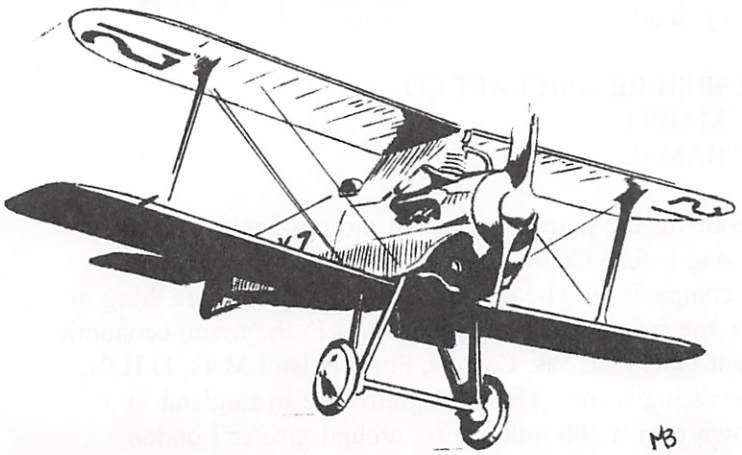
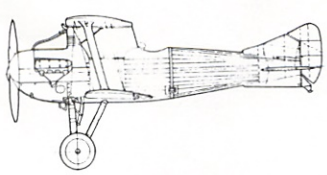
CROSSWINDS

No 89



The Gloucestershire Aircraft Co. Mars I

Crosswinds Editor
Russ Brown
4909 N. Sedgewick Rd.
Lyndhurst, OH 44124



CROSSWINDS
THE JOURNAL OF THE CLEVELAND FREE FLIGHT SOCIETY

Editor: Mark F. Braunlich Issue 89

This issue marks my debut as a guest editor of Crosswinds. This issue also marks the end of my active association with the CFFS. As this is being written, I have just accepted a new position as a design engineer with a company in Princeton, IL. Work on this month's plan was started in April following a lay-off from my job here. The decision to leave the Cleveland area has not been an easy one. Looking back on my 41 years here, many of the high points have been Sundays spent on the flying field with my friends here. Good bye to you all.

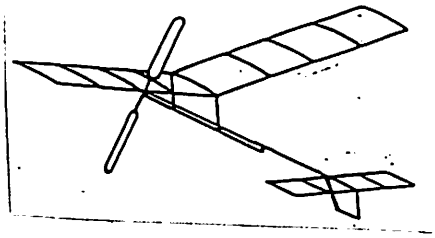
THE GLOUCESTERSHIRE AIRCRAFT CO.
MARS I
"BAMEL"

The idea of modifying war surplus fighter aircraft for the purpose of racing did not begin with the Thompson and Bendix racers of 1946-1949. Long before *Cobra II, Beguine*, or Anson Johnson's highly modified P-51D, the struggling aircraft companies in Great Britain did much the same thing in an effort to keep the name of their firms before the public and government eyes in the tough economic times which followed on the heels of World War One. S.E.5as, Camels, Pups, Bristol M.1s, D.H.9s, Martinsyde F.4s, and Avros were all part of the racing scene. The prestigious race in England in those days was the Aerial Derby which was flown over a 100 mile course around greater London. The subject for this month was built for the 1921 Aerial Derby by the struggling Gloucestershire Aircraft Co. (later re-named Gloster).

The Mars I was designed and built in an unbelievable four weeks. It was the brainchild of none other than H.P. Folland who had designed the S.E.5 at Farnborough before moving over to the British Nieuport Co. where he designed the ill-fated Nieuport Nighthawk. The A.B.C. Dragonfly radial engine prevented the Nighthawk from achieving success, but the airframe was a sound design and many of the war surplus airframes were purchased in 1920 by the Gloucestershire Aircraft Co. with the idea of the potential for success by installing the Armstrong Siddeley Jaguar or a Bristol Jupiter. These Nighthawks were called Mars VI and were eventually sold to foreign governments, but to achieve mere survival, the tiny G.A.C. had to be recognized. Before the British Nieuport Company collapsed, its famed designer, Harry Folland, began moonlighting for G.A.C., supervising the conversion of Nighthawks for the Japanese. As the 1921 Aerial Derby approached, he was encouraged to see what could be done with a Nighthawk for the race. Using a Nighthawk fuselage, tail, and u/c, coupled to the marvelous 450 HP, 12 cylinder Napier Lion engine and very small new wings braced with "I" struts reminiscent of his S.E.4 of 1914, one of the most successful racing aircraft ever built was quickly pieced together.



The Nieuport Nighthawk was the starting point for the Mars I.



THE CLEVELAND FREE FLIGHT SOCIETY

NOTE!! Change of date

A.M.A. sanctioned **Indoor Contest** for free flight model airplanes.

SUNDAY, April 6, 1997 Kent State University 8:00 a.m. to 5:00 p.m.

Flying Site - KSU Field House, Summit Road (near Dix Stadium)

SCHEDULE of EVENTS

8:00 a.m. -- Building opens

8:30 a.m. -- 1. *EZB* - - Scoring will be the longest of five official flights (30 seconds). Two attempts equals one official.

to

2. *EZB/PENNY PLANE COMBINED* - - Juniors only.

4:00 p.m.

3. *NOVICE PENNY PLANE*

4. *MINI-STICK* - - Best flight of 5 officials. 20 second minimum. 2 attempts/Flight.

9:30 a.m.

5. *SEVEN GRAM BOSTONIAN* - - A.M.A. Rules.

to

6. *JETCO R.O.G.* (J,SO) - Club Rules remain the same, except that the prop must be 5 1/2" max. May be cut down and have pitch altered.

4:00 p.m.

10:00 a.m. to 4:00 p.m. **F.A.C. EVENTS**



Caudron C.460

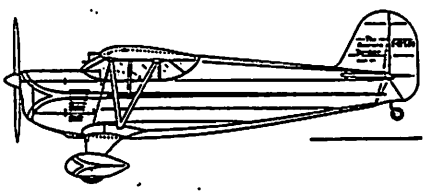
7. *Hi-Wing Peanut* (Experimental ex. Lacey, Fike etc.)

8. *Hi-Wing Peanut* (Production types).

9. *Peanut Scale* (low, mid, shoulder, bi, multi-wing, parasol). Tractor models only, no pioneer models.

10. *W.W.I Biplane Combat* - 4:00 p.m.

11. *Golden Age Scale*



12. *W.W.II No-Cal Combat.* Flown at 4:30 p.m.

13. *No-Cal Profile Scale* (total of three flights) 5 grams and under without motor.

14. *No-Cal Profile Scale* (total of three flights) Over 5 grams without motor.

15. *Dime Scale* (current FAC rules, wingspan 16"max.)

For Your Information

1. Steering of Models: as per A.M.A. rulebook.

2. Entry Fees: - *Open* - $15.00, *Senior* - $10.00, *Junior* $2.00

3. **VERY IMPORTANT** - You must provide your own table and chair.

4. KSU Fieldhouse is a non-smoking facillity. Also, please wear atheltic type shoes.

5. There is ample free parking outside the fieldhouse.

AWARDS

1st through 3rd - All events except mass-launch.
W.W.I Peanut and No-Cal Combat
1st place award only.

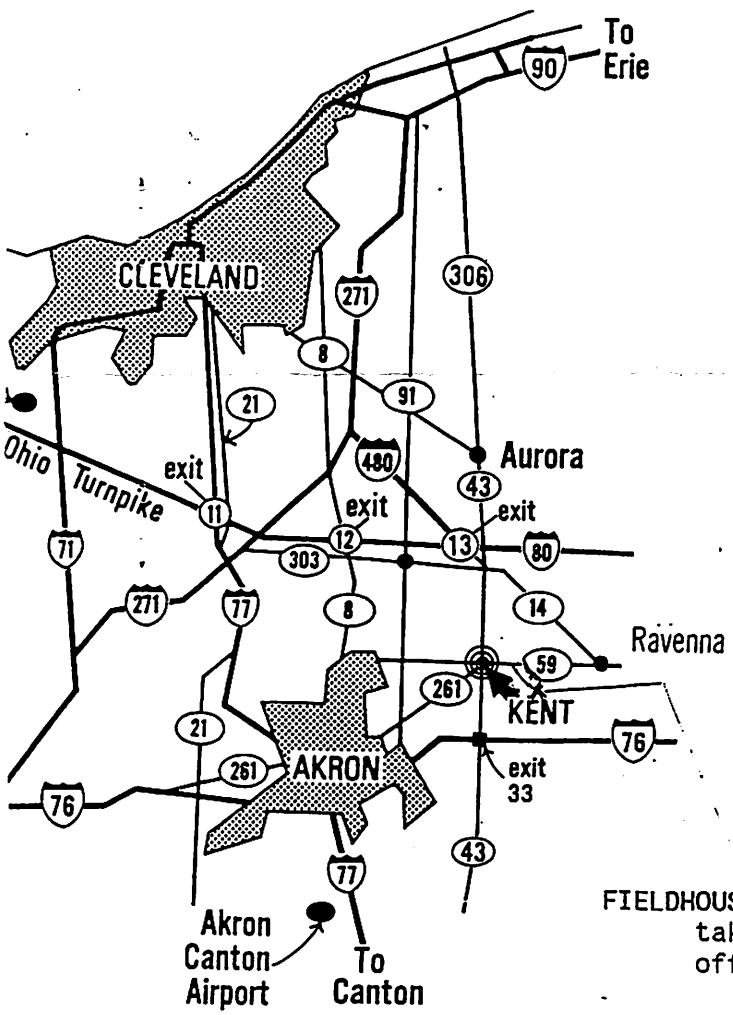
2nd place - minimum of 7 entries in the event.
2nd and 3rd place - minimum of 10 entries in the event.

SPONSORS - *Diels Engineering, Parma Hobby, CAS.*

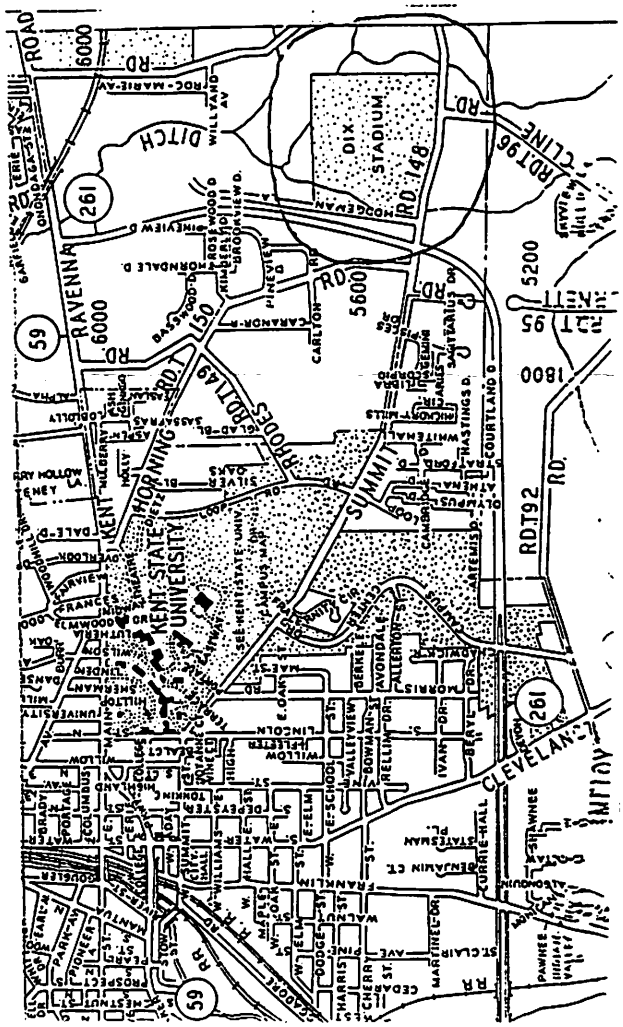
CONTEST DIRECTORS

Michael C. Zand
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216-357-7361



FIELDHOUSE
take 261 South
off 59.



The schedule was extremely tight and there were pre-race problems with exhaust manifolds and carburetor intake pipes. The rear fuselage and tail skid were damaged only four days before the race, repairs not complete until the day of the race. Despite all this, it not only won the 1921 Aerial Derby on 16 July in the hands of (Jimmy) J. H. James, but it went on to win again in 1922 and 1923 and established a British speed record of 196.4 mph on 12 December 1921. The airframe was cleaned up over the years and eventually sold to the RAF, mounted on floats and became a trainer for the 1925 Schneider Trophy contest.

This month's plan depicts the original 1921 Aerial Derby version. As with most racing planes, then as now, the Mars I was subject to continuous refinement. There were at least three sets of wings, three different vertical tail configurations, different radiator styles and differences in the cowling, undercarriage, etc. Anyone contemplating doing another version should be aware that much research is required to get it right. Thomas Foxworth's **The Speed Seekers** is a good place to start.

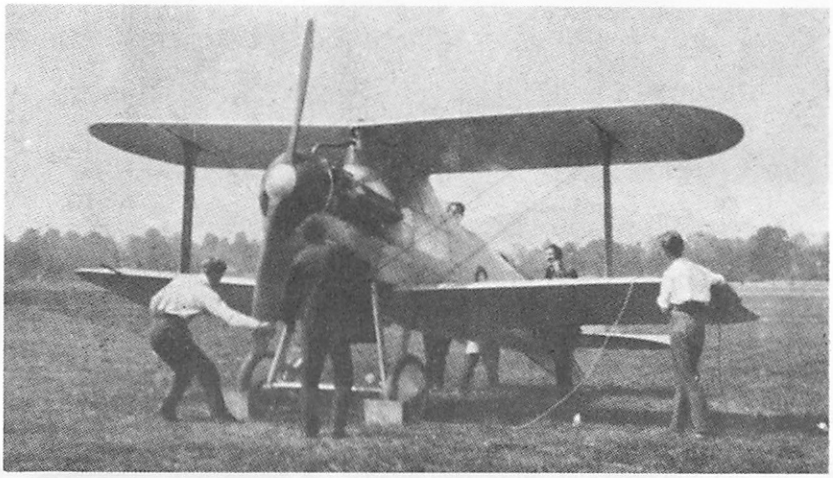
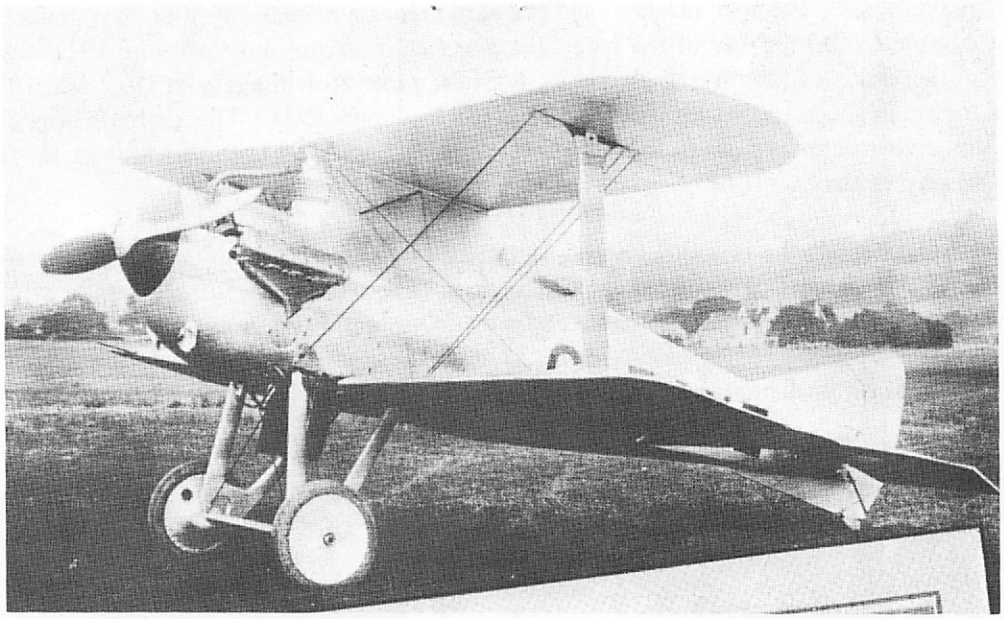


Photo shows Mars I as it appeared in the 1921 Aerial Derby but before race numbers were applied.

The color scheme for the 1921 Aerial Derby was overall aluminum dope on the fabric surfaces, natural metal cowls, and red registration G-EAXZ on the fuselage sides only, and red #21 on the rudder and under all four wing tips. Photos of the Mars I in this scheme are rare. Only two photos have come to the attention of this editor and neither are reproduced herein. One is easily found on page 331 of **The Speed Seekers** (available in the Cleveland area through the Cuyahoga County Public Library and kept at the Mayfield Branch). The second photo can be found in the September 12, 1921 issue of *Aerial Age Weekly*, page 7. The article may be found in bound form at the main branch of the Cleveland Public Library but cannot be loaned out.

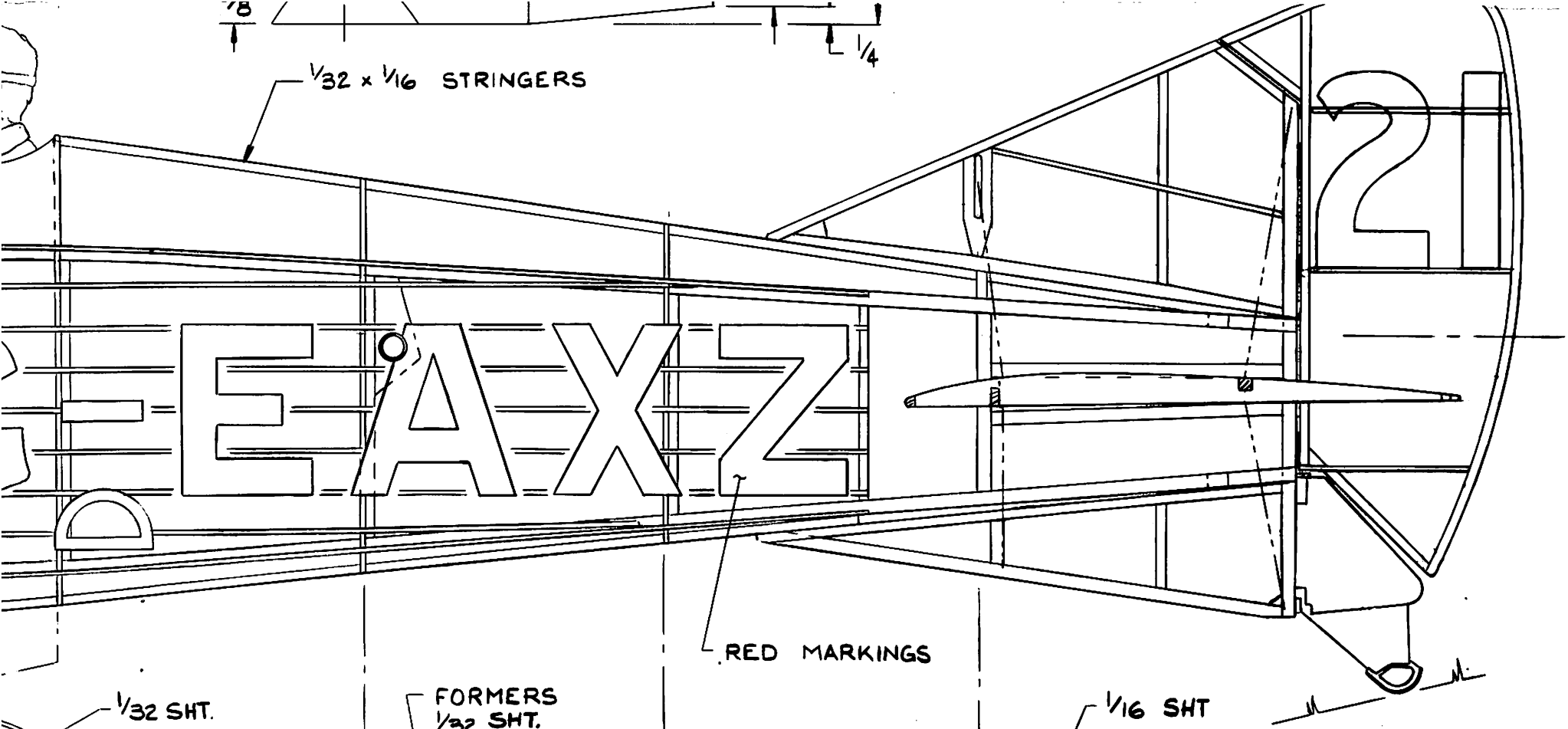
There are at least four different three-views available in the published material listed in the bibliography. The best available for model documentation purposes is that found on page 72 of Derek N. James' **Gloster Aircraft since 1917**, Putnam, London. This book is currently out of print and difficult to find. This three-view shows the pre-race configuration as first test flown on 20 June 1921. This differs from the race day configuration in that the wheels were originally reversed to achieve a wider track, thinner propeller, and exhaust manifolds on all three cylinder banks.

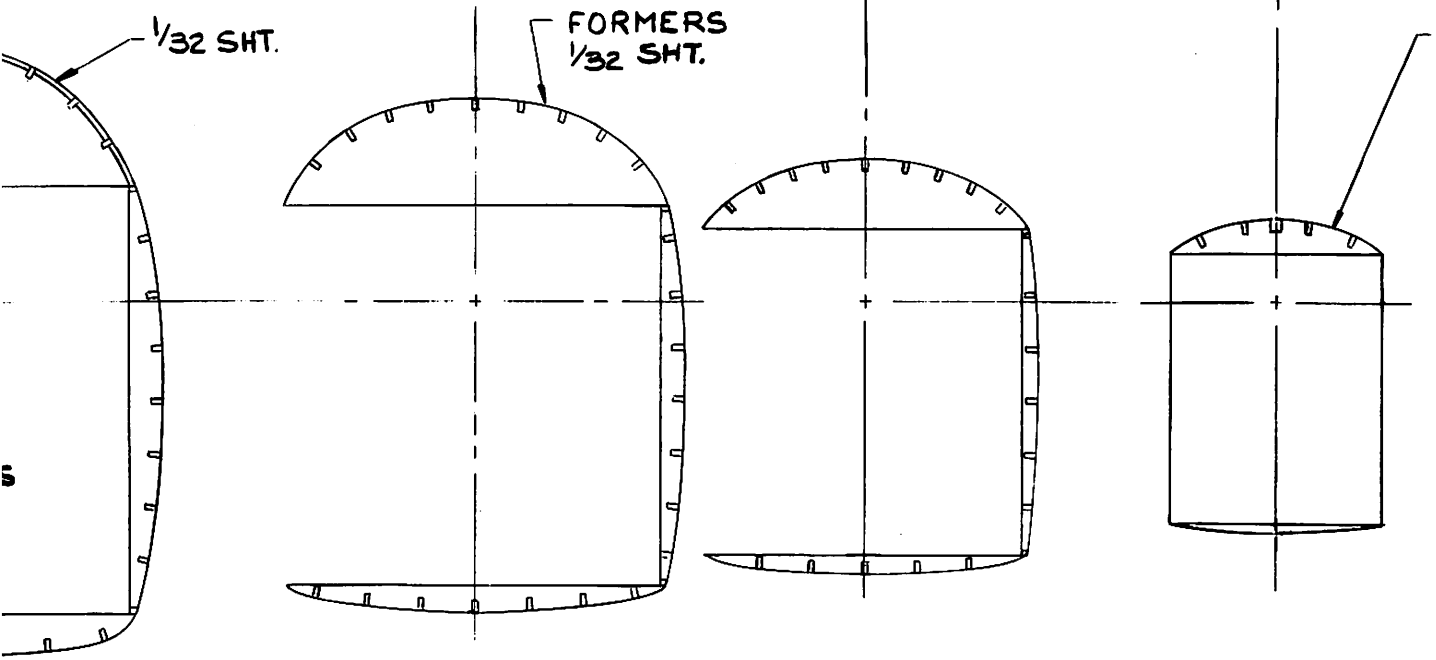
Without good three-views, drawing a plan of the Mars I is a challenge. It was pieced together much like the original Mars I. Start with a decent drawing of the Nieuport Nighthawk by Joe Nieto in the July, 1953 M.A.N., add the Napier Lion engine from the July, 1987 issue of WWI Aero together with a few well-documented bits and pieces from the S.E.5a (the Nighthawk used many S.E.5a parts), wheels from a Sopwith Camel, and employ a whole lot of study of Bamel photos. Many of the published dimensions of the Mars I/Bamel are conflicting and obviously incorrect once you start to make a layout of the fuselage side elevation. The resulting plan isn't perfect but perhaps only this editor can spot the trouble spots!



The two photos on this page show the Mars I as it looked in June, 1921 and may have been taken on 20 June on the occasion of its first flight from Hucclecote. Part of the upper cowling forward of the engine is removed. Note the reversed wheels, exhaust manifold and thin propeller, all revised by race day on 16 July. The three-view in Derek N. James' **Gloster Aircraft since 1917** depicts the aircraft in this configuration.







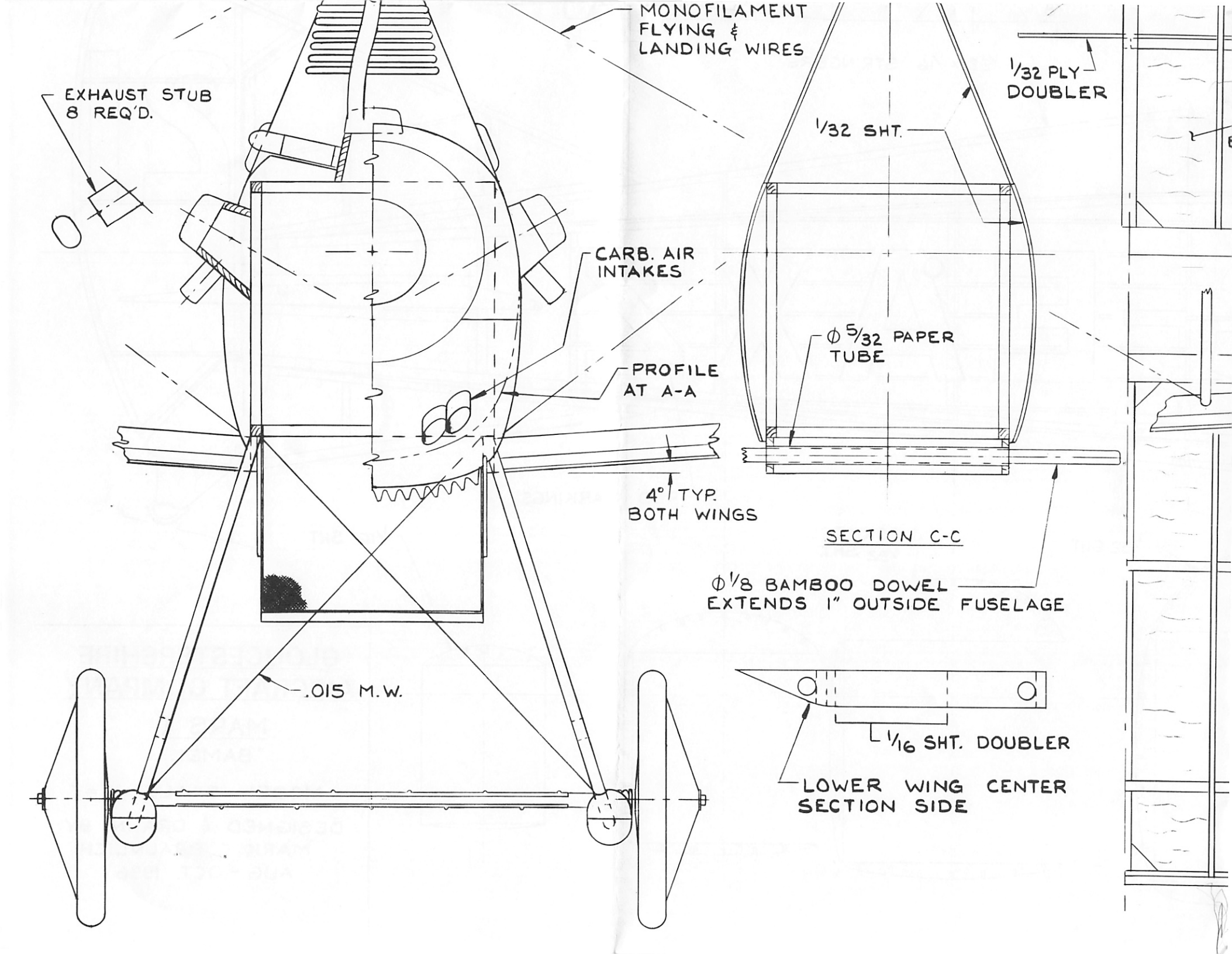
GLOUCESTERSHIRE AIRCRAFT COMPANY

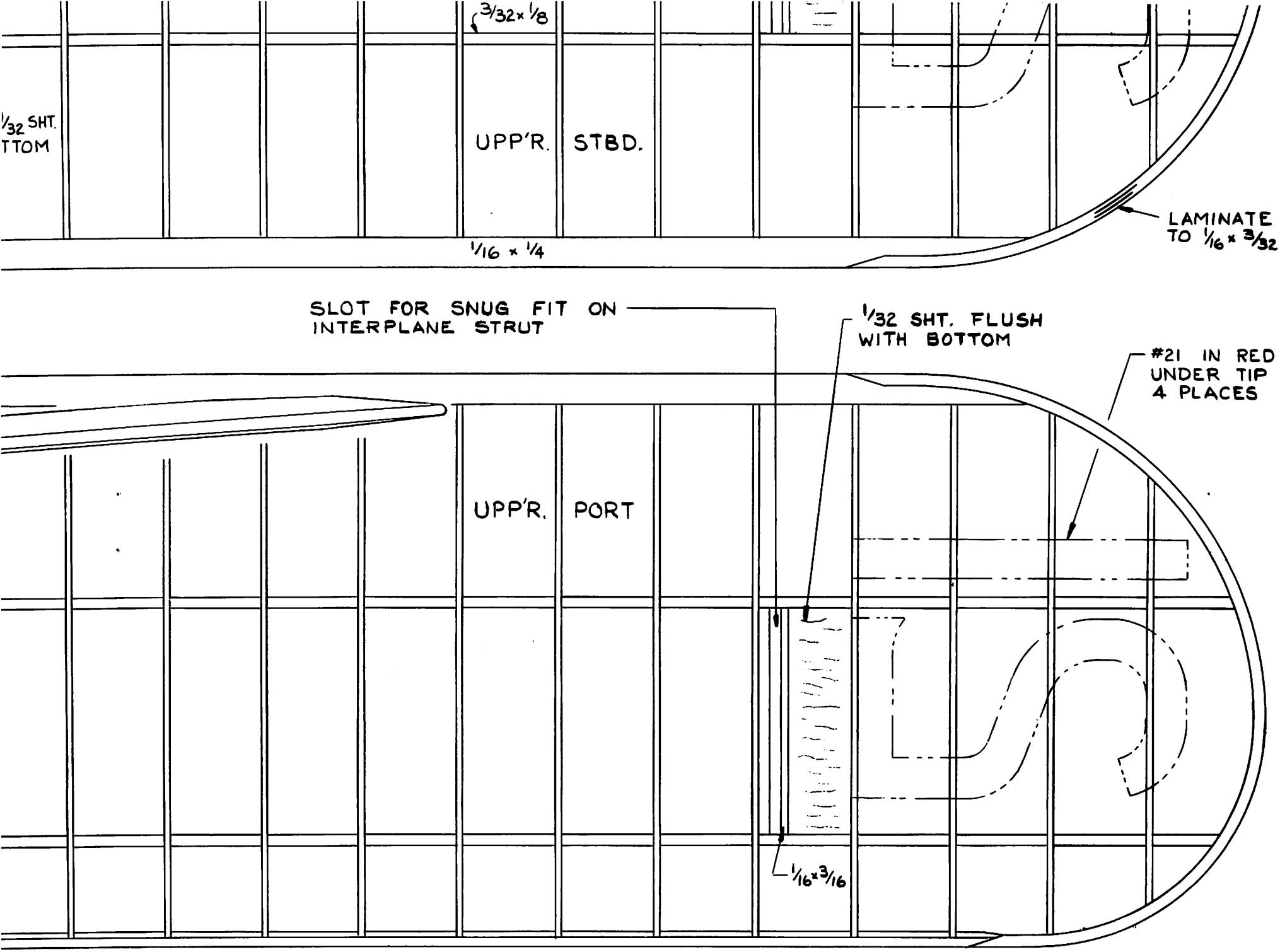
MARS I

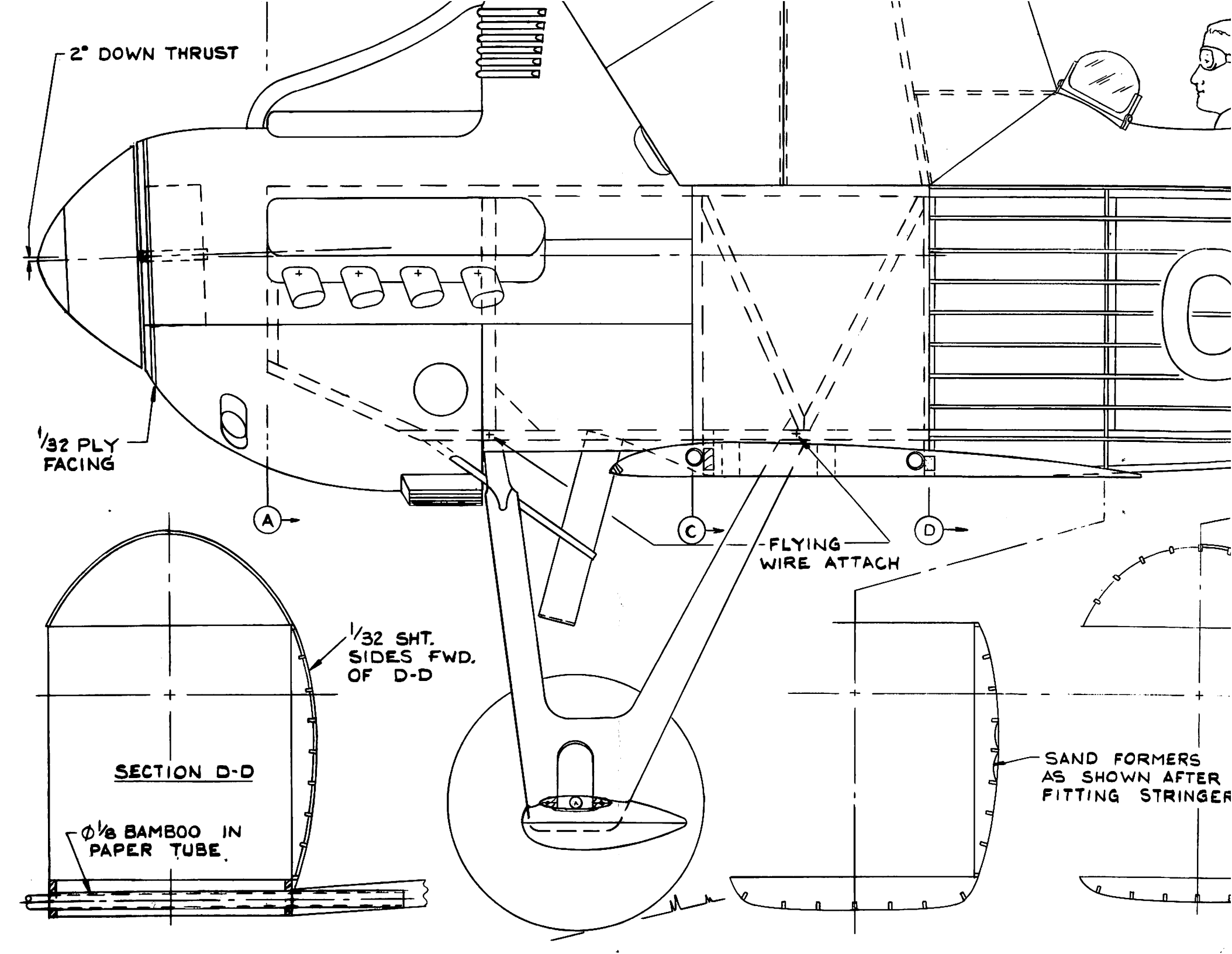
"BAMEL"

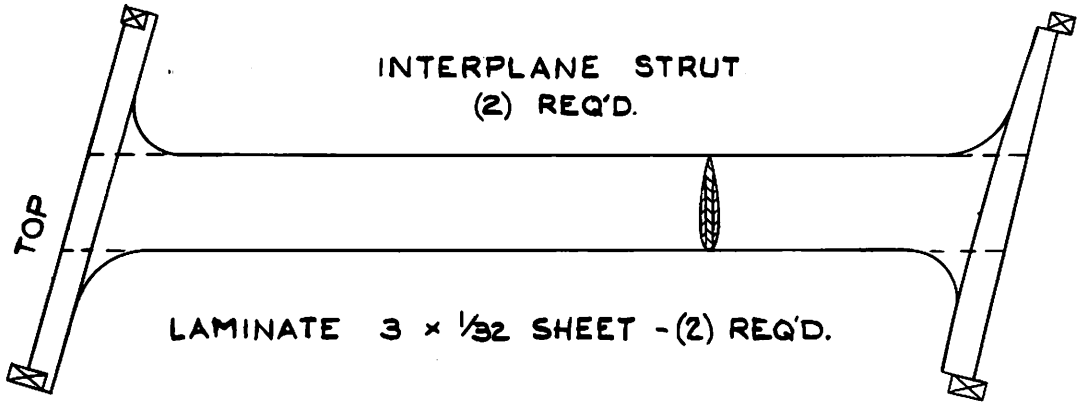
MODEL SCALE 1"=1'

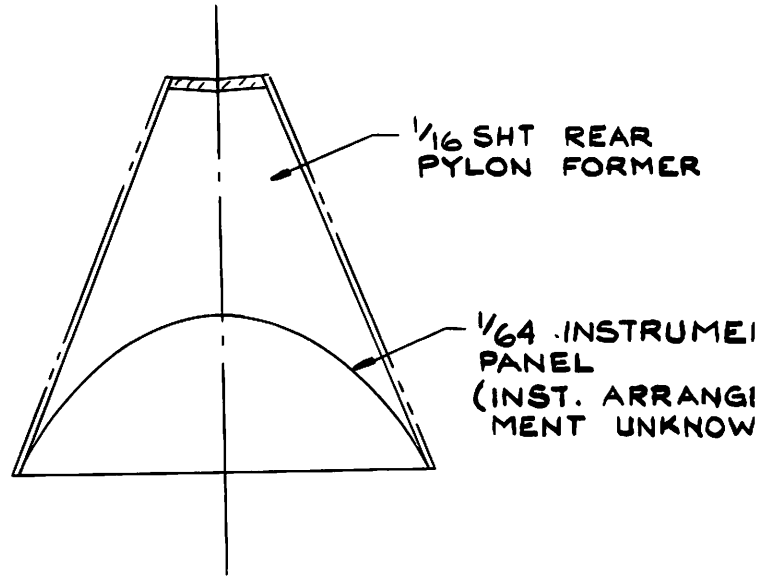
DESIGNED & DRAWN BY
MARK F. BRAUNLICH
AUG.- OCT. 1996

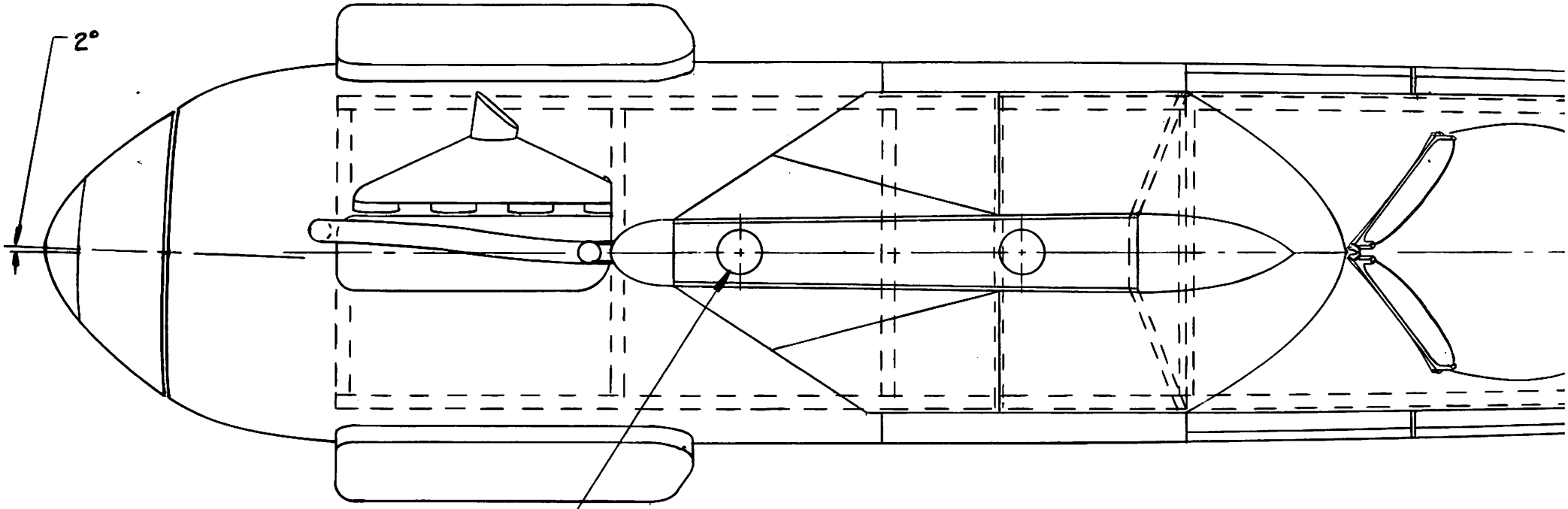

MONOFILAMENT FLYING & LANDING WIRES
EXHAUST STUB 8 REQ'D.
CARB. AIR INTAKES
PROFILE AT A-A
4° TYP. BOTH WINGS
.015 M.W.
1/32 PLY DOUBLER
1/32 SHT.
Φ 5/32 PAPER TUBE
SECTION C-C
Φ 1/8 BAMBOO DOWEL EXTENDS 1" OUTSIDE FUSELAGE
1/16 SHT. DOUBLER
LOWER WING CENTER SECTION SIDE

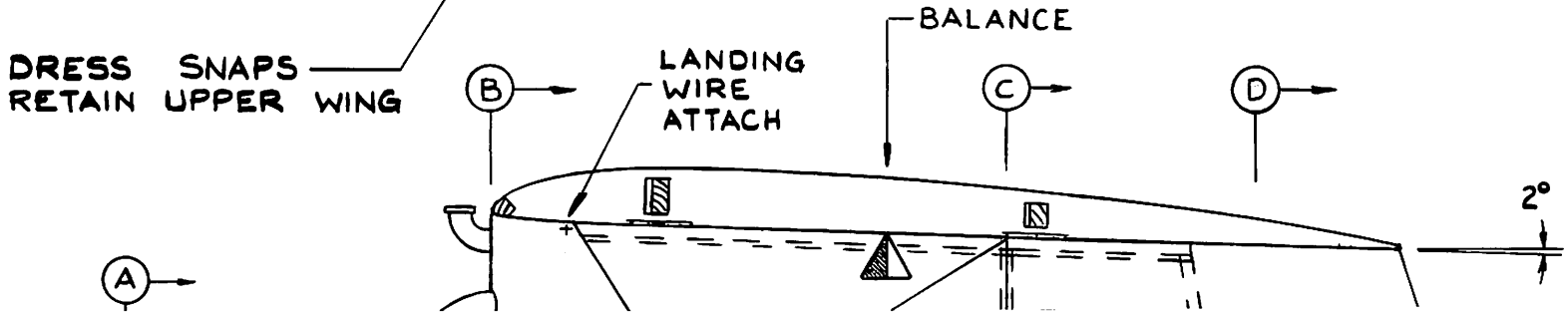

3/32 x 1/8
1/32 SHT.
TTOM
UPP'R. STBD.
LAMINATE
TO 1/16 x 3/32
1/16 x 1/4
SLOT FOR SNUG FIT ON
INTERPLANE STRUT
1/32 SHT. FLUSH
WITH BOTTOM
#21 IN RED
UNDER TIP
4 PLACES
UPP'R. PORT
1/16 x 3/16

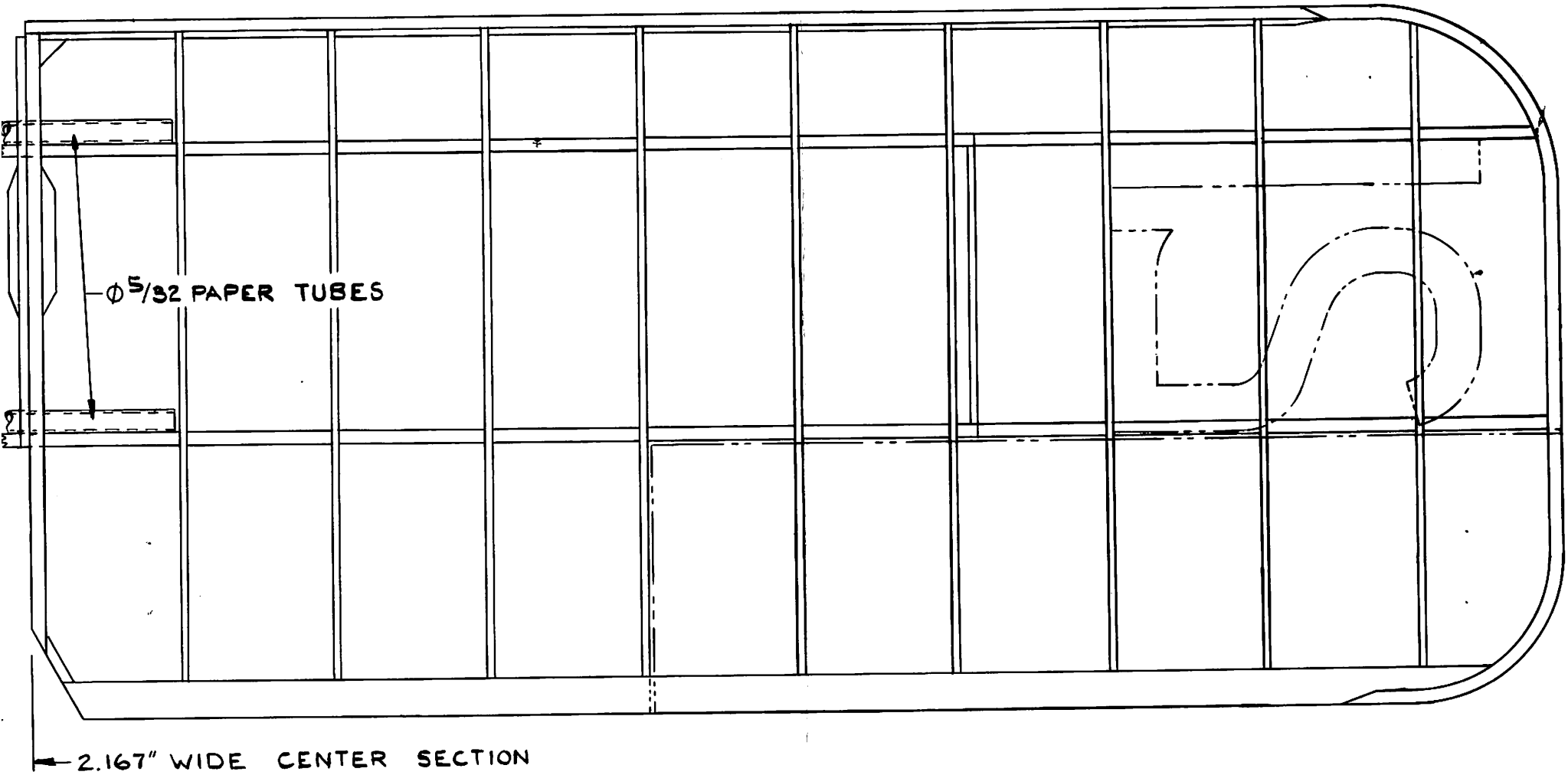

2° DOWN THRUST
1/32 PLY FACING
A
C
D
FLYING WIRE ATTACH
1/32 SHT. SIDES FWD. OF D-D
SECTION D-D
Ø1/8 BAMBOO IN PAPER TUBE
SAND FORMERS AS SHOWN AFTER FITTING STRINGER

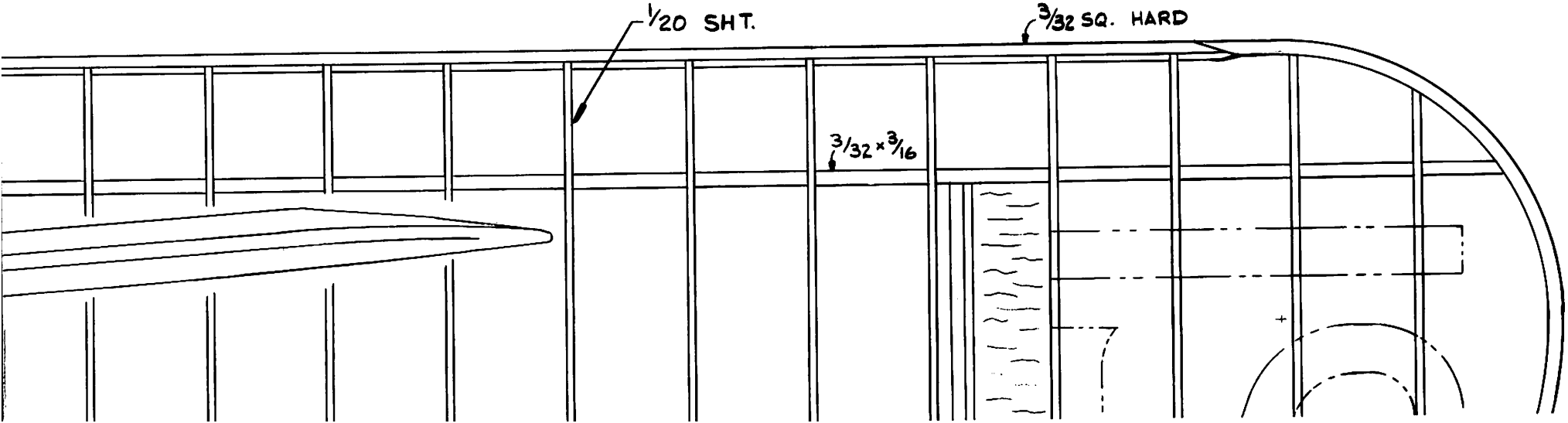

INTERPLANE STRUT
(2) REQ'D.
TOP
LAMINATE 3 × 1/32 SHEET - (2) REQ'D.

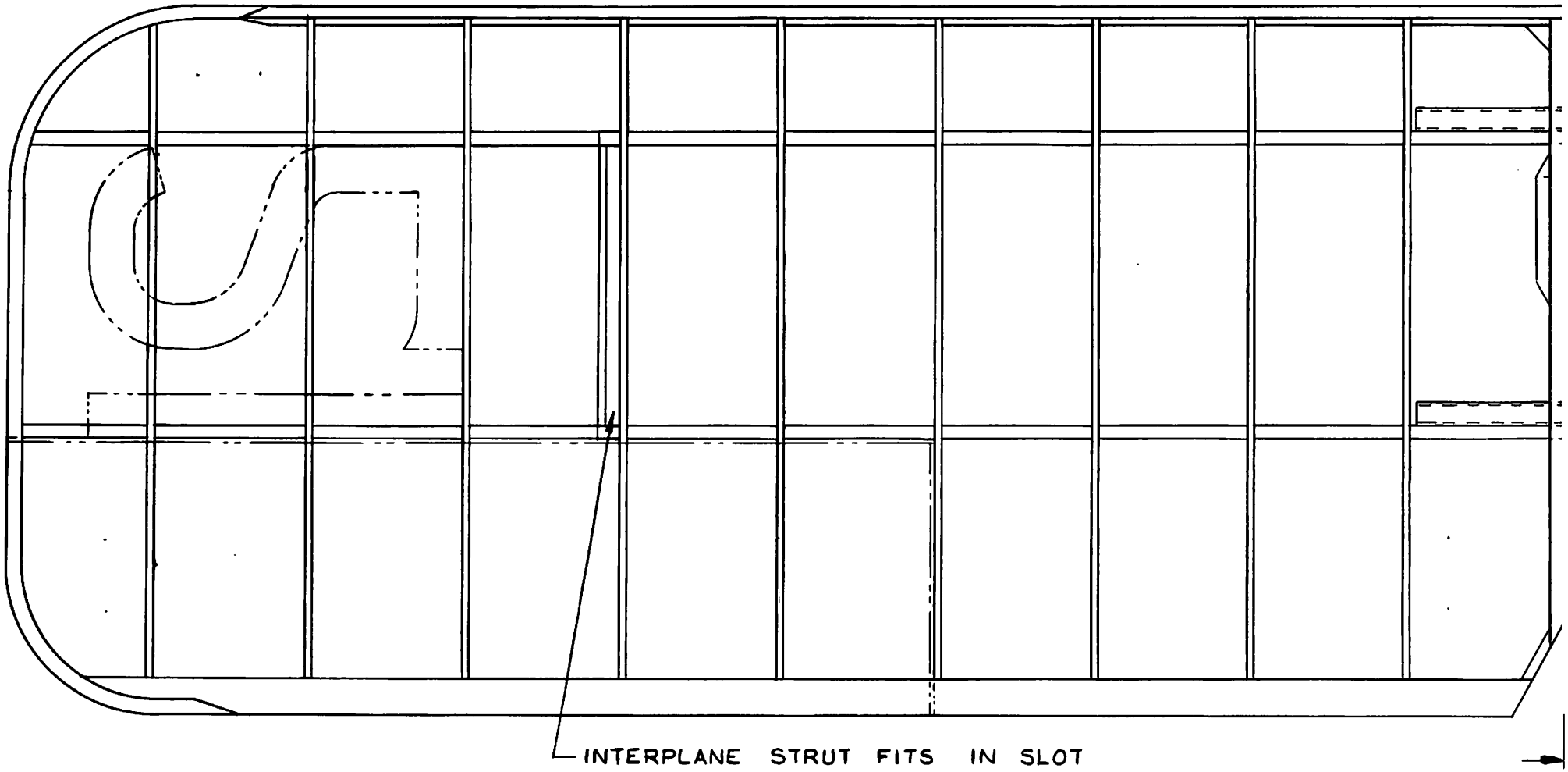

1/16 SHT REAR
PYLON FORMER
1/64 INSTRUMEI
PANEL
(INST. ARRANGI
MENT UNKNOW

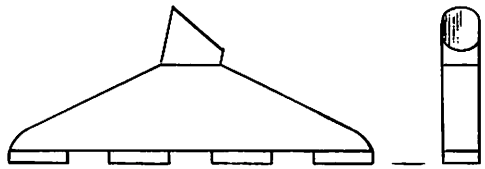

2°


DRESS SNAPS
RETAIN UPPER WING
BALANCE
LANDING
WIRE
ATTACH
A
B
C
D
2°

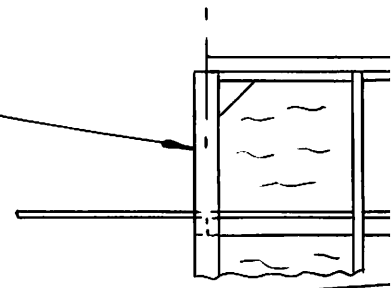

Ø 5/32 PAPER TUBES
2.167" WIDE CENTER SECTION


1/20 SHT.
3/32 SQ. HARD
3/32 x 3/16

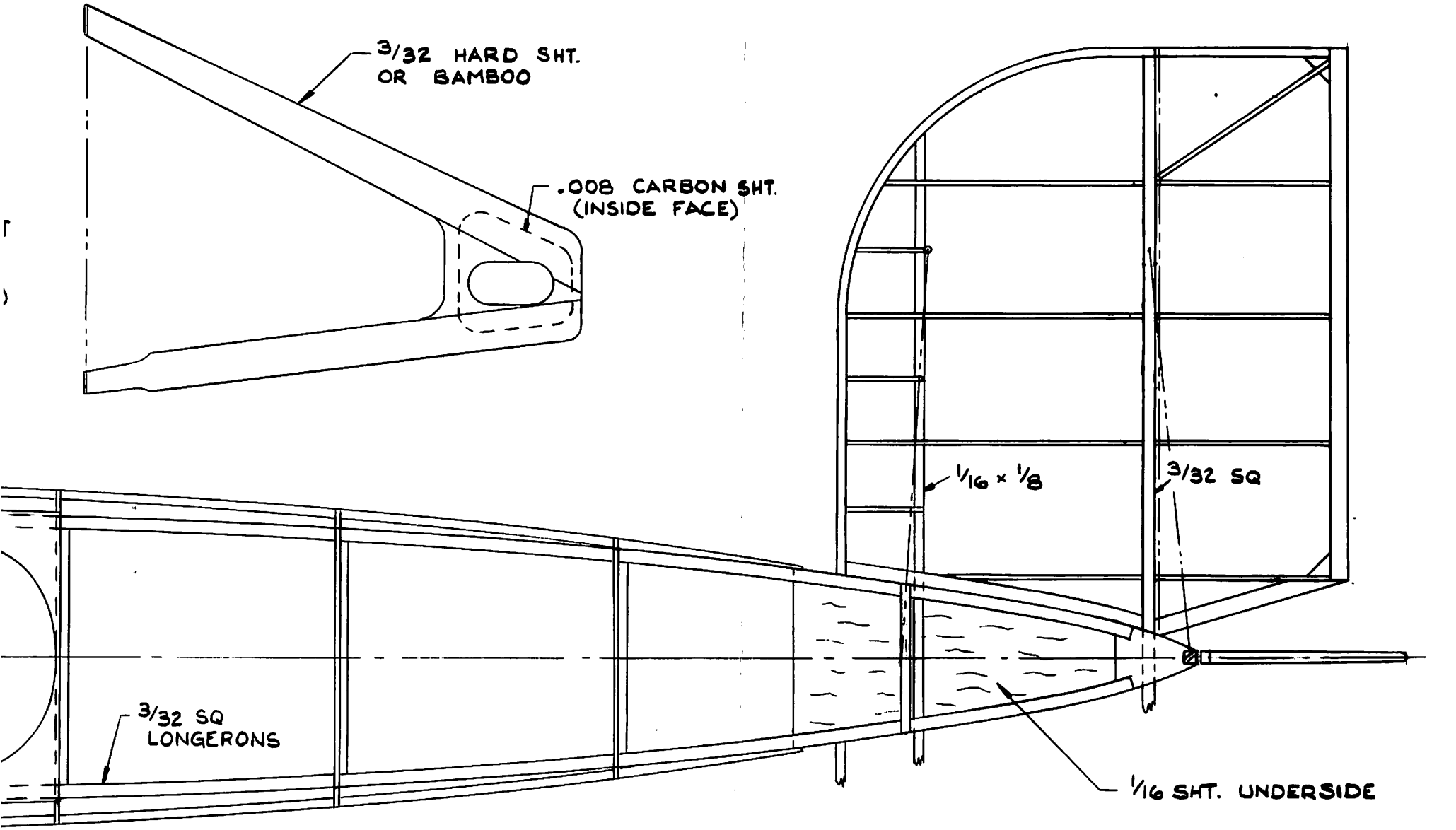


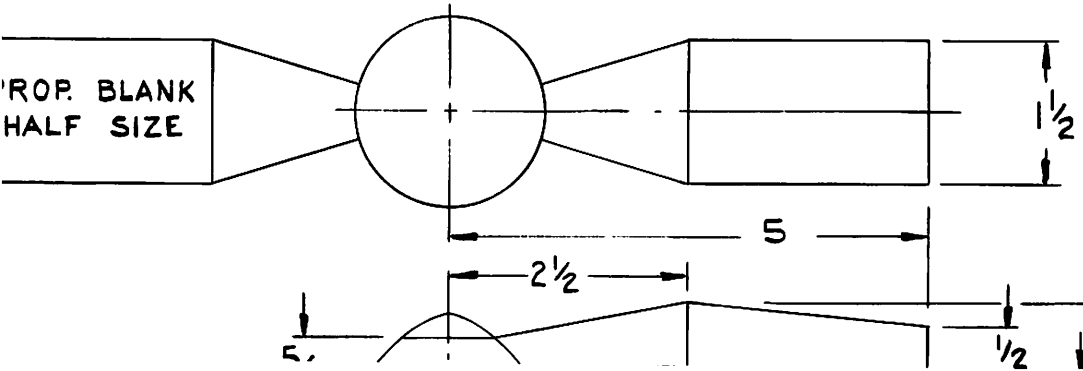


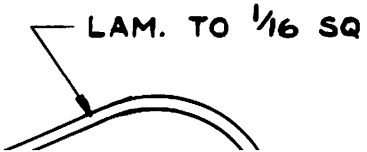
CENTRAL CYL. BANK EXH. MANIFOLD



LEFT HALF OF VIEW
SHOWS SECTION B-B


3/32 HARD SHT.
OR BAMBOO
.008 CARBON SHT.
(INSIDE FACE)
1/16 x 1/8
3/32 SQ
3/32 SQ
LONGERONS
1/16 SHT. UNDERSIDE


PROP. BLANK
HALF SIZE
1½
5
2½
½


LAM. TO 1/16 SQ

Building the Model

The Mars I model is not a beginners scale model. What follows therefore, are not detailed building instructions, but comments relative to some of the notable features of this model. While the Mars I has proportions similar to the S.E.5, it has by nature of its streamlining, a higher wing loading typical of racing planes. Every effort should therefore be made to keep the model as light as possible. Scale stringer and rib spacing is shown on the plan for those who want scale fidelity. Elimination of some ribs and stringers is advised to produce a better flying model.

The Wings

The wings are designed to be removable. A one piece biplane of this size is not a good idea! The one piece top wing is held on to the cabane pylon with two dress snaps. I have shown the wing ribs as made of 1/20 sheet balsa. I would stick with this thickness especially if you reduce the number of ribs as they are likely to bow if made of 1/32 sheet. You could make the ribs of 1/32 if you retain scale rib spacing. The lower wings are retained with paper tubes on 1/8 bamboo dowels. Build the lower wing center section first and make sure it is square and that the two dowels are parallel. Note the 1/16 sheet doubler on the inside of the center section sides. This is to allow the necessary carving away of the actual side pieces to allow for the rear u/c struts to reach the bottom longeron. Slide 1" long paper tubes (no glue!) onto the dowel extensions. Build the two outer panels and block them up to 4° dihedral adjacent to the center section. Fit the root ribs at their correct 4° angle at this time. Cement the tubes to the wing spars being careful to keep glue on the outside of the tubes. When dry, the outer panels should slide off the center section but it should not be a lose fit. Make the interplane "I" struts and fit them to the slots in the lower wing but do not cement them yet. Make the upper wing boxes to take the top of the "I" struts. This should be a close friction fit. The wings are retained with working rigging (monofilament line) and suitable light gage wire fittings should be attached to the spars to take these wires. The "I" struts are retained in their boxes in the top wing by the tension of the flying and landing wires. The struts will be cemented to the lower wings at the time of final assembly. The idea is to produce a somewhat flexible and forgiving structure. I would recommend light weight silkspan as the covering material but go easy on the dope and be sure to weigh down the wings on a flat surface after doping and keep them weighted down for several days as these thin wings are susceptible to bowing after covering.

The Fuselage

The fuselage is fairly straightforward, being a box structure of 3/32 sq. faired with 1/32 x 1/16 stringers. When making the basic box, do not cement the rudder post in place until after the tailplane has been fitted. The post is actually part of the fin. The three cylinder banks of the Napier Lion should be built up and cemented directly to the box structure. Reference can be made to drawings and photos of the Napier Lion for those requiring more engine detail. The cowlings are then fitted from light sheet and block balsa around the cylinder banks, being tack glued to the box frame and then carved and sanded to shape. They should then be removed from the frame and hollowed as thin as you care to go. Be aware that the Mars I has a short nose and you're going to need weight up front so don't get too carried away with hollowing out. Re-attach the cowls and fit 1/32 ply to the front face and carve and sand to fit the cowling contours. This piece of ply should have a square opening to take the nose block. Cover the cowls with Jap tissue and fill to a good smooth finish. Note that the cowling blocks extend into and make up the front of the cabane pylon. The sides of the pylon are 1/32 sheet and the "boat tail" rear of the pylon can be made of hollowed block or 1/32 sheet and should be fitted on top of the 1/32 cockpit decking.

Make and fit the undercarriage "V" struts but do not yet attach them to the fuselage. I would suggest light m.w. fittings bound with thread and epoxied to the top ends of the four struts. These wires should be bent to lie along fuselage cross pieces where they will eventually be bound and epoxied. Fit the lower wing center section to the bottom of the lower longerons and cement only after making sure that the wings are square to the fuselage. When dry, slowly and carefully carve away the portions of the center section and the lower wing root ribs necessary to clear the rear u/c struts. Then bind and epoxy the rear u/c struts at the correct angles to the cross piece. Fit two .031 m.w. u/c spreader bars to the "V" struts. Make the u/c cross bracing of .008 m.w. and bind and solder to the front spreader bar and bind and epoxy to m.w. fittings of the front u/c struts at the same time binding the front struts to the fuselage cross piece. The stringers on the bottom of the fuselage should now be fitted to the formers and extend them forward to the rear spar of the center section. I would suggest sheeting in the bottom of the center section with 1/32 sheet (grain span wise) as this area takes a lot of beating on biplanes.

The Tail Surfaces

The tail surfaces are quite simple. Special care should be taken to keep these items light but warp free. The tailplane has a lifting section so will be very prone to warping...be careful in the covering and doping stage. Non-shrink dope suggested here. The tailplane is fitted in the rear fuselage and blocked and lightly tack glued at a -2° angle of incidence. The fin/rudder assembly is then fitted to rear fuselage. The angle of incidence on the tailplane may be adjusted by packing above and below the tailplane at the time of flight trimming. Once the correct angle has been achieved, cement the tailplane and packing firmly in place and then fit the tailplane bracing wires.

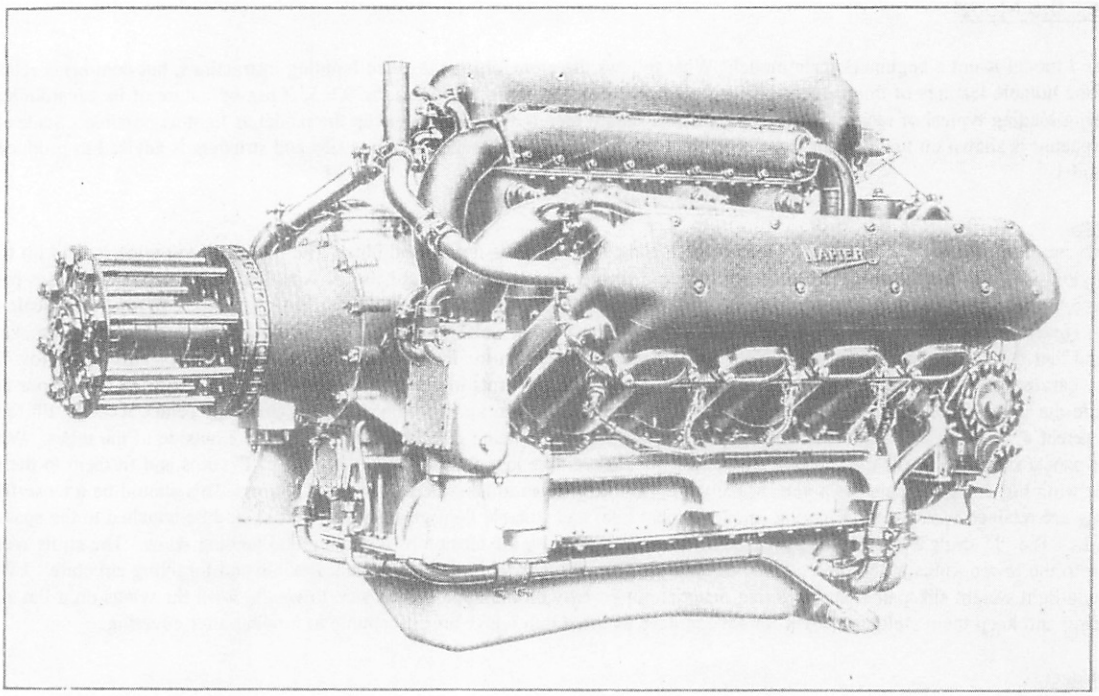
Details

Details which can add a lot to this model include the two windscreens, working bungee cord u/c, and the tail skid. All of these are actually S.E.5a items and details are given herein. The windscreen is also common to the Bristol M.1, F2B, the Avro 504 series, and many other aircraft and post-war racing cars! The wheels are the 700 x 75 mm Palmer style also fitted to the Sopwith Pup and Camel and others.

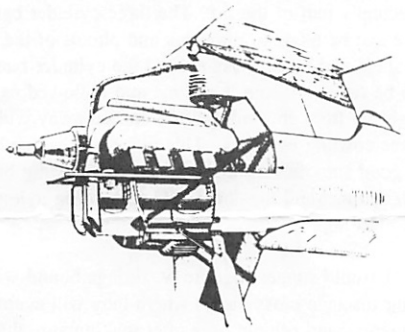
The radiator can be built up of 1/64 ply and balsa. Several sources indicate that this radiator could be retracted so there is an "out" for those who want to omit it altogether. However the detailed technical description of the Mars I found in *Aerial Age Weekly* makes no mention of a retracting feature and Leonard Bridgman's sketches would suggest it was fixed. In any event, during the race, the Lion was overheating so there is nothing to suggest that the aircraft would have raced with the radiator retracted had it been possible to do so.

Those seeking information for detailing the Napier Lion may purchase a photo copy of the 72 page Lion manual from WWI Aeroplanes, Inc., 15 Crescent Rd. Poughkeepsie, NY 12601.

Instrument panel details have not been found. Instruments would likely be standard British military items fitted ca. 1918-20.



(Jane's)



The heart of the Mars I was the fabulous 450 HP Napier Lion. Installation in the Mars I is shown in the *Flight* sketch at left. Note, there are three carburetor air intakes, two on the port side, one on the starboard side.

Mars I/Bamel Bibliography

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*Foxworth, Thomas, The Speed Seekers, Doubleday, New York, 1974

Jackson, A.J., British Civil Aircraft Since 1919, Vol. 2, Putnam & Co., London, 1973

*James, Derek N., Gloster Aircraft since 1917, Putnam & Co., London

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Swanborough, Gordon and John W.R. Taylor, British Civil Aircraft Register, Ian Allan Ltd., London, 1970

Drawing by Joe Nieto, Nieuport Nighthawk, Model Airplane News, July, 1953, pp. 30-31

"A Gloster Assortment," Planes, Vol. 1 #3, 1982, page 73

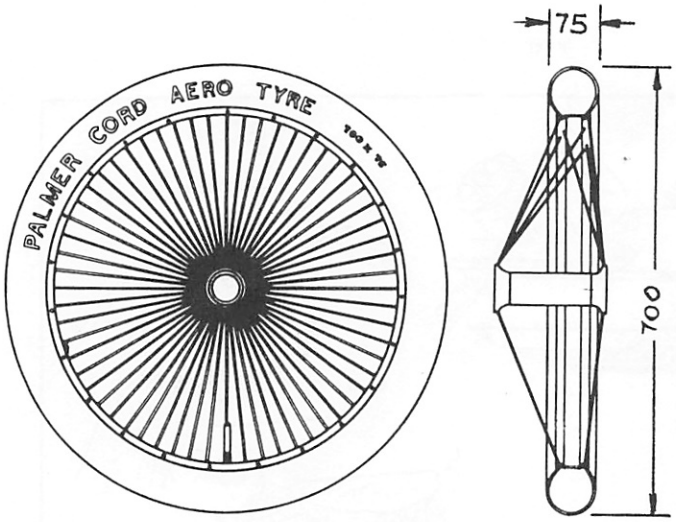
Drawing of Napier Lion, WW1 Aero #115, July, 1987, pp. 36-37

"The Nieuport Nighthawk," Cross & Cockade Journal, Spring, 1967, pp. 19-28

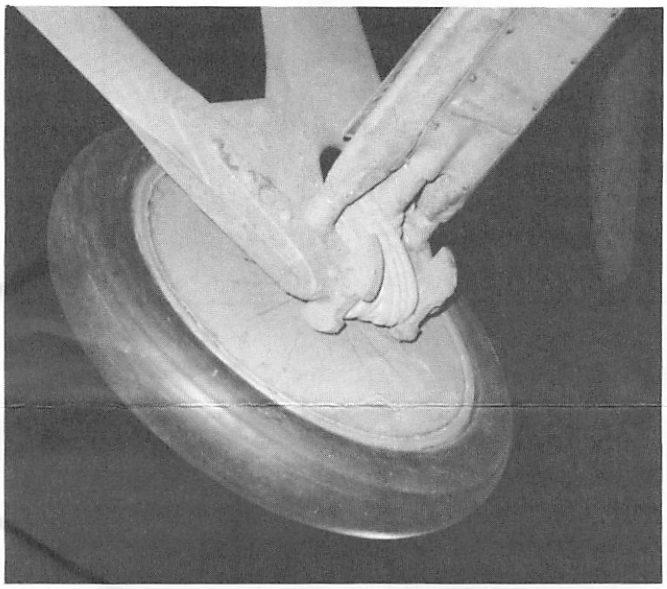
*"The Winner of the London Aerial Derby," Aerial Age Weekly, September 12, 1921, pp. 7-8

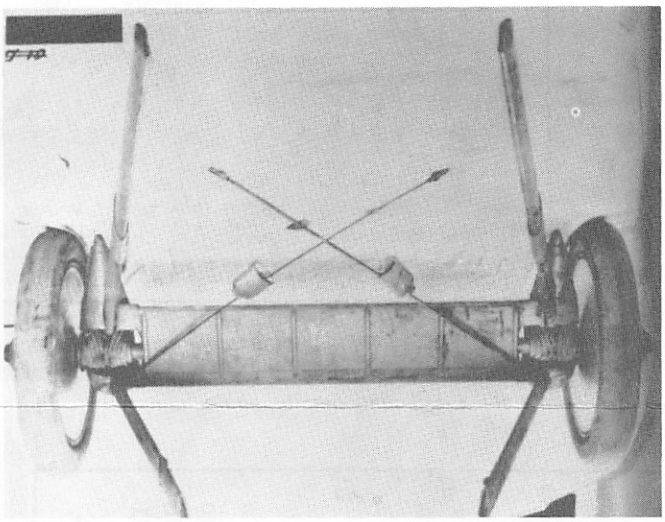
*Drawing by C.B. Maycock, Gloster Bamel, Model Aircraft, November, 1950, page 425

**Sources with 3-view of Mars I/Bamel*



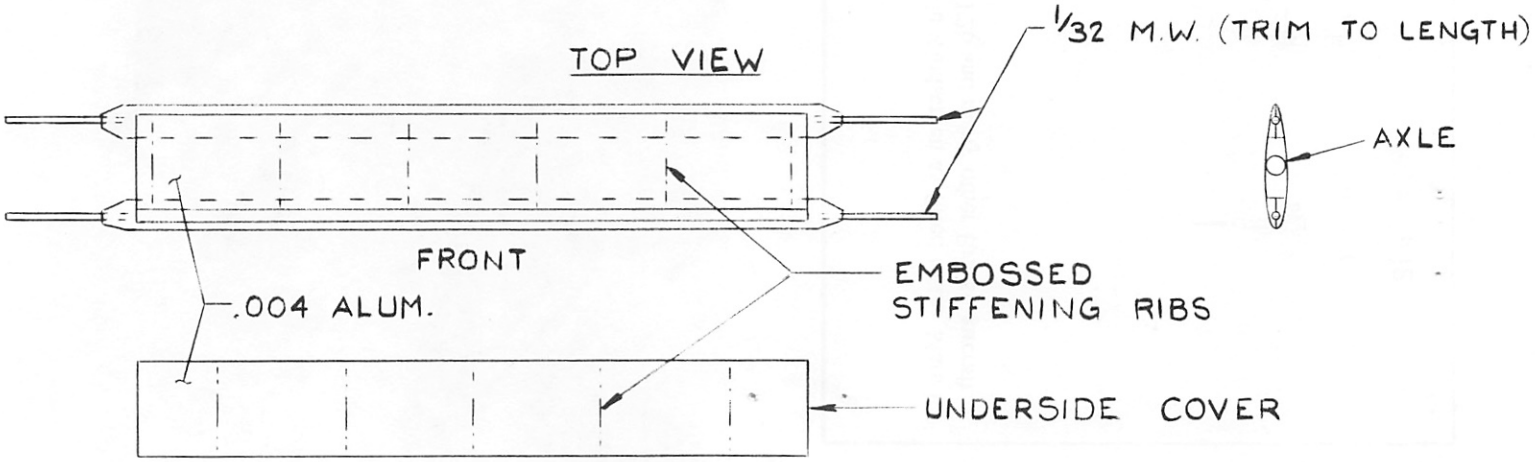
At left, the 700 x 75mm wheel (here uncovered) and tire of the Mars I. The wheels and tires of standard S.E.5a and Nieuport Nighthawk were the more robust 700 x 100 size but British ace Albert Ball substituted the lighter 700 x 75 wheels on his S.E.5. MarsI/Bamel racer used the same ploy.

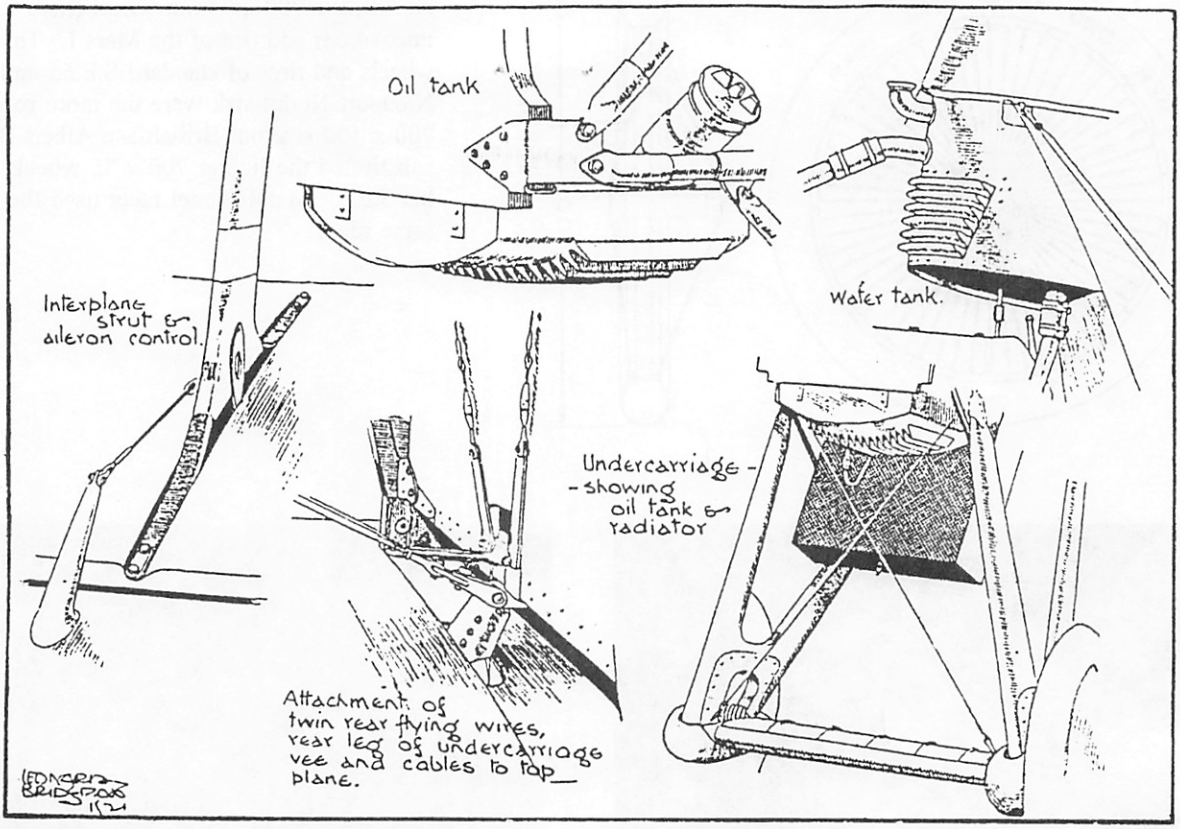




Above left, late S.E.5a undercarriage detail at Science Museum, London. Above right, early S.E.5a undercarriage. The S.E.5a, Nieuport Nighthawk, and Gloucestershire Mars series used the same spreader bar assembly.

Drawing below shows spreader bar for model. Top aluminum cover should not be attached to spreader bar but fixed to axle to allow axle vertical travel. Cover was forward hinged door on full size aircraft.





Above, Mars I details sketched by noted aviation artist Leonard Bridgman from a 1921 issue of *The Aeroplane*. Below right, tail skid details, again, common to the S.E.5a and Nieuport Nighthawk.

The Avro Windscreen

The drawing shows the Avro style windscreen as fitted to the Mars I, S.E.5a, Avro 504 series, Bristol F2b and many other British aircraft of the 1917-1925 period.

