAGE

1. Built all the frames, the keel, the rear oblique portion for the fuselage. Shape the longerons. The upper longerons 12 x 15 shaped progressively to 12 x 18 between frame 2 in the frame 3; lower strips (stringers) 25 x 12 shaped progressively to 25 x 8 from the frame 2 to the frame 3.

2. Assemble these elements on an assembly jig built as follows:

   On a very straight and square beam, raised 2 vertical uprights which will serve as a support to each frame. These upright pairs will be parallel to each other and at a distance such that the frames which will be affixed to them, will occupy their assigned position. The unit will be made rigid with triangular plates and horizontal beam at the fuselage longerons level. These will be held by crossbars put against the frame supports (see drawing 4).

3. Adjust the longerons in their emplacement, shaped to suit the floors holding them with clamps or if necessary nailed them on temporary floor cut to desired shape.

4. Glue and clamped these elements

5. glue on the wing-to-frame-2 junction gussets, avoid any excess of glue on the upper surface of frame 2, it would have for effect to bring the 2 gussets together introducing difficulties in the assembly. After drying, glue the blocks (pulley-bracket) at the top of the frame 2 inserting temporary blocks 32.4 mm between the gussets. Glue the floors.

6. Put the angle piece blocks, belt blocks, pulleys and diagonals previously made of laminates arched as required. The dimensions sheet gives a table for these diagonals between the frames 0 and 1, 2 and 3, the height of the exterior surface in relation to the length between its ends. This height is given at ¼, ½ and ¾ of the diagonal from the front.

7. Install the fixtures to the frame; control system, pulleys, belt fixtures and the angle strips for the gluing of the wing undersurface covering on frames 2 and 3.

8. Cut strips and blocks of frame 1, to make way, against the covering, for the tab cable casing.

9. Install the covering of the lateral surfaces, leaving a fairly wide edge of the plywood above the upper longerons. Close the rear cone.

10. If possible on the jig, finish the fuselage by installing the keel and the under covering. If not, this work will be accomplished after the fuselage is removed from the jig.

11. Glue, on the upper surface of the upper longerons against the covering plywood edge, blocks of sufficient size to be adjusted to the wing undersurface during assembly of the wing on the fuselage. The front block extends from the leading edge up to 160 mm of the spar; the rear block extends from the trailing edge up to 320 mm of the spar. The longeron between these 2 points must be absolutely straight.

12. Finished the upper front part of the fuselage, noticing that the stringer made of a 15 x 15 mm strip only fitted 10 mm deep in the frames so that the fuselage section can be shaped in the 5 mm in excess.

13. Install the remaining fixtures: air brakes, tab, release and rudder controls, install the cables.

14. Complete the covering.

15. Adjust the skid and install it.

An inspection door may be foreseen on the rear surface of frame 2, to check and maintain the rear pivot of the control column toward tube.

Seats:

The seat construction does not present any great difficulty, do not forget the openings in the inside boards of the longitudinal cross-bars. Carefully affix the plywood sheet 15/10 at its front and before gluing to the other sheet and to this seat cross bar.

III - FINS

The fins components: spar, false spar, rib selection will be assembled on plane surface there straight surface (outside fin surface) being in contact with the plane surface and these elements planes being at 90° with the plane surface (except of course for the fin false spar which is slanted at the angle shown). Note that the uprights 7 x 9 and the gussets in the fin spar at the rib D2 and D3 midsection level, are to be adjusted to these pieces slant.

The rudder hinges will be installed before covering the fin centre section, ensuring that the hinge rear plate grays the outside surface of the plywood covering and that both hinges be accurately aligned. Do not forget the stops to prevent the axis to slip out. (The rudder hinge will be ultimately fixed to the rudder, with axis in place, in order to avoid misalignment).

Cover the Finn structure of the midsection ribs. Foresee a significant edge of the covering plywood on the lower side to close the fin covering under the section, between the spar and the false spar (see Drawing 3).

Glue the nose sections, the tip fairing, the leading edge strip. Cover this nose section.

The installation of the upper and lower edge strips of their nose and covering will be made after assembly of the fins on the wing.

IV - MOVING SURFACES

Rudder:

Install the spar accepting the gusset at the push-rod level. Install the straight and slanted trailing edge rib sections including the fairing perpendicular to the spar. Assemble the straight portion of trailing edge, follow with the upper and lower fairings on the jig which will be used afterward for the fabric covering and drying of the rudder.

Install the centreing fixture, the gussets and the hinges. Horn centre line at 62 mm exactly to the hinge centre line.

Varnish the structure except the surfaces destined to be glued to the fabric.

Elevator and Ailerons:

Same principles of construction then that of the rudder's.

These control surfaces have spars build like the wing false spar but with 7 x 9 cap strips instead of 6 x 7. The diagonal strips are built as required, the air cap strips are straight on the upper and lower surfaces. (Varnish, even on the outside surfaces so that the fabric will not adhere to them.) Do not forget the blocks (wedges) with plywood on each side in the elevator rib 0 and in the aileron ribs 22 and 22 bis to support the horn bolts.

Air-Brakes and Tab:

Cut the upper surface of plywood to its exact dimensions. Glue the small spar or front strip. Install the ribs, the horn and hinges. Varnish the inside of the air brakes, except where the ribs, the small spar and the trailing edge will be glued.

Closed by gluing the under surface.

Trim and sand.

Fairing on Elevator:

Easily constructed but verify after assembly is adjustment to obtain an accurate and free travel in the rear part of the fuselage.

V - GENERAL ASSEMBLY

Wing and Fins Assembly:

After having installed the fin spar on the wing false spar, adjust the lower and upper edge strips, then trace the ribs D2 bis and D3 bis on the upper and lower surfaces covering between the ribs 7 and 8. Install the nose sections B1, B2, B3, B4.

Cover the upper and lower fin fillet. Adjust the rudder pushrods, horn and cables openings.

VI - WING FUSELAGE ASSEMBLY

When the temporary plywood between the ribs 1 and when the leading edge strips between these ribs have been removed, the necessary openings in the under surface covering will be made.

- At the rear of frame 2, where the junction gusset between the spar and fuselage is situated,
- On the front surface of the rear false spar, at frame 3 intersection;
- Where pulleys and where rudder and aileron cable's are passing through,
- Where the elevator pushrod is situated, preferably a slit in the fuselage centre line, 30 mm wide, from 85 mm to 200 mm from the front surface of frame 3.

Assemble the wing and fuselage and adjust the fuselage sides (upper part, block and plywood along the upper strip) as required by the under surface outline, in such a way that the under surface (wing) and the fuselage upper strips (stringers) will touch, from 160 mm in front to 320 mm at the rear of the front surface of the wing spar.

Install the triangular blocks or plates between frame 3 and the false spar. Complete the assembly with the plywood inside gussets which the nose section of ribs 1 to the general structure of the fuselage sides at right angles to the cockpit; pressed tightly with nailed strip, the gluing of junction gussets forward or rearward of frame 2, and the under surface of the wing on the angular strips of frame 2 and 3.

Install in the fuselage the rudder and air brakes cables. Rig the controls. Affix to the fuselage sides the release cable casing.

Install the upper surface of the wing panel between ribs 1 and spars after adjusting the horn travel opening and elevator counter-weight opening and the inspection door.

Cockpit

If a mold type cockpit is not available, build the one shown on drawing 4. The cockpit must be adjusted between the wing and fuselage; it's dimensions are dependent on the accuracy of the wing fuselage assembly. The assembly of the cockpit will be made when the general glider assembly is completed.

Apart from the Plexiglas or rhodoid canopy, the cockpit has the complex shape of a fillet where it fairs the upper surface of the wing leading edge to the cockpit opening. The canopy is fixed to the rear of the cockpit by a small frame of laminated wood at the front by a similar arch of laminated wood, or of steel tubing with welded brackets, or a full hat rolled section ( ). (See drawing-lower left corner).

This canopy has two sides almost parallel with the false-frame leaning on the control panel false-frame in front, and supported at the back by a cross bar. The sides are made as follows: at the rear of 40 mm high arch following the N1 nose section upper surface curvature, at the front the canopy lower sides are straight and are supported by the fuselage sides between the leading edge and the control panel. The birch 15/10 plywood web to both of these elements is extending from the wing spar to the control panel.

The two sides and do not go beyond 12 mm from the main spar front surface and a covering 15/10 (preferably 5 plies) grazing the wing covering at the N1 rib level after assembly of the sides, the cross bar in the front arch. Install the 2 opening frame strips (laminates to shape), the front stop, and the 2 faring pieces of the pilot's head opening.

The partial interior covering may be laminated at this stage, covering which starts from the 2 strips, the stop and the fairings.

Covering of the Assembly:

1. The section at the wing profile up to the leading edge, place temporary strips between the sides up to the leading edge (make a cardboard pattern before proceeding to this delicate covering).
2. After drying, cover the section corresponding to the fuselage, using the wing profile as a support with the help of triangular strips.
3. Once dry, the excess plywood and pilot's head opening can be cut trim. Re-inforce the junction of the wing fuselage surfaces with fabric. Make a fillet with putty. Install the edge made of an dural strip of 1 mm covering and slit between cockpit and wing with an edge of 10 mm from the cockpit sides (fixed with countersunk wooden screws in order that it is not protrude). Fabric cover. Install rhodiod (developed accordingly) and Plexiglas dome. The front dome is shaped from heated Plexiglas. (If it is shaped by the builder, make an exact mold of polished hardwood and edging freely the surface to shape. Cover with suede well stretched; heat the Plexiglas in an oil bath at 140° and apply on the mold, ensuring that it is stretched evenly, carefully salt the excess. Bore the holes slightly larger than the screws, countersink for the screw heads, then screw without force. At the rear, the dome overlap the Plexiglas. At the front windshield and dome are joined by an inside strip and by small bolts with countersunk heads and lightly tightened.

   It is important for the aerodynamic cleanliness to have the cockpit carefully joined do not forget the fixtures; first of all on the cockpit itself at the upper rear corners, and their equivalents on the spar, then the lock at the front. If the cockpit tends to deform, centering plates may be affixed to the lateral straight portions at the front.

Rear Canopy Fairing

If a mold is not available (although it seems to be the best method of building, it can be formed with a few rods and arches according to detail the. (See drawing 4), the whole being fabric covered and thin plywood covered. The rear part in any case must be hollow and empty to allow the counterweight partial travel in the elevator fairing travel.

The junction between cockpit and rear fairing must be accurate without gapping and with a smooth curvature.

VII - Wing Tip Skid And Wing Tip

The skid, intended to be in contact with the ground, shaped from laminates according to the drawing 1, is glued to the exterior surface of rib N30. The wing tip is then installed. The wingtip is made of balsa hollowed or solid and is fabric covered. It is also made in two pieces, one fixed, the other movable at the aileron tip.

VIII – Controls

It is evident that the trolls must be perfectly built, with precision and without any play but with free movement. The supply of prefabricated has been foreseen.

General

Dural pieces that have to be folded (rear support of torsion to, rudder bell cranks in the fins) should be heat treated and pressed by an experienced worker. The welds (torsion tube, elevator pushrods, elevator horn) will be done by an approved welder. All pivots, as well as the aligned pivoting holes, must have a perfectly smooth finish, especially the support of the pivoting bushing of the ailerons ands the rudder horns, and that of the rudder pushrods. The inside supporting surfaces for the dural washers must also be smooth so that the bushings may rotate easily without play.
grease all pivots during assembly with a graphite grease. Do not forget to apply some grease afterwards.

Cables

It is convenient to use cables prepared in advance complete with swaged clevis or eye and at one end and a threaded turnbuckle and fitting at the other. (The prefabrication of such cables are taken into consideration). Remove the pulleys for installation.

If swaged in fittings are not used, making an end splice and insert thimble than fabricate pairs of dural plates 1.6 mm or 2 mm as per drawing 7 on the rudder horn detail drawing. If 5 mm shafts are not available for these plates, cut them from 5 mm S.A.E. 4130 steel with washer and pins on each side. The splices may be also replaced by the “classic” method of the copper tube annealed, flattened and twisted one turn and half.
At the front end of the petal and release cables, commercial cadmium plated cable clamps (No AN Std.) can be used, (screw at each end), corresponding to the cable, since at these points the cables do not risk catching or hook in their movement. Where the cables pass through the fabric covering (ailerons), make the opening just sufficient to avoid rubbing against the fabric.

Support Bushings

The rudder horn support bushings (N7 andN8) or aileron bushings (on spar) may be fixed by either 4 bolts (mild steel). O.D for millimeter or by one bolt through the centre (steel H.T.) O.D. 1/4“ with 2 set screws. In any case, ensure that the bolts heads holding the horn (lever) small bushing, do not hook on the belt heads or screw heads of the bushing. Countersunk head bolts (O.D. 3 mm) could be used to fix these small dural bushings.

Adjustable Pulleys

Once the supports are fixed in the cables are in position, the air brakes and ailerons adjustable pulleys must be locked by the support bolts. Do not forget to install the cable leads very accurately, preventing the cables from disengaging the pulley. The space between the pulley lips and the lead must normally be between 3/10 and 7 to 8/10 mm.

Locate the exact position of the air brakes movable pulleys for installing the support block. The exact slope of the air brakes pulley support block (at the air brakes lever) should be adjusted as required, the dimensions given on the drawing are for reference figures only.

Hinges

These are of treated aluminum according to the Norms Air B.N.Ae 176.60 (French specification) or AN-252 & AN253 - see Bill of Material, and cannot be replaced by any kind of material.

The four types of accepted installation are detailed in drawing 7. The Simmonds plate type permits the installation after covering, tightening or replacing of the hinge easily. The U type allows re-tightening if need be, which can be done quite often with folded edge back plate and fan-type washers. The system with dome shaped washers made of English steel compensate automatically for drying of the wood.
In all cases, always use bolts of 3 mm diameter H. T. Steel or #10 AN-509 - see Bill of Materials. Do not omit to install the small hinges travel stops at each and of the hinges. Greece these parts during assembly with agrees containing graphite.

Installation of the End Fittings on the Aluminum Tubes -see drawing No. 11

This installation is held by 2 tapered pins crosswise and mated. Once the tubes are cut to their exact length, insert the end fittings, drill two holes perpendicular to one another with a 3.2 mm size drill then use a reamer of 4 mm in its conical section pass it to the hole until it just emerges on the other side. Insert the tapered pin firmly, cut it at the 1.5 mm to 2 mm from the tube at each extremity, rivet the small then the big end of the pin. Before drilling the pinholes on the aileron rods, which have clevis and fittings at each end, ensure that the clevis and fittings are exactly parallel.

Control Column

The rear support of the torsion tube must be so placed as to ensure that the torsion tube is perpendicular to the frame 2 and at 490 mm of the upper edge of the frame (which is also the

lower spar surface). The supporting front bearing plate of the torsion tube must be located such that - Horizontally and vertically it will be perpendicular to the torsion tube. - Longitudinally it will not push or pull out of the rear support. If you make an error in the length, correct by a shim or a block. Drill holes for the vertical and horizontal installation once the final adjustment has been made. Aluminum plates 16/10. Do not omit the 4 mm bolt fixing the column to the and fitting.

Elevator

The horn installation on the elevator must be made according to the dimensions given. The counterweight, around 1 kg (2.2 pounds) (lead plates cut, stacked and held in place by a bolt, or again a lead block cast) is not meant to balance entirely the elevator completed, covered and equipped with a tab; it should still have a tendency to turn towards the ground.

The middle horn behind the torsion tube must be in the position indicated on drawing No. 7 when the elevator has a zero degree incidence, this puts the lower pushrod pivoting point at 11 mm behind a parallel to the main frame passing through the middle horn upper hinge point. The control column tip centre line will then be 10 mm behind the control panel.

The tubes length must be such that the self-aligning rod and fittings can be screwed in the tubes as shown on drawing No. 11. The 6 ¼ inch bolts used as shafts for the self aligning fittings will be tightened and locked (or peened). The stop aluminum, or dural washer between the female section of the end fitting and the locking nut when in position, will be folded at one edge on the flattened part of the female section of the end fitting and at the opposite edge on one side of the nut.

The threaded ends shaft, on which the oilite bushing of the middle horn turns, will be tightened on the horn sides such that the nuts will not rotate on the horn sides but also such that the oilite bushing will not be tightened on the horn sides.

The lateral control column shaft must have washer larger than the outside diameter of the “metafram rings” on each side (whether shaft has a head and threaded and or two threaded ends) and it must be tightened for free movement without play and locked with a split pin. The lateral control column tube through which the shaft is inserted must be machined to close tolerances in the order that it will fit with out play between the oilite bushings. Once this is done, the locking screw can be tightened to immobilize the shaft on the control column.

Notes on Oilite Bushings

These rings must remain in lubricationg oil for 1 to 2 hrs. at 80° and drained. The inside diameter must have a chamfer on the mating side at least. They must be fitted tight and straight, their inside diameter must be machined to the tolerances, giving smooth rotation without play, and the shafts must be machined to the corresponding tolerances.

Ailerons

The installation of the “V” horn to the torsion tube must be made such that the control column is in the symmetrical axis. The push rods lengths will

be determined with the control column centered and the aileron horn arms in a horizontal position (each arm in the direction of the other arm centre line). It is evident that will obtain two push rods of the same length. As mentioned previously, the 2 clevis wing end fittings must be exactly parallel.

If the clevis ends of the 5 X 53 clevis fit too tightly on the horns, a few strokes of fine file will prevent the sides from rubbing on the horns. These eye clevis ends turnbuckles 5 x 53 may be replaced by 2 eyed turnbuckles 4 x 43 to which can be added a chain link if procurement difficulties are met. See AN STD in Bill of Materials. The aileron horns are held by 3 bolts to the inside aileron and by the 2 upper bolts to the outside aileron. The lower bold has a countersunk head with a suitable hole in the horn

Rigging

The cables must be conveniently tightened, the control column being in its vertical position, the ailerons in neutral position (and is not up or down).

Rudder

The rudder's common cable can be adjusted by a 5 x 53 clevis type turnbuckle or a 4 x 53 turnbuckle with a chain link. See AN STD in Bill of Material.

The 0 position of the 2 rudders must be such that the horn arms for the rudder common cable are parallel to the symmetrical axis of the system when the cables are held taught by the foot pressure on the controls during flight. From there, the rudder pushrods are determined and adjusted to be in neutral position when the pedals are adjacent. Note that the 2 dural horns 6mm ¼ inch thick are symmetrical not only in camber but also in the countersink which will relieve the countersunk nut of the pushrod shaft. Normal position of the pedals at neutral rudder setting 80 to 85 mm forward of frame 0.

The steel pedal pivot, is welded at each end to 2 angle plates bolted by #10 steel bolts to frame 0. At the middle of the tube is welded the forward skid fixture, which is also used to clamp the lower pylon trusts. Verify the dimensions of these 3 fixtures and ensure that their rear surfaces are in the same plane. Do not omit to slide the petal spacers before welding the and brackets.

Air brakes

One the support of the movable pulley is adjusted, tie the end fittings or the thimble of the cable by a chain-link (dural 1.6 mm) with a distance of 60 mm between centre line of each extremity of the chain link. To equalize the air brakes setting, adjusted the turnbuckle of the air brakes cable that needs adjustment, for identical setting at the 30° mark. Ensure that the restraining spring does not catch or rub and if necessary rectify its adjustment. When closed, the control cable must be loose enough at the control lever to prevent any gapping of the air brakes.

Release mechanism

The turnbuckles must be adjusted in such a way that a perfect synchronism of release can be achieved before reaching the full control travel but in such a way as to permit a complete closing of the hooks when the control is at rest. This control can be placed on the control panel a little bit more to the side if desired (according to the instruments location convenience…

it's stem is made of brass like the cockpit locking mechanism and its support) so that a cheaper compass without compensating devices can be used with the same accuracy, since the control column is in dural, there is no magnetic component near the compass.

Elevator tab

The tab control lever may be placed a little bit more forward if desired. Adjust the fiber tube 2 x 4mm in the elevator in such a way as to have a minimum length of piano wire un-sheeted when the elevator is in its maximum downward position. File the end of the piano wire round and lubricate with a graphited grease before passing the piano wire in the sheet which will be retained by a piano wire of (1 mm) hook with fiber spacer inserted between the sheet in the wing false spar, leaving between the bowden and the fiber tube the minimum space allowed.

I X – MISCELLENEOUS

Pylon

The pylon supporting the nose cover, made of steel tubing SAE 4130 drawn seamless and steel sheet, is also used as a stop for the pedals and as a 3 mm which represents 200 to 250 grams each which are held by a bolt with a butterfly not, 3/8 inch in diameter in the metal casing at the pylon apex.

Nose Cover

The nose cover held by one's screw only at its apex is resting on the frame 0 where it is centered by strips 10 x 10 brought to shape and slope. They received from the fuselage surface to the exact thickness of the nose cover, which may vary according to the material used, light metal or plastic. The nose cover in light metal, aluminum or duralinox 10/10 (1 mm) will be made in two welded haves since it is an important component. A circular reinforcement will be riveted around the hole to which the supporting screw is inserted.

Before fabric covering, the glider being assembled, control surfaces and control levers rigged, trim the control surfaces fairings covering the slots between the main structure and the surfaces. Strips of soft wood will be glued to the lower side of the ailerons and elevator spar to close the slot. These strips will be cut where the supporting blocks uprights and gussets which are on the false spar webbing, are met, since at the maximum settings these strips will touch the false spar webs. Adjust at the same time and progressively the plywood edge on the undersurface of the wing and rudders. Carefully curve this strip in the edge of the plywood to avoid any catching. The plywood edge may be retouched once the fabric covering of the control surfaces is completed, since the fabric also covers the strip.

Fabric Covering

After having sanded the surfaces carefully, glue the fabric especially in the reflexed portion of the wing section (a plywood nail strip, the surfaces of which has been waxed, may be used to that effect). Do not dope the fabric too soon after it has been glued and use only dope of first quality.

Do not glue the fabric on the diagonal ribs (which must have been entirely varnished previously in any case), but only the normal rib trailing edge and on the plywood strips on the hinge and trailing edge side (the edge of which on the rib strip has been smoothed). On the undersurface the fabric will cover the curved closing strip and will extend up to the spar web.

Painting – Finish

Paint all wooden components first with a primer suitable to the type of paint used. Use a filler if necessary. Sand with fine paper between each coat of paint (or dope) applied in a dust free location and with paint free of residue. Sand the fabric lightly with very fine sandpaper which has been previously smoothed on a piece of wood. It is important to note that a good finish gives better results on a glider than on a powered aircraft, and it is also important to note that the finish requires more time and patience than could be expected at the time when the glider being nearly finished you will feel impatient to fly it.

X – ACCESSORIES

Lifting Rods

This rod is of drawn steel 11 x 14 (see Bill of Materials) and is inserted in the pedal tube. The nose cover must therefore have two holes at the emplacement of this tube, these holes may be lined with foam rubber glued and adjusted to give absolute water proofing. Paint this rod with red paint.

Make 2 rods: One for permanent use which will be left with the B. C. trolley and another one which will be placed in the cockpit against the diagonal cross bar and held by a spring. Then (with an additional 250 grams (1/2 lb.) only to the all up weight) it will be easier to move the glider wherever it lands particularly in the field where the onlookers help may be used. Paint the nose of the glider near the tube whole an inscription in red “Lifting Rod ”with an arrow indicating the orifice. Paint near the rudder skid on the wing side of the surface, in red “lift here”.

Launching V cable

The drawing detail on the type constituted of an arched sliding tube is sufficiently clear. The length of the hemp or nylon cable is normally 16 meters; this length may be reduced to 14 meters. The system can be simplified by replacing the arched tube by 2 rings or by the thimbles of the 2 sections of V cables passing through the 8 mm ring. In this arrangement the two sections of the cable must be exactly of the same lengths.

However, with an increase in complication, a certain amount of safety can be added by replacing the arch sliding tube by a ring of thick cross section (upper left side of drawing 8) made out of a piece of tube 55 mm inside diameter conveniently flared on each side, the centre being covered with a foam rubber, (bostic glue can be used for rubber metal adherance) this will protect the system when falling on the ground.

The interior section of this ring must permit the insertion of the V cable hooking ring (exterior diameter smaller than 49 mm) with the help of this flare. With this method at a braking system which will prevent the cable from coming out of this ring and consequently loosing it while the towing

aircraft is coming back. To this effect to foam rubber balls of exterior diameter 40 to 45 mm may be inserted in the V cable holding them to one meter approximately from the ring on each side of the ring. Regardless of the system used, it must necessarily include a swivel connector and prior to take-off the V cable must be set on the ground with the launching cable set along the glider centre line over approximately 20 meters.

In all cases, the release mechanism of the glider hooks (which are necessarily of the type "semi-open with safety", the slope of the hook is 27° with the reference cord line, i.e., with the wing under surface) must always function faultlessly and must be adjusted as mentioned in the utilization notice. It is recommended to have 2 V cables, one in use on the field, and the other one carried (in one of the wing compartments so that in the field the glider may be ready to take off with any kind of towing system and can also be used as ready replacement). The simplified cable and nylon 5 to 6 mm is in this case the lighter and less cumbersome one.

Trolley

This trolley is known as B. C. trolley and is the classic type II wheel trolley prolonged with a tube carrying movable wheel. Carefully placed the sheet metal emplacement at the rear of the skid in order that the hole in the skid falls exactly on the pin of the trolley when the rear of the skid slides into its track. This rear support must be high enough so that the glider on trolley presents an incidence very small to facilitate movements or parking conditions in windy weather.

The tube carrying movable wheel can be made removable for ease of transportation. For example, when an aircraft is used to tow the glider from a field where it launched. If it is desirable to move the glider on the ground with the two wheel trolley only, it will be necessary to drill another hole on the other side of the glider along the vertical passing through the empty glider centre of gravity, maintaining the equilibrium of the skid with the lifting rod pushing the glider on the leading edge.
"In the Bill of Material commercial air wheels for the trolley and the rear wheel are mentioned".

Trailer

If it is necessary to build the glider to close tolerances - and use it carefully - the trailer construction is left entirely to the builder's discretion, as long as the following conditions are respected:

The trailer will be light and rigid longitudinally, laterally and in torsion. It will not have suspension springs which would produce lateral oscillations but will have air wheels blown to a light pressure (preferably aircraft wheels with roller or ball bearings) with thin walls (blown to approx. 7 PSI). With this arrangement the obstacle is absorbed by the wheel and the trailer is completely stabilized. The glider will rest on its skid parallel to the trailer axle centre line and will be held by a hook of thick cross section passing near the skid through the shock absorber of the main frame and by the pin passing through the skid hole. The rear part of the skid will rest on a supporting block which will allow the glider to be loaded firmly, just like for the trolley.

The left wing will be held in a lined trestle at rib 20 1 meter deep and the incidence as described on drawing 8 will be maintained. (The lining can be made of foam rubber glued with bostic for rubber-wood adherence). The glider will have a natural lateral incidence as indicated in drawing 8 to avoid lifting by lateral wind. The right aileron will be immobilized by its surface control locks and the elevator by the foam rubber pieces mentioned previously while the rudder will be held by the system designed for this purpose. The pylon and the nose cover will be fixed to the trailer floor with an arrangement similar to the one used on the glider which is a lining of foam rubber of felt.

(Then if you wish you may provide an awning on the trailer supported by tubes between the floor and the beam under the wing, which will give you a nice tent for camping).

Conclusion

Briefly: The performance of your glider will depend as much on the quality of the construction as the availability and quality of the thermals.

XI - APPENDIX TO THE CONSTRUCTION INSTRUCTION

NOTE: Regarding the Construction and Inspection of Certain Parts.

The important pieces to be welded especially: control column, torsion tube, intermediate horn and elevator horns must be welded by an approved welder. The parts mentioned above must in addition be controlled by an official organization (in France, Bureau Veritas).

The rudder bellcrank in dural 6 mm, ¼" located in the fins must be folded right after heat treatment by an expert in this type of work. They will also be officially inspected.

It will be the same for the rear support of the torsion tube if it is made of dural. The hinges if built in accordance with the air specs will be without play: if necessary replace the pin by one slightly bigger still bearing free movement. The hinges components for the rudder may be taken from the hinge material 8/10, provided the thickness, the pieces and the method of support is the same. See AN hinges on Bill of Material.

All these pieces may be supplied as specified on prefab. Elements Sheet.

The spar must be specially controlled by the official organization before installing the second web.

All pulleys must be ball bearing type.

As far as the Aerazur Hooks are concerned (see prefab. Parts), it is emphasized that:

1. only hooks having a gap of no more than 2.5 mm between the hook and the safety lock should be used on the A. V. 36.

2. The additional spring mentioned at the beginning of this instruction should always be installed. This modification is now shown on drawing.

MAY YOU BE REMINDED THAT NO MODIFICATION IS TO BE BROUGHT TO THE CONSTRUCTION BY THE BUILDER IN ACCORDANCE WITH THIS CONTRACT.

THE ONLY MODIFICATIONS WHICH MIGHT BE ACCEPTED BY THE OFFICIAL SERVICES CONTROLLERS MIGHT BE ONLY THOSE WHICH WOULD HAVE RECEIVED FORMAL ACCEPTANCE (WRITTEN) BY MR. FAUVEL OR WHICH WOULD HAVE BEEN INDICATED BY HIM AND WOULD HAVE BEEN DETAILED VERY ACCURATELY.

IN CANADA THESE MODIFICATIONS MUST ALSO BE APPROVED BY THE DEPARTMENT OF TRANSPORTATION BEFORE CERTIFICATE CAN BE ISSUED.