

BUD NOSEN MODELS

MR. MULLIGAN

BUILDING INSTRUCTIONS

Read instructions and study plans carefully before starting construction. Use Epoxy type glues on all plywood and spruce joints. Use epoxy also on all fuselage joints from and including rear of cabin forward. Use Titebond or Elmers glue on all other joints. For ease of sanding, Sigmant may be used on sheet joints. Use stick and wood as per material list only. FUGURE FOR NO WASTE!

FUSELAGE:

Begin fuselage construction by building two identical crutch members over shaded areas on side view. Use 1/4 x 1/2, 1/4 x 1/4 and 1/4 x 3.8 stick stock as shown. Remove each from plan when dry, and pin both down over top of plan view. Work on a flat table or board. Leave pinned down over top view until instructed to remove. Add crutch cross members from stick stock at this time. Now, working from nose to tail, add the following parts. 1/4 ply firewall top, BHD 1A, BHD 2B, join 1/8 x 3-5/8 x 11 and 1/8 x 5-3/4 x 11 ply and add to crutch. Add a 1/8 x 1/2 balsa filler strip on outside of crutch from the front of built up ply bulkhead forward. See section B-B and plan or top view. Study section B-B. Note that BHD 3A is in fact the joined ply bulkhead. Note also the 1/4 square x 3 inch balsa stick. This stick must be flush with the filler strip to outside and will therefore protrude 1/8 inch to outside of ply BHD 3A. Add BHD 2A. Note that it glues to 3A and sits on top of the 1/4 sq. stick and BHD 2B. It will only fit properly one way. BHD is in fact a stringer for the 1/8 sheet later. Add BHD 2C to the top of 2A. Try to set at proper angle. Make sure all bulkheads remain vertical.

Next laminate WC 2 and WC 3 upper cabin pieces. Make one right and one left--balsa must be to outside. Drill 3/16 inch diameter holes at punch marks. Next build two assemblies over the side view consisting of: 1/4 balsa side sheet, 1/4 x 1/4 spruce, F3, F4, F2, and upper cabin lamination. Make one right and one left--balsa to outside as before. When dry remove from plan and add F6 doubler strip. These are to be installed on what will be the inside of the cabin. They serve to tie the vertical members to the 1/4 side sheet.

Next join 1/8 x 2-7/16 x 11 and 1/8 x 5-3/4 x 11 ply and add to crutch at rear of cabin Add two window or cabin assemblies to crutch, add stab saddle part F-1 with 1/8 x 3. Sheet the top rear of the fuselage with 3/16 x 2-1/2 x 12 balsa. Add 1/8 x 1/4 stringers to rear top of fuse and rear sides. After the top and side stringers have been installed, a filler will have to be added to each corner on top. This can be a 1/4 square stick, or as we have found a 1/4 inch dowel works very well, giving a ready made curve from top to side. 1/4 x 3/8 spruce cabin braces may now be added. Sheet nose from 1/4 sides forward with 1/8 x 3--Not cowl. Add to top of cabin center WC 2 and WC 1 cross pieces. Add 1/4 x 6 dowels. Allow all joints to dry and remove from plan at this time.

Next assemble BHDs 4, 5, 6, see detail A. Join BHDs 7 and 8 together and back up joints with scrap 1/8 sheet. Add short pieces of 3/8 x 1/2 to bottom of crutch where BHDs 1 attach. Add BHD 1 front, then epoxy firewall to BHD 3 for floor and also mark one for the shock strut holes. Drill 5/32 holes in one BHD for shock struts. Using the holes in BHD 3 as a guide drill 5/32 holes in the two 1/8 x 2 1/4 x 1 ply doubler strips. Epoxy one on each side of one BHD 3 as added support of shock struts. Add BHDs 2.

Using floor for spacer add BHDs 3. Drill each landing gear half for four 3/16 inch bolts. See LG detail for location. Using gear for a guide drill matching holes in floor. Bolt gear in place and install floor with gear assembly. Laminate BHDs 1 and 4 and install. Add a 1/4 square stringer to front bottom to help keep bulkheads straight. Add BHDs 5, 6, 7, and 8. Add tail block and 3/16 square stringers. A fuel tank box should be built up at this time prior to adding 1/4 square front lower stringers. Add 1/2 x 1 stick around firewall after lower sheeting is in place. Make up motor mount box using MM1, MM2, as shown. Epoxy 3/8 x 3/8 ply strips to sides of box. MM 3 can then be glued or screwed to box. We prefer to screw MM3 on because it can then be removed for fuel tank access. Add F5 wing strut mount drilling 3/16 inch holes at locations shown. Add remaining 1/4 square stringer note detail C. Add shock struts trapping in place with 5/32 wheel collars as shown. Plank lower front with 1/8 x 3 sheet at this time.

COWL:

Refer to detail D and drill one pair of ply cowl rings at locations shown with a 3/32 dia. drill. These will be the cowl mount points. Pin a undrilled cowl ring upright over side view of cowl--front. Pin a drilled cowl ring over side view of cowl-rear. Add 1/4 square stringers, keeping uprights square to board. Allow to dry and remove. Stand completed half on rear ring. Epoxy remaining drilled half to rear ring on partly built up cowl. ~1en dry reverse procedure and glue front cowl ring in place. Add 1/4 square sticks on second half. Trial fit plastic nose ring in place. Sand down built up cowl if needed so ring will fit tight or trim ring back to fit. We have found it best to sheet the cowl with the 1/32 ply by wrapping it right around. We have found the quick glues such as Hot Stuff to be the best for gluing plastic parts together or to wood. The plastic can be but glued to the edge of the 1/32 ply or, we have found it easier to slip it over the 1/32 ply and then fill in behind it with primer or Micro Balloons. Sand and fill cowl as needed. Cut rocker arm covers from plastic sheet, as shown on detail D and side view of cowl trial fit, then glue in position. Add 1/2 x 1/2 x 3/4 pine blocks to firewall. Using back cowl ring as a guide mark blocks and drill 1/16" hole in each. Screw cowl in place.

MISCELLANEOUS:

Carve and sand tail block, notch 1/4 x 3/8 for brass tube, build up fin and rudder sections using parts as shown. Bend tailwheel wire making sure to put the brass tube on before making top bend. Hinge rudder and glue fin to fuselage. Note that the leading and trailing edges of the fin can be extended down in to the top of the fuselage for a much stronger joint at body. We have found it better to add the R5 parts after the rudder is in place to get the proper shape. As you will note the R5 parts are in fact a part of the body and do not move with the rudder.

STAB AND ELEVATOR:

Build stab and elevator over plan on a flat surface, using parts and sticks as shown. Use epoxy type glue on 3/8 x 6 dowel. Note stab support locations for 3/16 dowel that is installed after stab and fin are in place--we would suggest after covering.

WING CENTER SECTION:

Finish wing center up by tack gluing 2-1/32 x 6 x 12 ply pieces in place. Laminate 1/16 x 3 sheet to top of 1/32 ply. Hinge at rear as shown and drill for hold down screws in front after setup. Radio and equipment installation will be done through this hatch.

WING PANELS:

Please note the wing plan calls for 0° dihedral. As 0° dihedral wings look like they are drooping, the model will in fact look better if a 1/2 inch or so dihedral is added to each tip. The amount is not critical.

Pin down trailing edge sheet and rear 1/4 square spar in place over plan. Add ribs starting with the three plywood ribs at center. Drill the outer ply rib with a 3/16 inch dia. drill bit at center punch marks. Continue adding ribs working out to the aileron. Add tip rib and aileron spar, trim ribs to fit along aileron spar and pin in place, add top trailing edge sheet, top rear and forwards spars. (Note: cut lower spar to raise tip rib, so top of wing is flat--see note on plan.) Remove wing from plan and pin upside down over plan. Add forward spar and bottom leading edge sheet. Remove from plan and pin down again right side up. Add partly shaped leading edge and trim for proper fit. Add top leading edge sheet along with wing webbing. Build wing tip up over plan and add to wing. Top leading edge sheet will be straight and bottom leading edge sheet will angle up. Make sure you have 10-24 nuts very secure in wing panels so they do not pullout after model is complete. Also note part W 1 on tip is two layers thick. Make up gussets and add to trailing edge of tip. Add 3/8 x 6 dowels, wing strut and interplane mounts, add bellcrank mount, bellcrank and pushrod, glue cap strips to ribs. Do not sheet over center ribs until set up is complete. As wing struts are fully functional, make sure strut mounting parts are well in place. Use gussets and beef up as much as possible. A failure of the strut mounting assembly will result in certain destruction of the aircraft.

AILERONS:

Pin wing over plan, and build ailerons in place. Trim and pin lower 3/32 sheet in place. Shim aileron tip end to match wing. Shape and add spar. (See rib section) Add ply horn mount and ribs. Sand to fit the wing and add upper 3/32 sheet.

WING STRUTS:

While building struts check fit against your model as slight differences will be noted from one model to the next as the wing is trued, etc. Make one right and one left strut. Mark at strut arm as shown on plan, as they are easy to mix up. One end of each spruce strut should be notched for 1/16" aluminum. Build strut over plan. USE SLOW DRY EPOXY, remove from plan and notch lower end for aluminum. Use a bandsaw or a vice and saw by hand. Fill slots with slow dry epoxy and inset aluminum (bend to approximate angle first) Fill slots on top end of strut and insert aluminum also. Drill through with 3/32 dia. bit in several places and pin with round toothpicks. Drill aluminum ends with 3/16" bit to fit bolts and file corners round to complete the struts.

SET UP:

Block fuselage up square, block up wings to 1/2 inch (not critical) dihedral each and bolt in place. Adjust bend in aluminum strut fittings to proper fit, put struts in place and mark and drill wing a fuselage mounts. Bolt struts in place and fit interplane struts, wrap struts with thread and epoxy in place to main strut. Hinge the elevators and the rudder also if not done up to this time. Epoxy all strut and wing nuts in place. It is a good idea to glue scrap 1/8 ply pieces along side each nut to insure against turning. Drill or cut an opening for strut screw access--see detail C.

FINISH:

Make up a heavy paper template for windscreen pattern. Trim to fit properly and transfer to heavy clear plastic. We have found that providing a windscreen pattern is not much help as small differences in building throw the pattern completely off on a model this size. Glue windscreen in place after covering. Add side windows from thin plastic or clear MonoKote after covering. For covering we recommend super Coverite or Permagloss Coverite because of its superior strength. Using conventional silk and dope is OK if you use the low shrink type dopes. Shrinking the fabric too much will cause stringers to sag badly. The overall color of the model is white. Add decals as shown on plan at the three view provided. Burn marks can also be added as photos of the original show a lot of black streaking. Add pant fairings if desired. Make from lite cardboard or 1/64 ply. Body fairings are best made with Sig Epox-O-Lite.

ABS PLASTIC PARTS:

Trim and sand parts for a good tight fit at joints. Lay a strip of plastic inside of one part and allow it to hand out of edge to be joined about 1/8 inch or more. Glue strip in place using dope thinner or Hot Stuff.

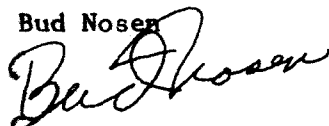
RADIO:

Install in a conventional manner, as far forward as possible or as needed to help balance the model. Support pushrods to tail section very well in order to avoid flexing. Install aileron servo in center section of wing. To take model apart you will have to unsnap quick links from servo. We did all test flying with one servo on each function--that is one servo for aileron control, one for elev. etc.

ENGINE AND PROP:

If a .60 is used it would have to be a good one with a pump. A .76 or larger is best. Min prop size is 16-4-1/2 Rev-Up. If a prop drive type unit is used you must use a 10 pitch prop or greater turning at least 4800 RPM. Set elevator throw at least 1-1/4 inches up and 1-1/4 inches down. Rudder throw should be at maximum as well as aileron throw. When flying the model, use both rudder and aileron as under certain condition ailerons may not be effective. The model if built as per plan tends to climb; start out with 1/4" down trim.

Bud Nosen

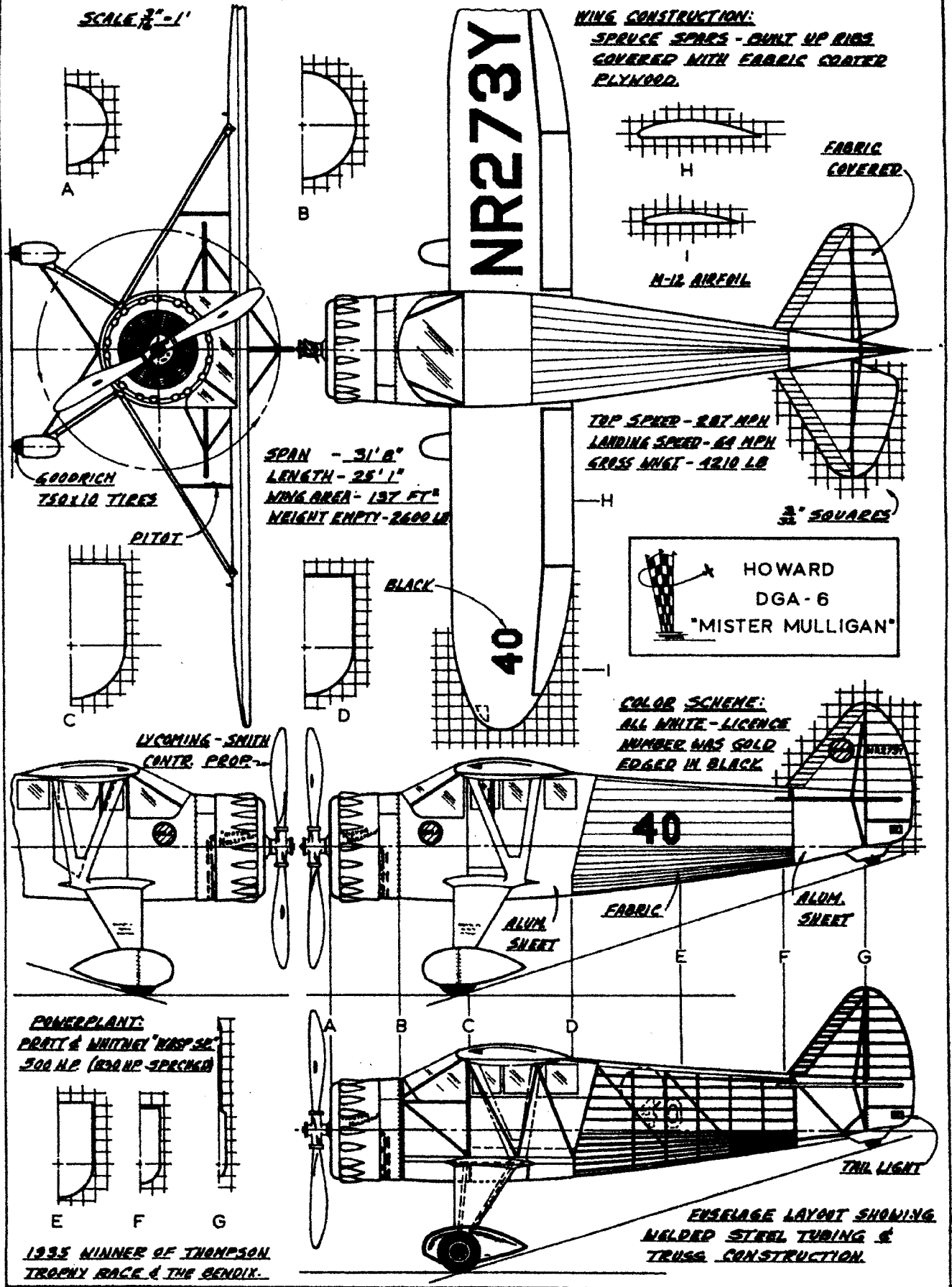


MISTER MULLIGAN MATERIALS AND USE LIST

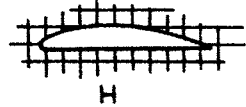
Our original Mulligan plan called for many odd lengths and sizes of balsa stick and sheet stock. In order to simplify construction and material use, we now pack where possible all standard lengths of wood. Try to figure for no waste.

4	3/32 x 2-1/2 x 48	use for wing leading edge sheet
4	3/32 x 2 x 30	use for wing trailing edge sheet out to ailerons
7	1/8 x 3 x 38	use where 1/8 balsa plank is indicated.
2	3/32 x 3 x 36	use on wing center section--rear half
1	1/16 x 3 x 48	cut up and bond to 1/32 ply to make up center section hatch
2	1/16 x 2-5/8 x 36	cut up for wing webbing
2	3/16 x 2-1/2 x 12	rear top fuselage plank
1	3/8 x 1/2 x 36	horizontal stab stick
1	3/8 x 1/2 x 18	horizontal stab stick
1	3/8 x 3/8 x 18	horizontal stab stick
4	3/8 x 1/2 x 30	horizontal stab sticks and rudder
4	3/16 x 3/8 x 36	horizontal stab ribs
2	1/4 x 1 x 21	aileron caps--see plan
2	1/4 x 3/4 x 21	aileron cutout caps on wing--see plan
18	3/32 x 1/4 x 36	use for wing rib cap strips
2	1/2 inch angle cut	leading edge--48 inches long
3	1/4 x 1/4 x 24	use as lower body stringers
2	1/4 x 1/2 x 42	use for body crutch
2	1/4 x 3/8 x 36	use for body crutch
2	1/2 x 1/2 x 18	use for body crutch
10	1/4 x 1/4 x 36	use for body crutch
1	1/4 x 3/8 x 21	use for upper body cross pieces
2	1/4 x 1/2 x 36	use for body crutch
1	3/8 x 3/8 x 12	use as indicated
19	1/8 x 1/4 x 30	upper rear body stringers
11	3/16 x 3/16 x 30	rear lower body stringers
2	1/8 x 3/8 x 36	rudder ribs (cut up as per length on plan)
1	1/2 x 1 x 42	glue to firewall bulkhead as shown and round to shape shown
6	1/2 x 1/2 x 3/4	pine cowl mount spacers
2	1/4 x 1/4 x 3-1/2 spruce	--use for cabin supports
8	1/4 x 1/4 x 48 spruce	-- do not cut up--use for wing spars only
4	5/16 x 3/4 x 30 spruce	-- notch ends--shape as shown--inset alum part wing struts
1	1/4 x 3/8 x 48 spruce	cut up and use on top of cabin
4	3/16 x 16 inch dowels	use for tail plane supports
2	1/4 x 36 dowels	
2	1/4 x 6 dowels	
5	3/8 x 6 dowels	
1	tail block	shape to lower rear of fuselage
2	1/8 x 5-3/4 x 11 ply	use for cabin bulkhead
1	1/8 x 2-7/16 x 11 lite ply	use for cabin bulkhead
1	1/8 x 3-5/8 x 11 ply	use for cabin bulkhead
4	1/8 x 1 x 2-1/2 ply	use for doublers both sides of BHD where shock strut mounts
2	1/4 ply strut wedges	
2	3/8 x 3/8 x 4 1/4 ply	use on motor mount assembly
2	3/8 x 3/8 x 3 1/2 ply	use on motor mount assembly
2	1/32 x 6 x 12 ply	use to make up cabin access hatch (wing center section)
1	1/32 x 4 x 38 inch ply	cowl piece--cut to proper length
2	1/4 inch plywood	firewall halves--
1	right hand shock strut	
1	left hand shock strut	
1	3/32 x 7 inch wire	-- bend up for tailwheel assembly
2	strut support wires	
2	1/4 inch balsa	fuselage sides

SCALE $\frac{3}{8}$ " = 1'



WING CONSTRUCTION:
SPRUCE SPARS - BUILT UP RIBS
COVERED WITH FABRIC COATED
PLYWOOD.



FABRIC COVERED



H-12 AIRFOIL

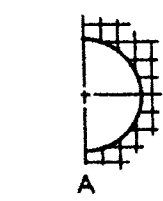
SPAN - 31' 8"
LENGTH - 25' 1"
WING AREA - 137 FT²
HEIGHT EMPTY - 2600 LB

TOP SPEED - 807 MPH
LANDING SPEED - 64 MPH
GROSS WGT - 4210 LB

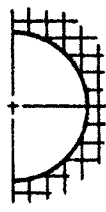
$\frac{3}{8}$ " SQUARES

HOWARD
DGA-6
"MISTER MULLIGAN"

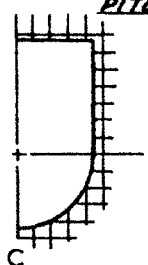
COLOR SCHEME:
ALL WHITE - LICENSE
NUMBER WAS GOLD
EDGED IN BLACK



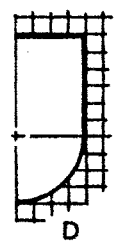
A



B

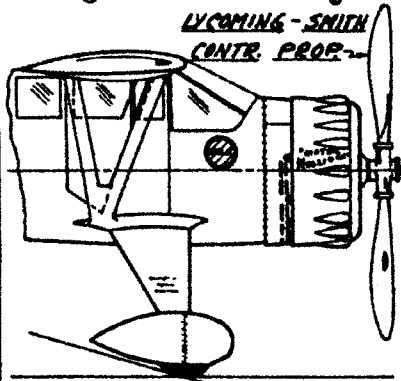


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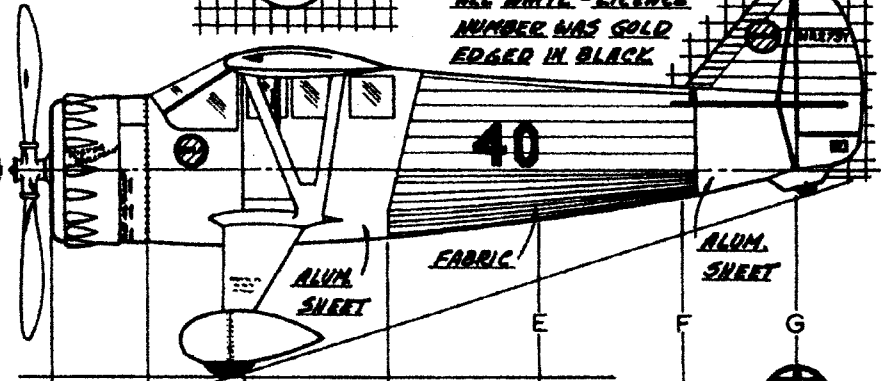


BLACK

40



LYCOMING-SMITH
CONTR. PROP.



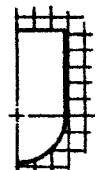
FABRIC

ALUM. SHEET

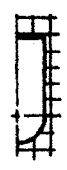
ALUM. SHEET

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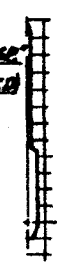
POWERPLANT:
PRATT & WHITNEY "RAMP 30"
500 HP (300 HP SPEC'ED)



E



F



G

1935 WINNER OF THOMPSON
TROPHY RACE & THE BENDIX.

FUSELAGE LAYOUT SHOWING
WELDED STEEL TUBING &
TRUSS CONSTRUCTION.

TAIL LIGHT