AEROMODELLER ANNUAL 1952

AEROMODELLER ANNUAL - 1952

A review of the year's aeromodelling throughout the world in theory and practice; together with useful data, contest results and authoritative articles, produced by staff and contributors of the *AEROMODELLER*

Compiled by
D. J. LAIDLAW-DICKSON

and Edited by
C. S. RUSHBROOKE, F.S.M.A.E.

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AEROMODELLER ANNUAL 1949
AEROMODELLER ANNUAL 1950
AEROMODELLER ANNUAL 1951
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CONTROL LINE MODEL AIRCRAFT

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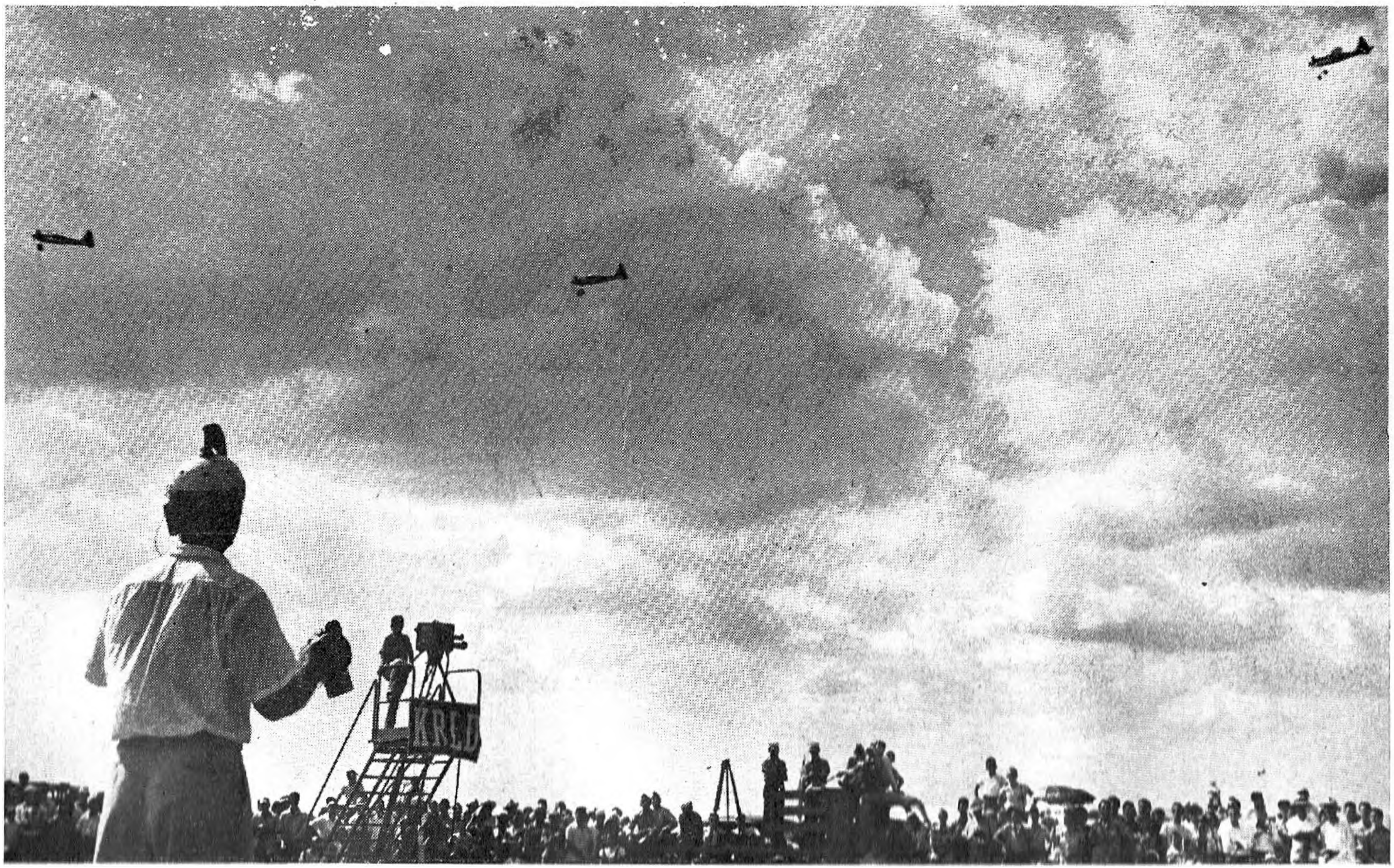


Control-line maestro Jim Walker demonstrates his famous one-man-three-planes simultaneous exhibition for the television camera.

INTRODUCTION

THERE'S ALWAYS SOMETHING NEW

AEROMODELLING and full-size aircraft designing seems to play a constant game of leapfrog. In the early days model work was the usual prelude to full-size development, then for a time models lagged behind their larger brothers, until again some radical change in ideas made models desirable before risking large sums on man-carrying machines.

This year the aeromodeller can notch up a great achievement, with the limited release of data on government progress with remote controlled missiles—these are nothing more than grown-up versions of our own radio-controlled models, developed several stages further. Pioneers in this particular field such as Reginald Denny, and indeed, our own former AEROMODELLER technical expert Peter Hunt, have every reason to pat themselves, and the whole aeromodelling movement, very smartly on the back for this ultimate justification of our efforts. To our own knowledge more than half a dozen of our own aeromodelling friends are now working full time with one or other of the numerous companies developing this new technique, and throughout the country a practical knowledge of model aircraft is opening the doors to well paid useful and, we would add, highly exciting work.

The encouragement given to aeromodelling by the Royal Air Force is already well known. With over a hundred active clubs within their midst, they are fully alive to the benefits of the hobby. This year for the first time the S.M.A.E. were the guests of the Royal Navy at Gosport on the occasion of the Nationals held at H.M.S. *Siskin*, Gosport. As usual, the Senior Service provided a splendid flying field organisation, including boat parties to secure flyaways over the Solent. American aeromodellers have had several National meetings under Navy auspices; let us hope that we too will again be invited to enjoy naval hospitality.

In the international field our teams have travelled to Sweden and Belgium for meetings at both Namur and Brussels, Austria and Switzerland, with mixed success, but everywhere they have been they have been able to spread abroad the British tradition of good sportsmanship, win or lose. It is better that no one nation should have the monopoly of the trophies, and for this reason we should welcome any new stars in the control line firmament, for except in some speed classes our experts seem to be a little better than the rest. Perhaps next year some of the well-known American champions can be persuaded to make the trip to Belgium to provide a world status to the stunt control event.

The participation of German teams is a welcome sign that will do much to encourage the renewal of friendly competition between the nations—for aeromodelling has always been in high esteem amongst the youth of Germany and Austria, and they will surely be a power to be reckoned with in future years. The presence of a Spanish team was another pleasing feature of the year. We look forward, ultimately, to an enjoyable international meeting in sunny Spain, which, if a little more distant than most European countries, has the reputation of being more reasonably priced than many for sterling visitors, and the Spaniards have an age-old reputation as courteous hosts.

At home, the big surprise of the year has been Phil Smith's development of ducted fans, making possible such amazing models as his Lavochkin 17. We had hoped that progress would be sufficiently advanced for an attempt to be made on a flying scale "Comet," but much has yet to be done before this is a possibility but, who knows, 1953 may see such a model in the air! Radio control has continued to make steady progress, with George Honnest-Redlich piloting a boat across the Channel so successfully, we had expected him to follow with a model aeroplane, but to date this model-Bleriot-in-reverse has not transpired

The trend of the average modeller has continued towards better and better flying scale models, and the advent of a number of sub-miniature engines of less than half a c.c. will doubtless encourage this welcome development still further. Scale models like these have a far wider appeal than the normal contest model, and will help to bring more and more ordinary sort of fellows into the sport of building and flying model aircraft to the betterment of the movement as a whole.

Manufacturers will look back on the passing of 1952 with some relief, for it has not been a happy period for them, with an adverse judgment in favour of H.M. Customs and Excise, demanding back payment of purchase tax not levied on their customers. We extend every sympathy to those brave firms who defied them, and only hope that some equitable arrangement can be made which will not bear too heavily on them at a time when their export efforts can be so valuable.

We, in our turn, have had a year of changes, with our departure from our country address to more central offices in Watford, and for the first time AEROMODELLER ANNUAL appears under the Editorship of C. S. Rushbrooke. In this volume we have endeavoured to interpret the requirements of our readers by a number of minor changes. While there are slightly fewer plans than in former years, those included are better documented, and should present no problems to those desiring to build them without recourse to full-size plans. We have included a great many more articles and drawings of an informative nature, making this more than ever an annual reference book of value to all classes of aeromodeller. The extension of the contest programme combined with a demand for earlier publication has meant that only results to hand on going to press can be included. Next year we shall continue straight on where we left off, with the latest 1952 results to complete the record.

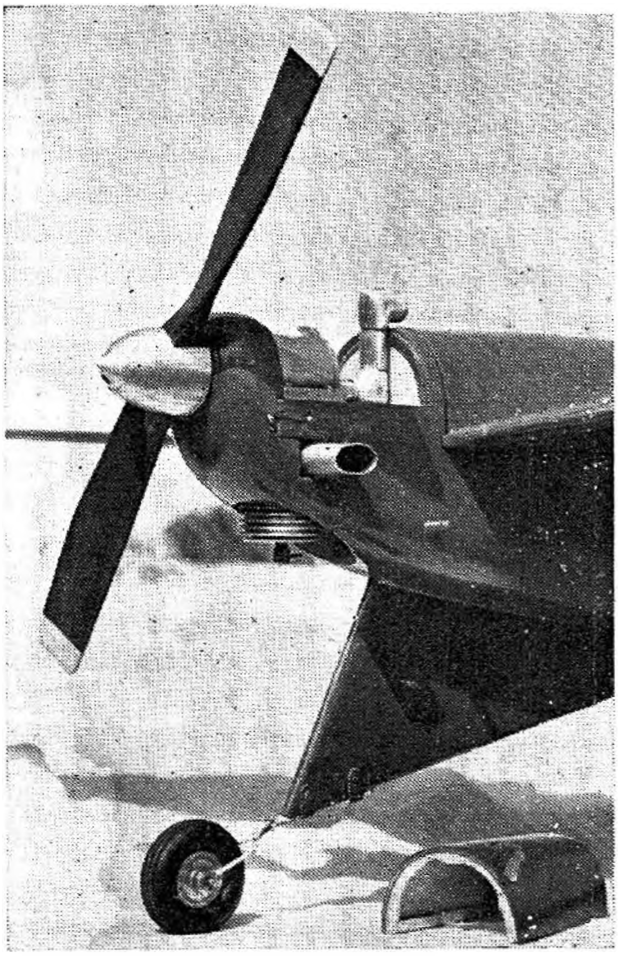
Meanwhile, we would thank the many enthusiasts who have provided material for this volume, or whose constructive criticism has influenced its contents, and trust the mixture will meet with your approval.

Sultana

Powered Tailless Pusher Model

By Dr. Martin Sultan

Flying Club of Israel



This good looking flying model is a design of Dr. Martin Sultan, who traces his aircraft experience back to before World War I days, when he was interested in ornithopters, and indeed ultimately built a fullsize machine of that class though he left the country before it could be tested.

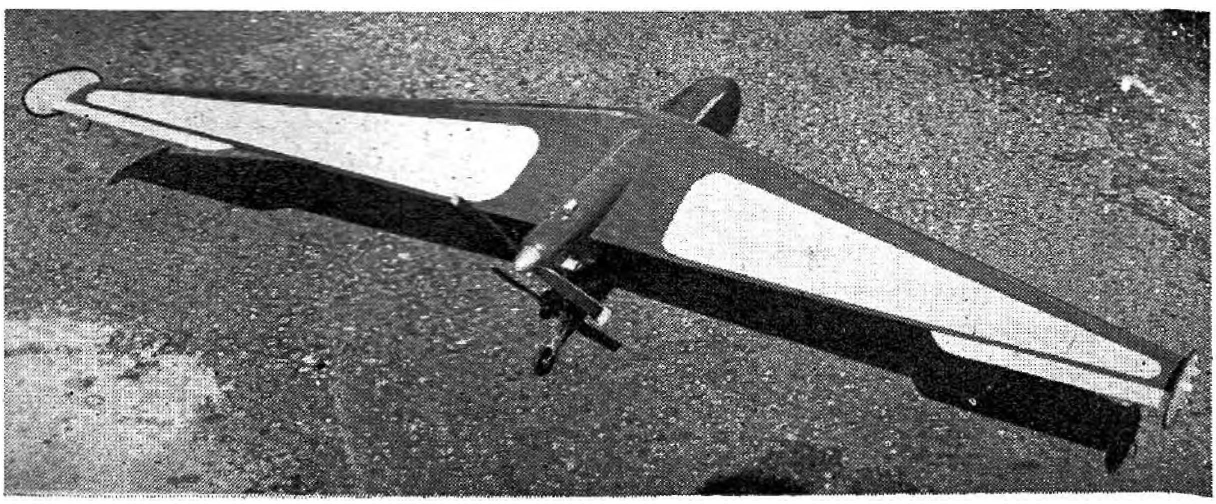
To return to the model, the original version was powered with a 5 c.c. Bonnier diesel (similar to Micron) equipped with a four-blader propeller. The final version illustrated has a 5.8 c.c. Super Tigre, with a normal two-blader of 14-in. diameter and 6-in. pitch.

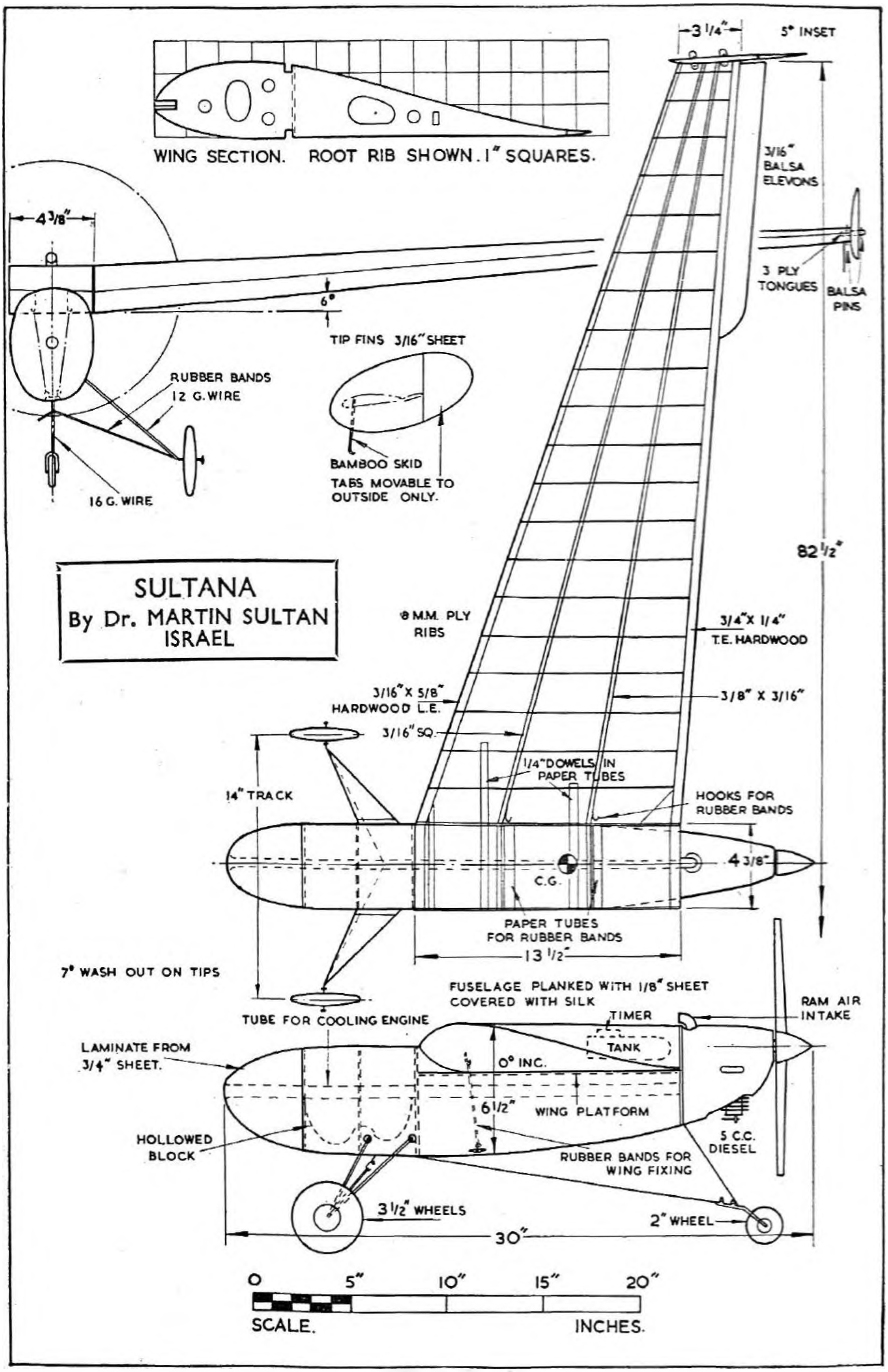
To ensure absolute accuracy the wings are built in jigs. All bearing members of both wings and body are of spruce. Bulkheads and centre-section ribs are three-ply, other ribs of 3/16th-in. balsa. Exhausts have been lengthened with tubing, while motor is fully cowled with a removable cowling.

Work on designing the model took nearly a year, and its actual completion a further year, as the designer is a busy dentist, with only Saturdays available for model making.

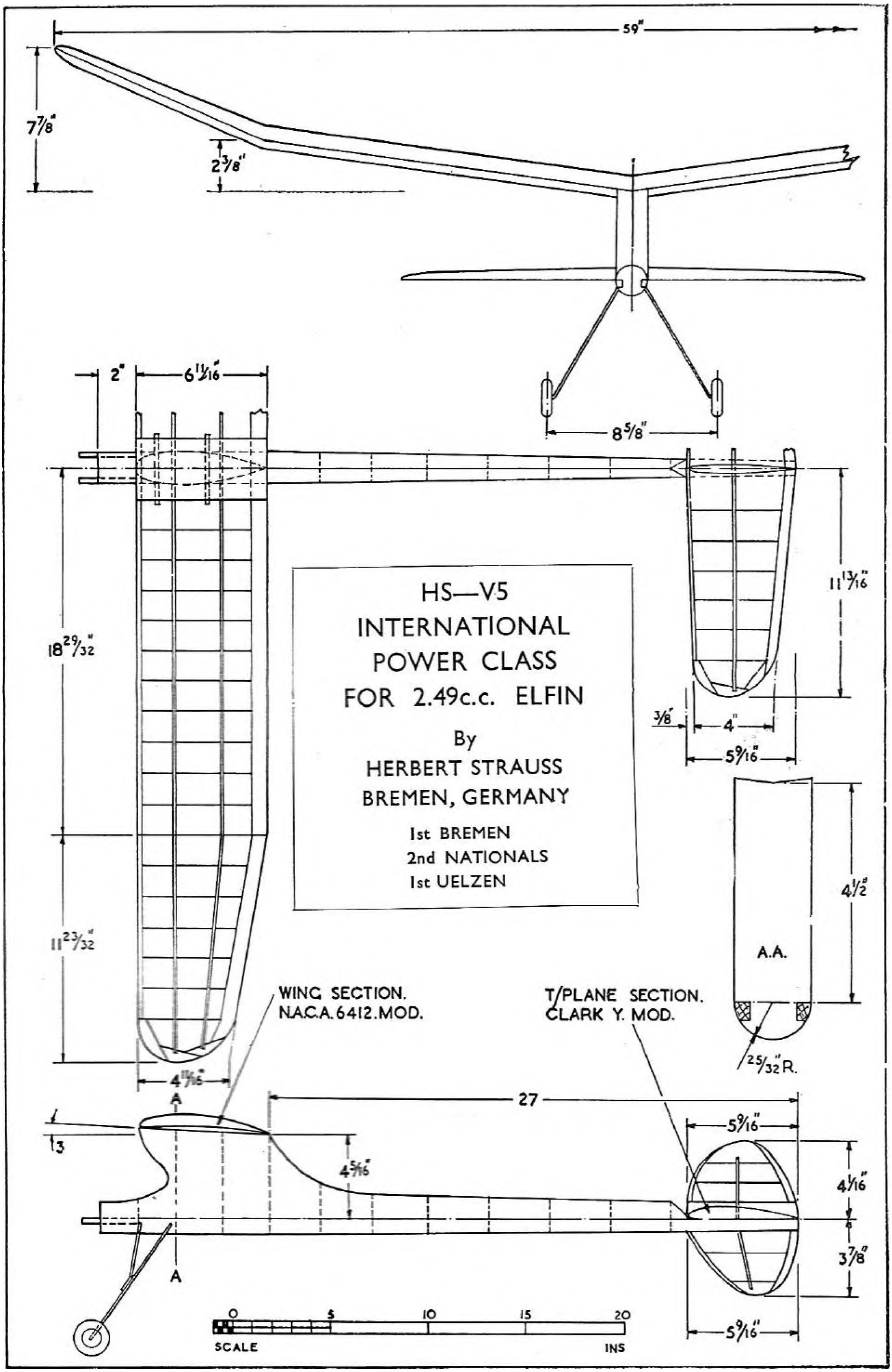
Colour scheme is red and white.

All up weight approximately 5½ lb.





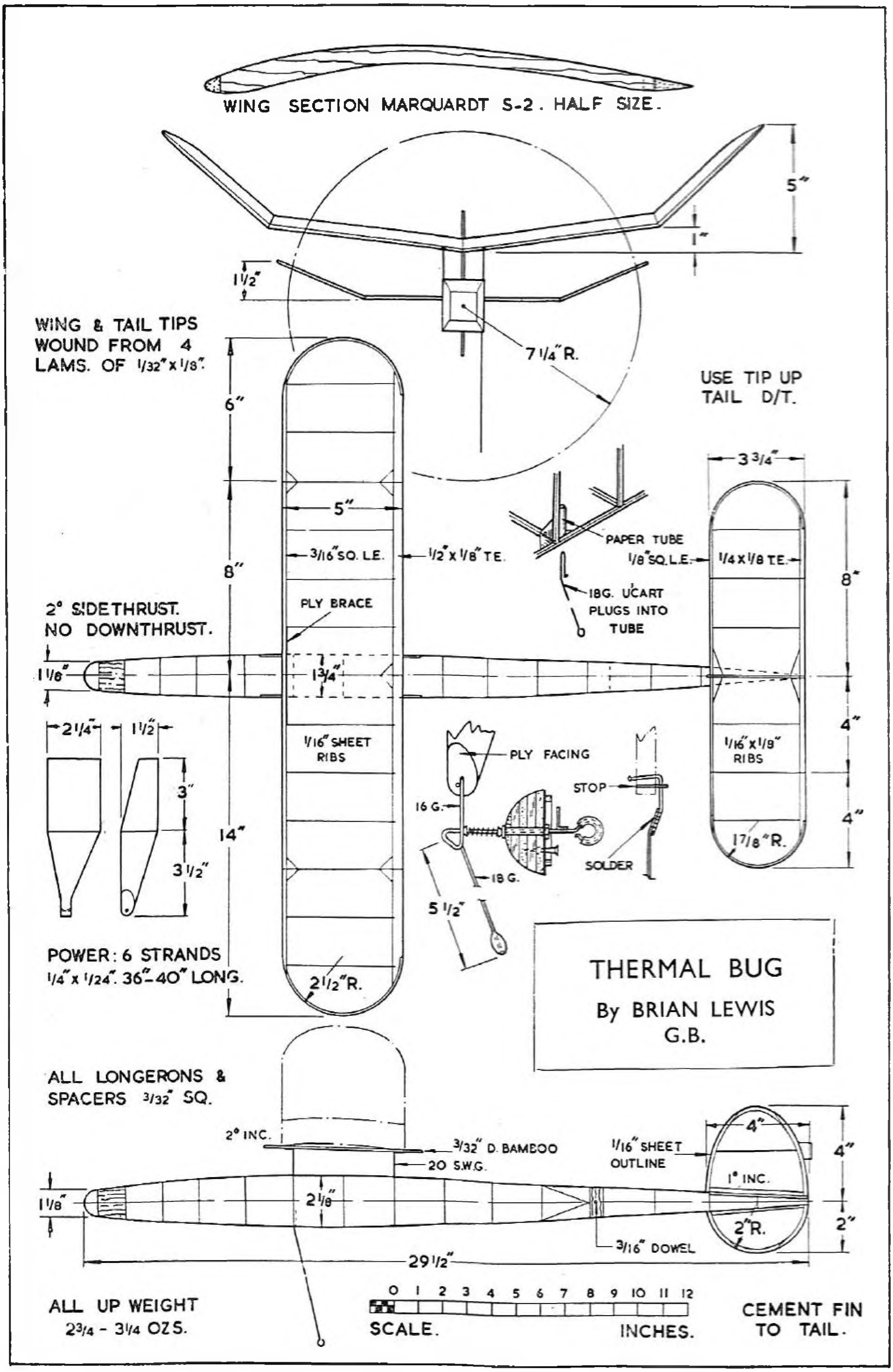
WING SECTION. ROOT RIB SHOWN. 1" SQUARES.
3 1/4"
5° INSET
3/16" BALSA ELEVONS
3 PLY TONGUES
BALSA PINS
4 3/8"
6°
TIP FINS 3/16" SHEET
RUBBER BANDS
12 G. WIRE
16 G. WIRE
BAMBOO SKID
TABS MOVABLE TO OUTSIDE ONLY.
82 1/2"
SULTANA
By Dr. MARTIN SULTAN
ISRAEL
·8 M.M. PLY RIBS
3/4" X 1/4" T.E. HARDWOOD
3/16" X 5/8" HARDWOOD L.E.
3/8" X 3/16"
3/16" SQ.
1/4" DOWELS IN PAPER TUBES
14" TRACK
HOOKS FOR RUBBER BANDS
4 3/8"
C.G.
PAPER TUBES FOR RUBBER BANDS
13 1/2"
7° WASH OUT ON TIPS
FUSELAGE PLANKED WITH 1/8" SHEET COVERED WITH SILK
RAM AIR INTAKE
TIMER
TUBE FOR COOLING ENGINE
TANK
LAMINATE FROM 3/4" SHEET.
0° INC.
6 1/2"
WING PLATFORM
HOLLOWED BLOCK
5 C.C. DIESEL
RUBBER BANDS FOR WING FIXING
3 1/2" WHEELS
2" WHEEL
30"
0
5"
10"
15"
20"
SCALE.
INCHES.



HS—V5
INTERNATIONAL
POWER CLASS
FOR 2.49c.c. ELFIN

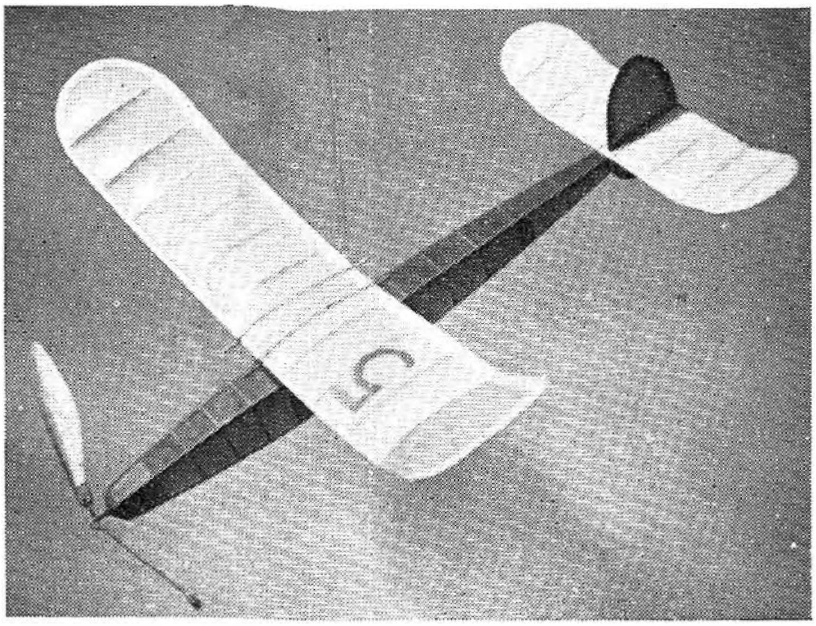
By
HERBERT STRAUSS
BREMEN, GERMANY

1st BREMEN
2nd NATIONALS
1st UELZEN


WING SECTION MARQUARDT S-2. HALF SIZE.
5"
1"
1 1/2"
7 1/4" R.
WING & TAIL TIPS WOUND FROM 4 LAMS. OF 1/32" x 1/8".
USE TIP UP TAIL D/T.
6"
3 3/4"
5"
PAPER TUBE
3/16" SQ. L.E.
1/2" x 1/8" T.E.
1/8" SQ. L.E.
1/4 x 1/8 T.E.
8"
8"
18G. U/CART PLUGS INTO TUBE
PLY BRACE
2° SIDETHRUST. NO DOWNTHRUST.
1 1/8"
1 3/4"
4"
2 1/4"
1 1/2"
1/16" SHEET RIBS
PLY FACING
1/16" x 1/8" RIBS
3"
STOP
16 G.
4"
14"
1 7/8" R.
3 1/2"
SOLDER
18 G.
5 1/2"
POWER: 6 STRANDS 1/4" x 1/24". 36"-40" LONG.
2 1/2" R.
THERMAL BUG
By BRIAN LEWIS
G.B.
ALL LONGERONS & SPACERS 3/32" SQ.
2° INC.
3/32" D. BAMBOO
20 S.W.G.
1/16" SHEET OUTLINE
4"
4"
1° INC.
1 1/8"
2 1/8"
2" R.
2"
3/16" DOWEL
29 1/2"
ALL UP WEIGHT 2 3/4 - 3 1/4 OZS.
0 1 2 3 4 5 6 7 8 9 10 11 12
SCALE. INCHES.
CEMENT FIN TO TAIL.

Thermal Bug

By BRIAN LEWIS



THE first Thermal Bug was designed in the early part of 1948; it weighed $2\frac{1}{4}$ oz. and had a $2\frac{1}{2}$ min. motor run. Since then the design has been developed through seven models, and a Wakefield version is being built for the 1953 season.

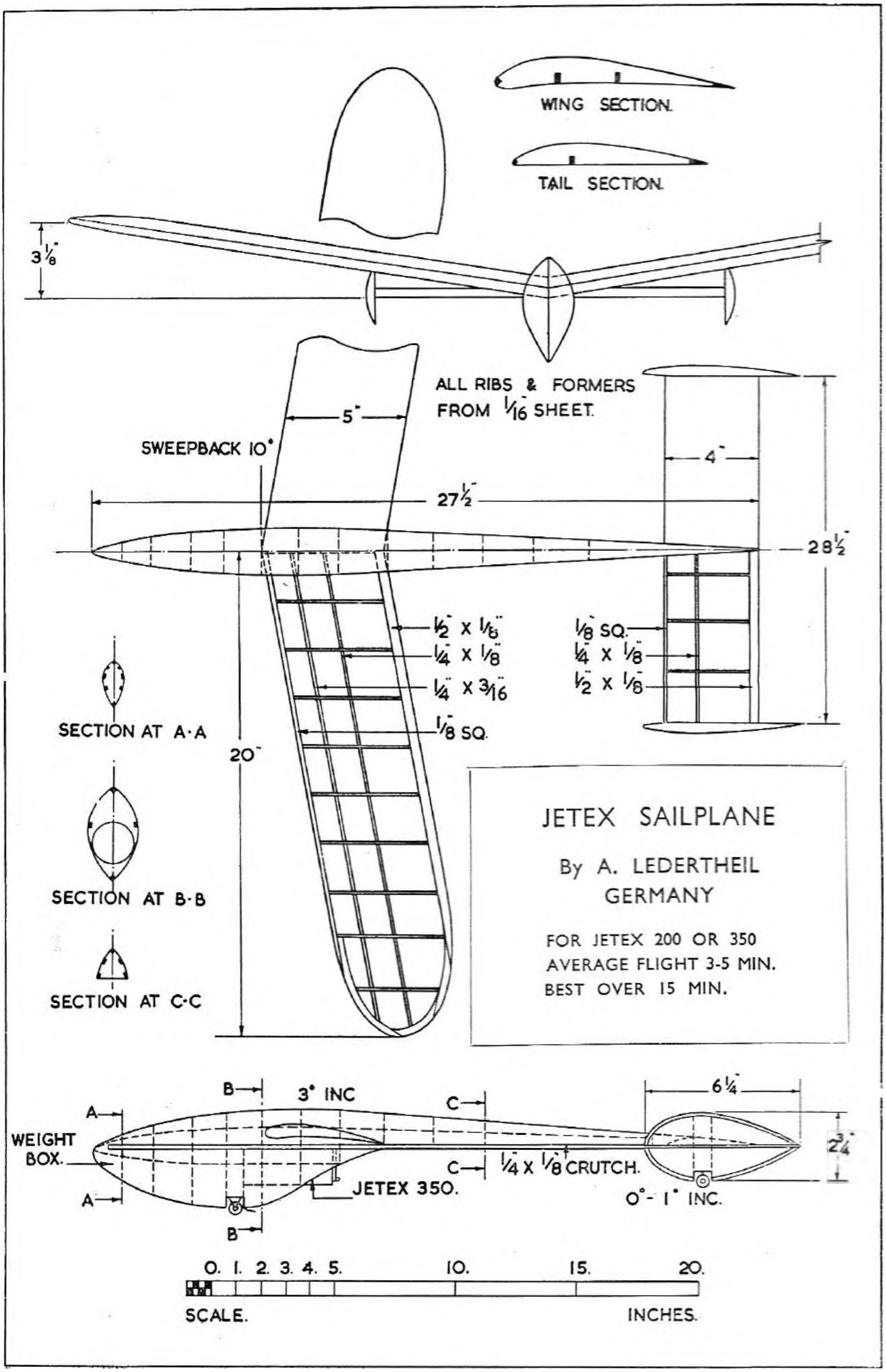
Mk. 2 won first prize in the 1950 Southern Cross Exhibition and went on to win two club contests, and win second place in the Southern Counties rally. Mk. 3 was lost on its first flight and spent two weeks in a potato field, which wrote it off. Mk. 4 was flown in the Northern Heights gala, but after climbing to 100 feet the motor peg slipped out, prop and rubber shot out of the nose, and the rest of the model sank for 30 secs. ! Model No. 5 won a Southern Cross contest first day out. Flown in the 1951 Bill White trophy it was lost on its second flight, but placed 13th; another flight of $2\frac{1}{2}$ min. would have placed it first.

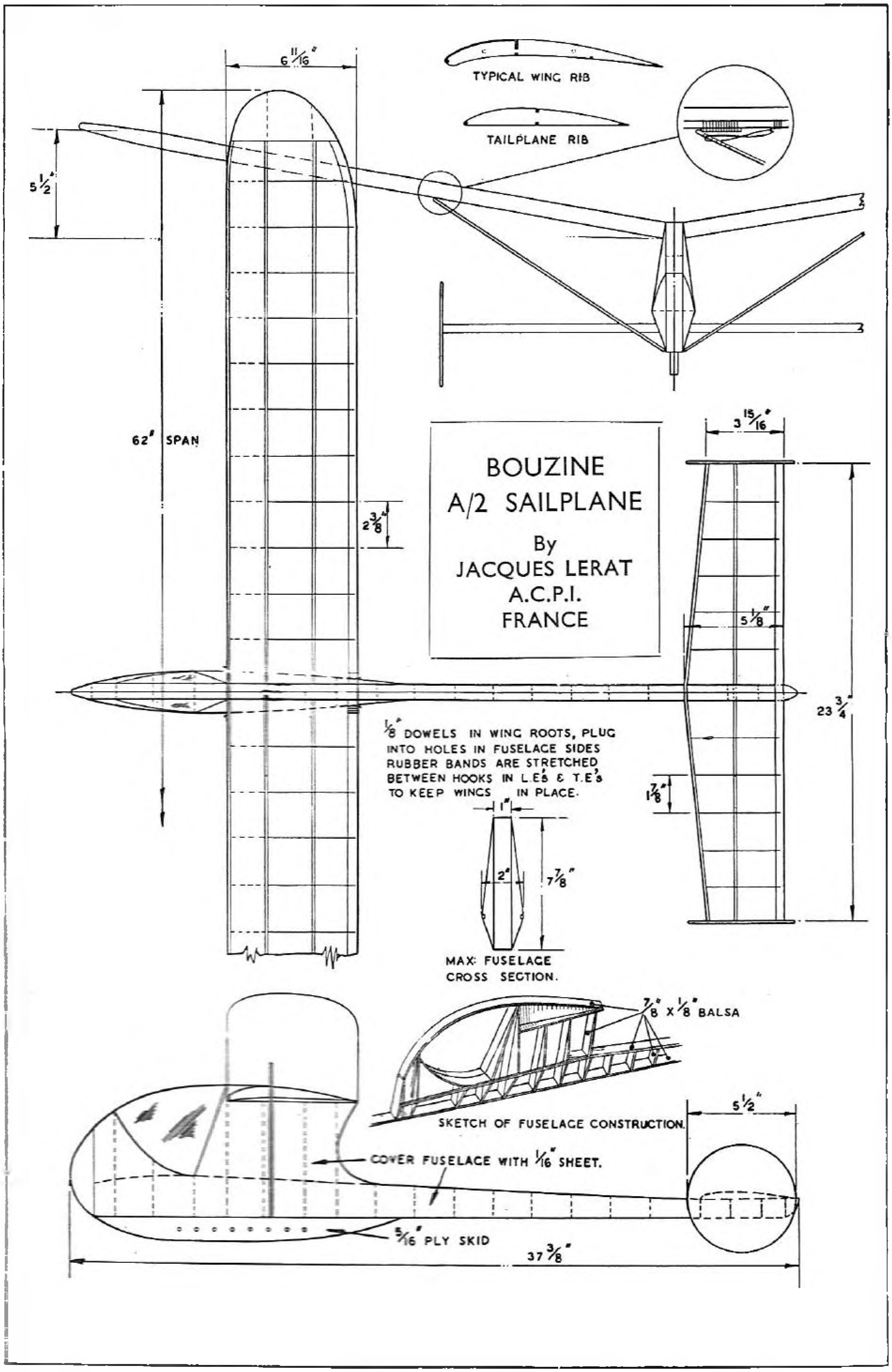
The sixth model was flown in the Farrow Shield and returned top time in the S.E. Area. Later it was flown in an Icarian/Luton/St. Albans triangle match at Eaton Bray and placed third.

Trimming the model is straightforward enough. Just move the wing fore or aft to get the glide, then trim the bamboo runners to project $\frac{1}{4}$ inch either side of leading and trailing edges. This will make sure the wing position is the same every time the model is assembled. Try not to use any downthrust, but use a little sidethrust if necessary. A tight right hand turn is best. The Thermal Bug has plenty of spiral stability so do not be afraid of overdoing the turn, provided that the model is launched to the left of the wind it will get away safely every time.

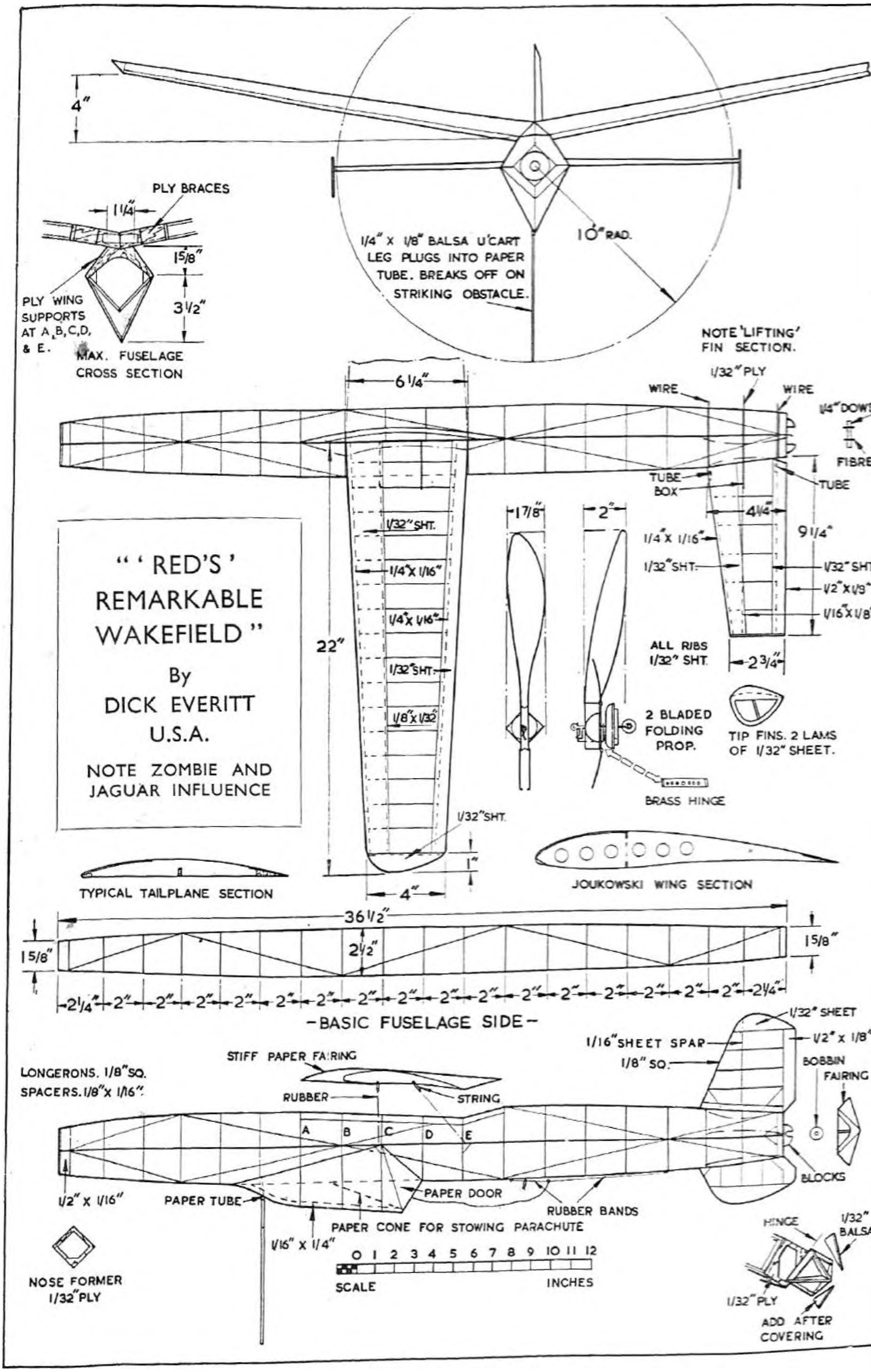
Though the first Thermal Bugs were very light, due to influence of indoor flying, the later jobs are made more robust using quite hard balsa. This has paid off in consistency of performance, less repair work and fewer warps.

This type of job makes an ideal contest model. It costs about 3s. all up to make and can be built in a week of evenings. Trimming is usually completed in half a dozen flights. By the way, final trimming is done by bending the prop hinge to alter the pitch and obtain the best climb : motor run ratio. This can be altered to suit conditions—fine pitch for gusty weather, coarse pitch for "still air."

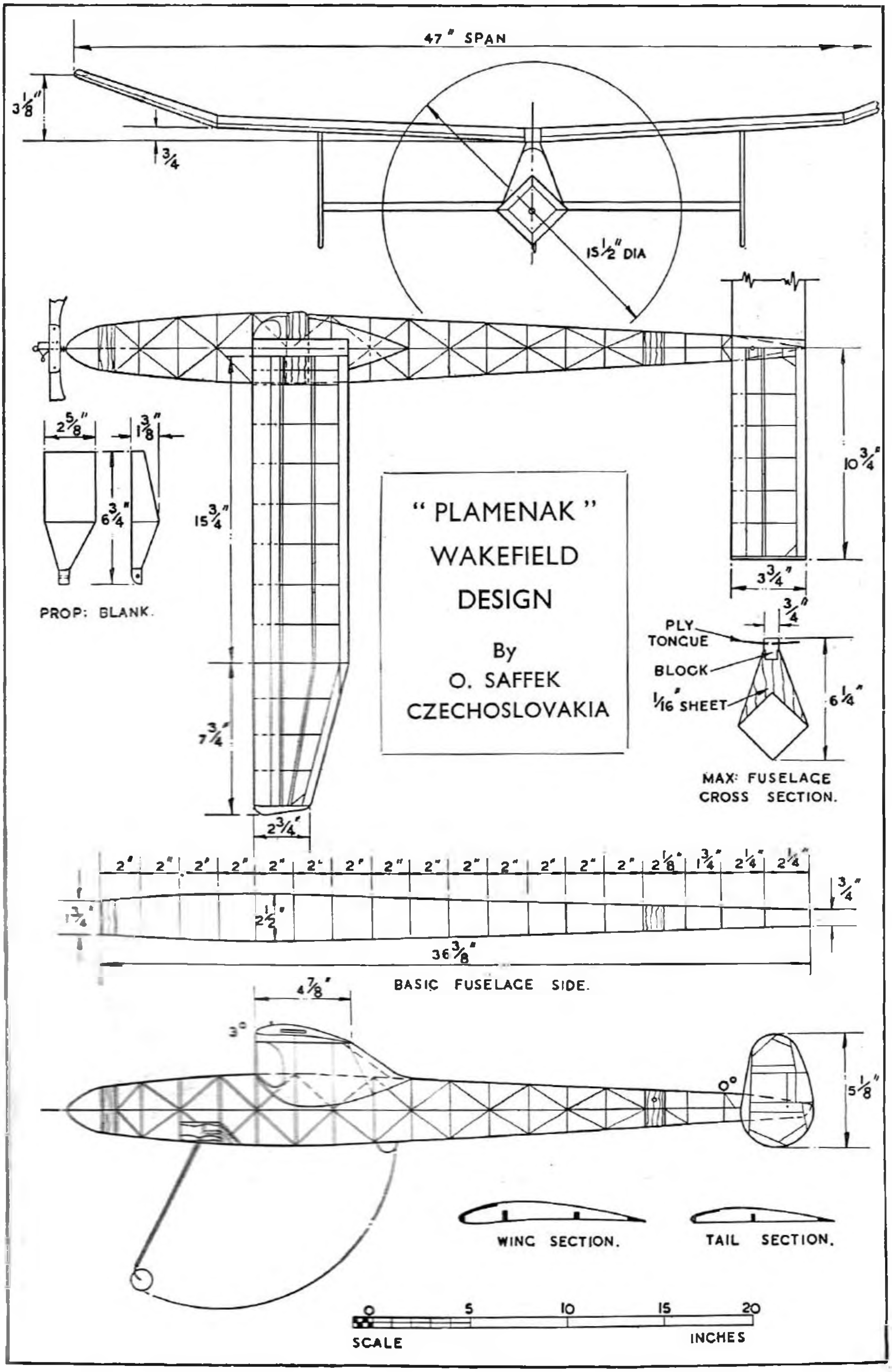

WING SECTION.
TAIL SECTION.
3 1/8"
ALL RIBS & FORMERS FROM 1/16" SHEET.
5"
SWEEPBACK 10°
27 1/2"
4"
28 1/2"
1/2" x 1/8"
1/4" x 1/8"
1/4" x 3/16"
1/8" SQ.
1/8" SQ.
1/4" x 1/8"
1/2" x 1/8"
SECTION AT A-A
20"
SECTION AT B-B
SECTION AT C-C
JETEX SAILPLANE
By A. LEDERTHEIL
GERMANY
FOR JETEX 200 OR 350
AVERAGE FLIGHT 3-5 MIN.
BEST OVER 15 MIN.
B
3° INC
C
A
WEIGHT BOX.
6 1/4"
2 3/4"
1/4" x 1/8" CRUTCH.
JETEX 350.
0°-1° INC.
0. 1. 2. 3. 4. 5. 10. 15. 20.
SCALE.
INCHES.

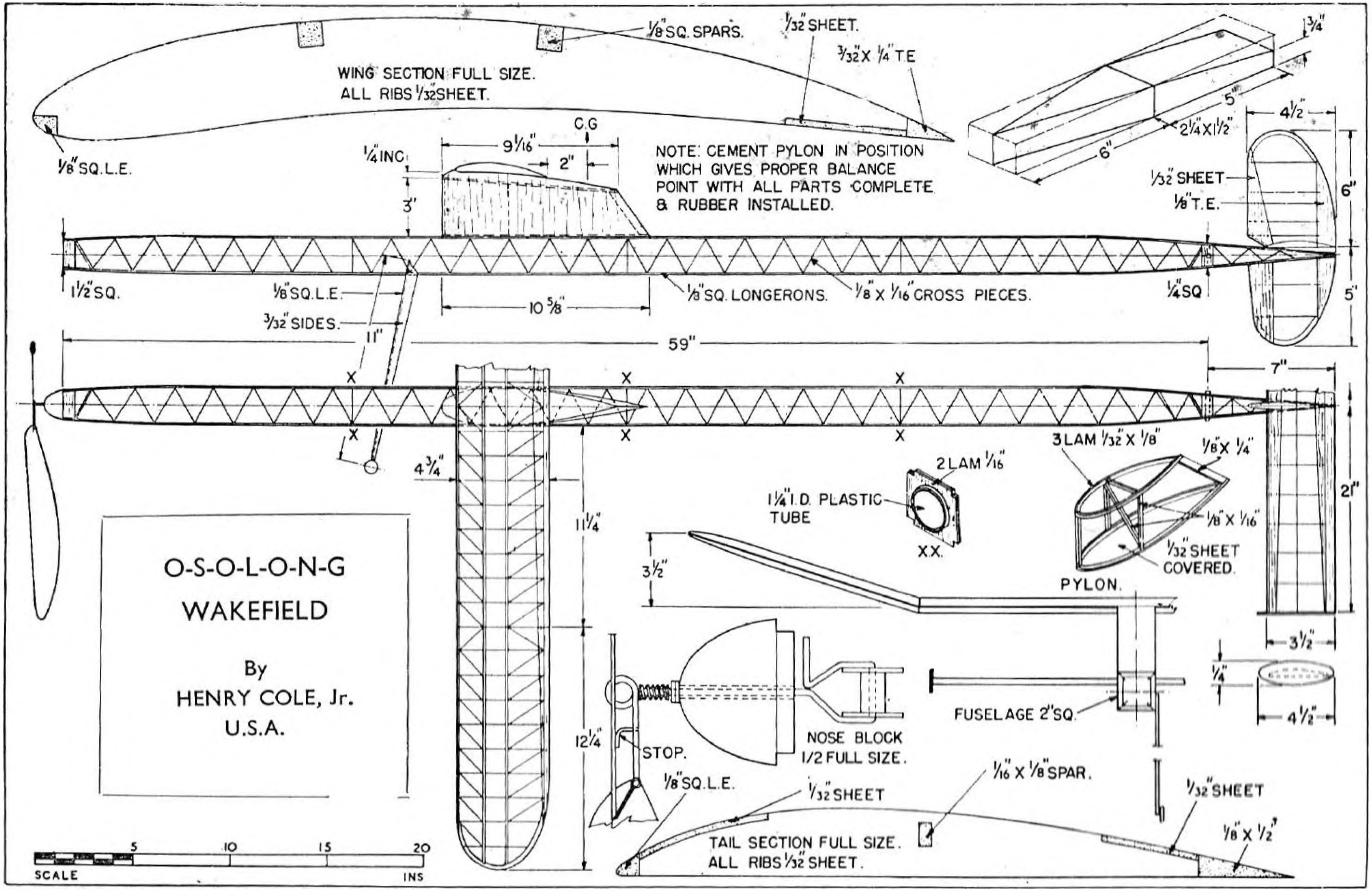


6 11/16"
TYPICAL WING RIB
TAILPLANE RIB
5 1/2"
62" SPAN
2 3/8"
BOUZINE
A/2 SAILPLANE
By
JACQUES LERAT
A.C.P.I.
FRANCE
3 15/16"
5 1/8"
23 3/4"
1 7/8"
1/8" DOWELS IN WING ROOTS, PLUG INTO HOLES IN FUSELAGE SIDES RUBBER BANDS ARE STRETCHED BETWEEN HOOKS IN L.E's & T.E's TO KEEP WINGS IN PLACE.
1"
2"
7 7/8"
MAX: FUSELAGE CROSS SECTION.
7/8" x 1/8" BALSA
SKETCH OF FUSELAGE CONSTRUCTION.
5 1/2"
COVER FUSELAGE WITH 1/16" SHEET.
5/16" PLY SKID
37 3/8"

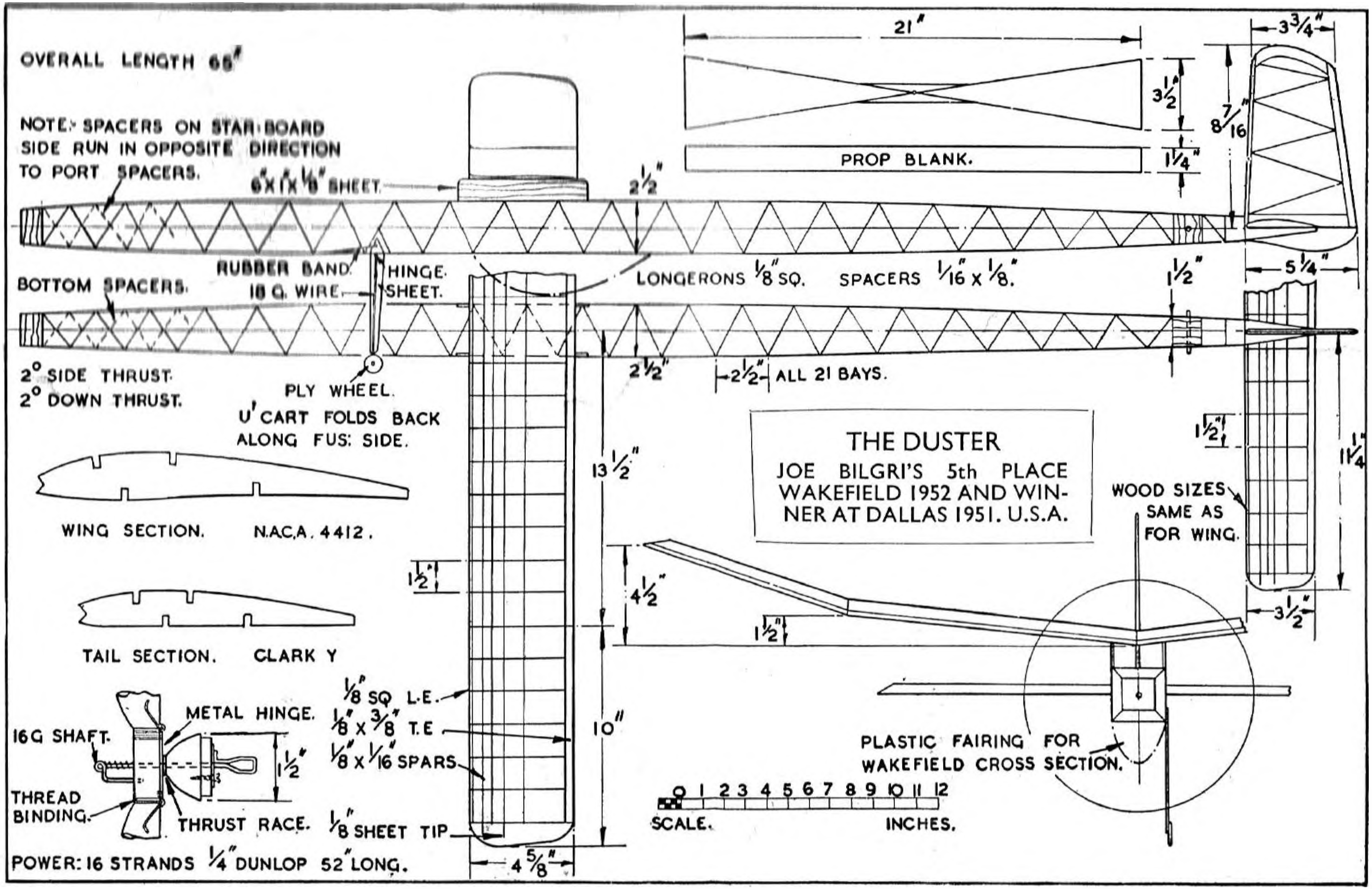


" 'RED'S' REMARKABLE WAKEFIELD "
By
DICK EVERITT
U.S.A.
NOTE ZOMBIE AND JAGUAR INFLUENCE
4"
PLY BRACES
1 1/4"
1 5/8"
3 1/2"
PLY WING SUPPORTS AT A, B, C, D, & E.
MAX. FUSELAGE CROSS SECTION
1/4" X 1/8" BALSA U'CART LEG PLUGS INTO PAPER TUBE. BREAKS OFF ON STRIKING OBSTACLE.
10" RAD.
NOTE 'LIFTING' FIN SECTION.
1/32" PLY
WIRE
WIRE
1/4" DOWEL
FIBRE
TUBE
TUBE
BOX
6 1/4"
1/32" SHT.
1/4" X 1/16"
1/4" X 1/16"
1/32" SHT.
1/8" X 1/32"
22"
1/32" SHT.
1"
4"
1 7/8"
2"
4 1/4"
9 1/4"
1/4" X 1/16"
1/32" SHT.
1/32" SHT.
1/2" X 1/8"
1/16" X 1/8"
ALL RIBS 1/32" SHT.
2 3/4"
2 BLADED FOLDING PROP.
TIP FINS. 2 LAMS OF 1/32" SHEET.
BRASS HINGE
TYPICAL TAILPLANE SECTION
JOUKOWSKI WING SECTION
36 1/2"
1 5/8"
2 1/2"
1 5/8"
2 1/4" 2" 2" 2" 2" 2" 2" 2" 2" 2" 2" 2" 2" 2" 2" 2" 2" 2 1/4"
-BASIC FUSELAGE SIDE-
1/32" SHEET
1/2" x 1/8"
1/16" SHEET SPAR
1/8" SQ.
BOBBIN FAIRING
STIFF PAPER FAIRING
LONGERONS. 1/8" SQ.
SPACERS. 1/8" x 1/16".
RUBBER
STRING
A B C D E
BLOCKS
1/2" x 1/16"
PAPER TUBE
PAPER DOOR
RUBBER BANDS
PAPER CONE FOR STOWING PARACHUTE
1/16" x 1/4"
HINGE
1/32" BALSA
0 1 2 3 4 5 6 7 8 9 10 11 12
SCALE
INCHES
NOSE FORMER 1/32" PLY
1/32" PLY
ADD AFTER COVERING

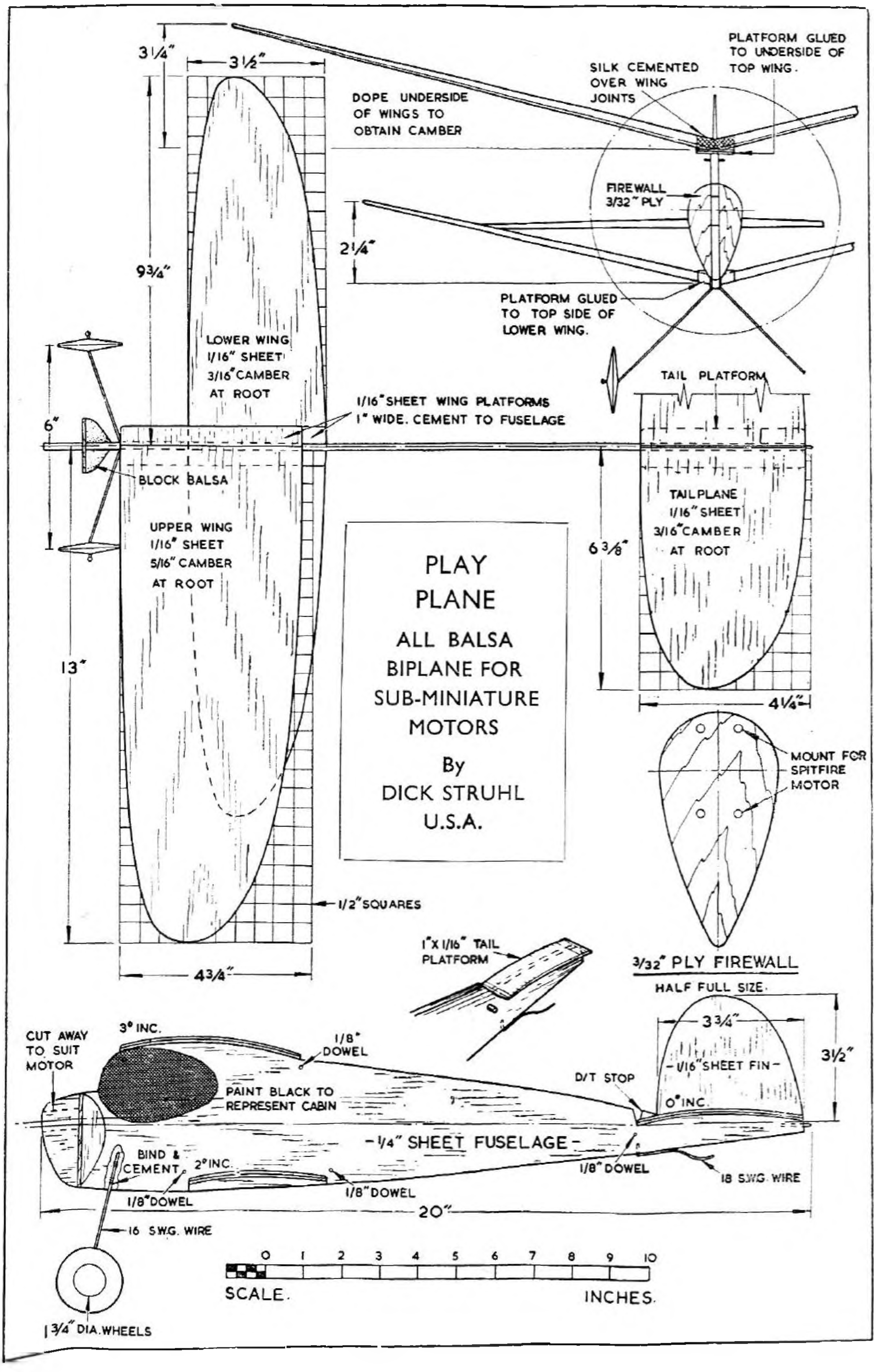

47" SPAN
15½" DIA
PROP: BLANK.
" PLAMENAK "
WAKEFIELD
DESIGN
By
O. SAFFEK
CZECHOSLOVAKIA
PLY TONGUE
BLOCK
1/16" SHEET
MAX: FUSELAGE CROSS SECTION.
BASIC FUSELAGE SIDE.
WING SECTION.
TAIL SECTION.
SCALE
INCHES

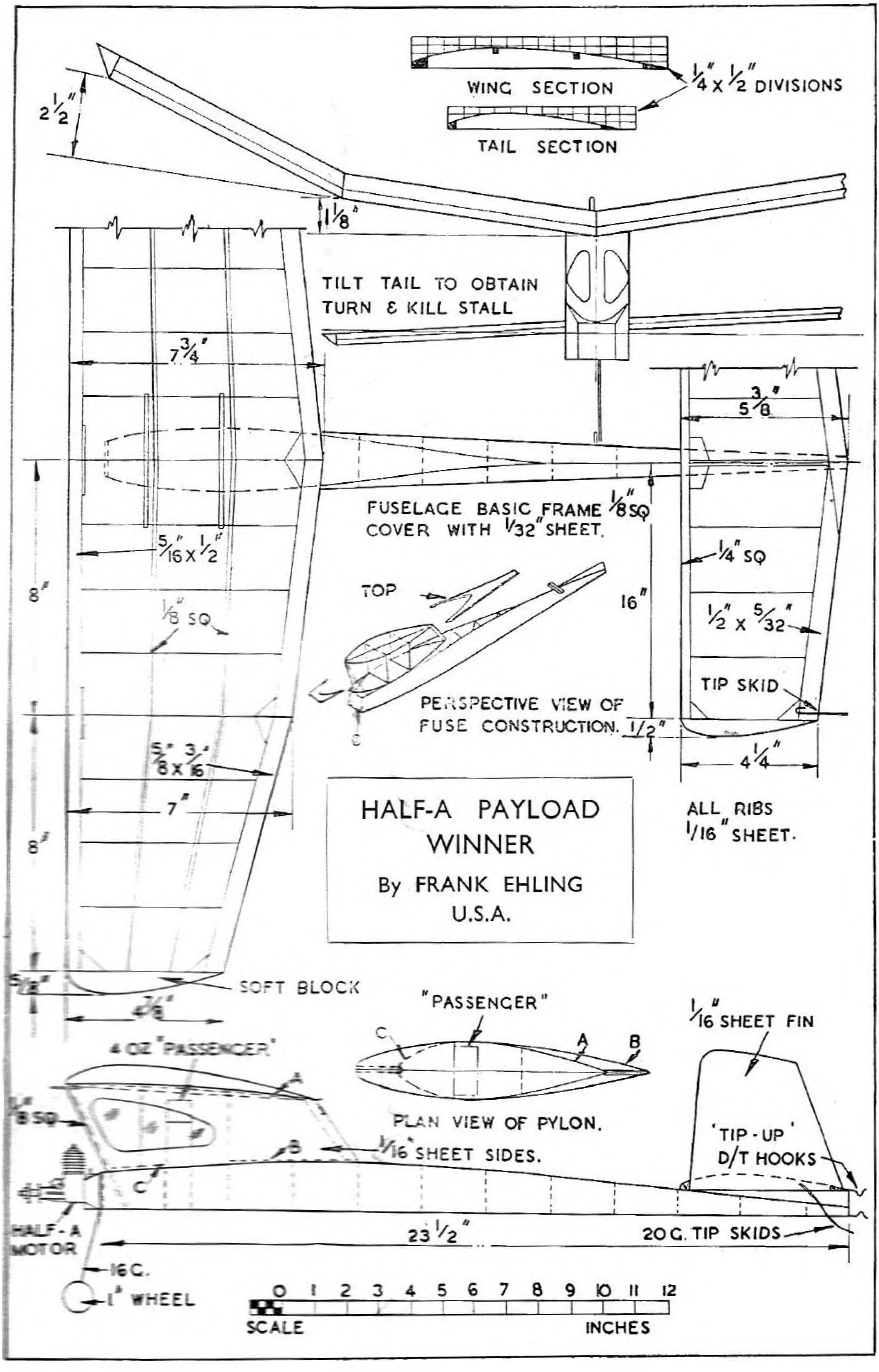


O-S-O-L-O-N-G
WAKEFIELD
By
HENRY COLE, Jr.
U.S.A.
WING SECTION FULL SIZE.
ALL RIBS 1/32" SHEET.
1/8" SQ. SPARS.
1/32" SHEET.
3/32" X 1/4" T.E
1/8" SQ. L.E.
C.G
9 1/16"
2"
1/4" INC.
3"
NOTE: CEMENT PYLON IN POSITION WHICH GIVES PROPER BALANCE POINT WITH ALL PARTS COMPLETE & RUBBER INSTALLED.
3/4"
5"
2 1/4" X 1 1/2"
6"
4 1/2"
1/32" SHEET
1/8" T.E.
6"
5"
1 1/2" SQ.
1/8" SQ. L.E.
3/32" SIDES.
10 5/8"
1/8" SQ. LONGERONS.
1/8" X 1/16" CROSS PIECES.
1/4" SQ
11"
59"
7"
X
4 3/4"
11 1/4"
12 1/4"
3 LAM 1/32" X 1/8"
1/8" X 1/4"
2 LAM 1/16"
1 1/4" I.D. PLASTIC TUBE
XX.
1/8" X 1/16"
1/32" SHEET COVERED.
PYLON.
21"
3 1/2"
3 1/2"
FUSELAGE 2" SQ.
1/4"
4 1/2"
STOP.
NOSE BLOCK 1/2 FULL SIZE.
1/8" SQ. L.E.
1/32" SHEET
1/16" X 1/8" SPAR.
1/32" SHEET
1/8" X 1/2"
TAIL SECTION FULL SIZE.
ALL RIBS 1/32" SHEET.
5
10
15
20
SCALE
INS

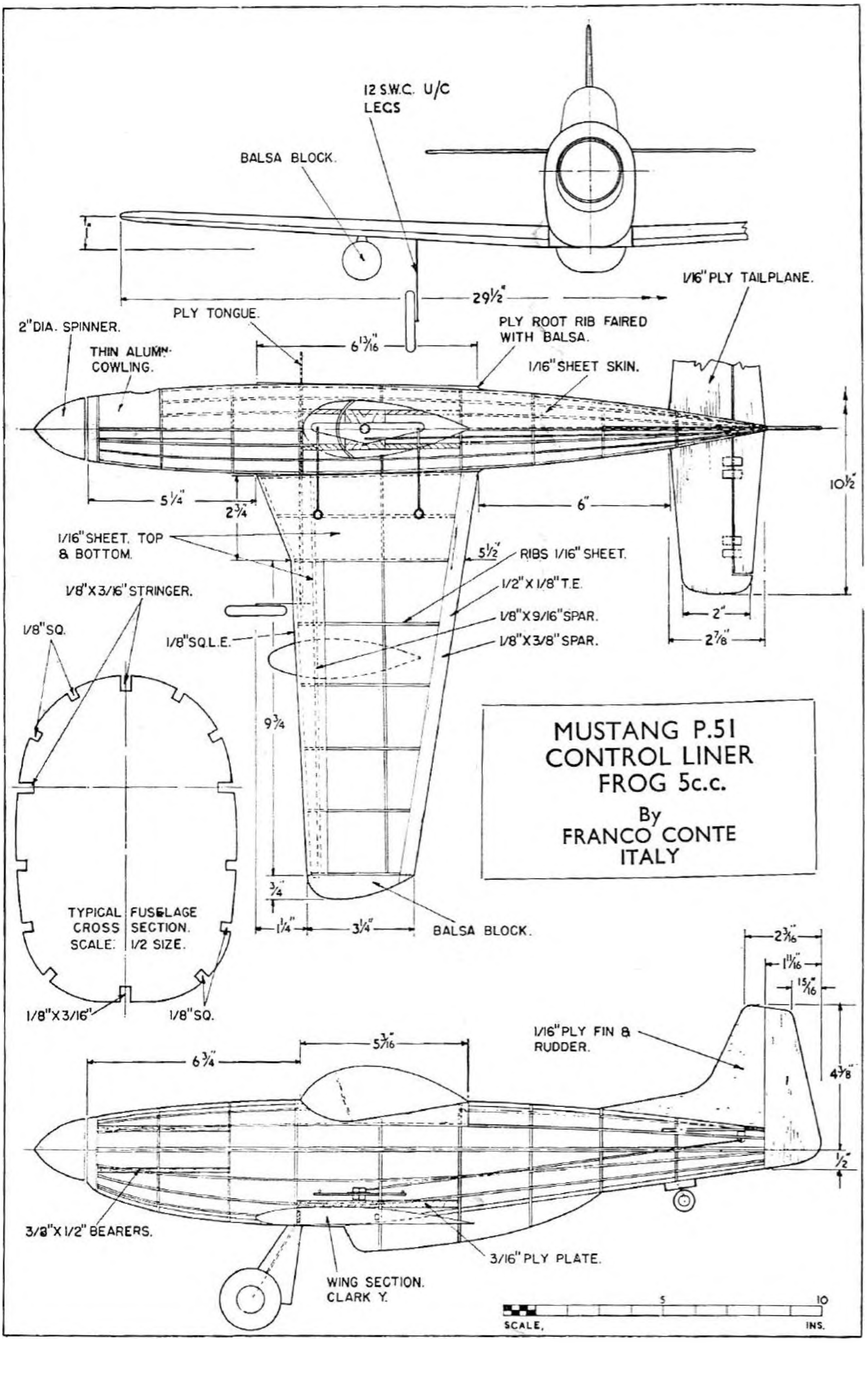

OVERALL LENGTH 65"
NOTE:- SPACERS ON STAR-BOARD SIDE RUN IN OPPOSITE DIRECTION TO PORT SPACERS.
6" x 1" x 1/8" SHEET
2 1/2"
21"
3 1/2"
PROP BLANK.
1 1/4"
3 3/4"
8 7/16"
RUBBER BAND.
HINGE. SHEET.
18 G. WIRE.
BOTTOM SPACERS.
LONGERONS 1/8" SQ.
SPACERS 1/16" x 1/8".
1 1/2"
5 1/4"
2° SIDE THRUST.
2° DOWN THRUST.
PLY WHEEL.
U' CART FOLDS BACK ALONG FUS: SIDE.
2 1/2"
2 1/2" ALL 21 BAYS.
THE DUSTER
JOE BILGRI'S 5th PLACE WAKEFIELD 1952 AND WINNER AT DALLAS 1951. U.S.A.
13 1/2"
1 1/2"
11 1/4"
WOOD SIZES SAME AS FOR WING.
WING SECTION.
N.A.C.A. 4412.
1 1/2"
4 1/2"
3 1/2"
TAIL SECTION.
CLARK Y
1 1/2"
1/8" SQ L.E.
METAL HINGE.
1/8" x 3/8" T.E.
16 G SHAFT.
10"
1/8" x 1/16" SPARS.
1 1/2"
PLASTIC FAIRING FOR WAKEFIELD CROSS SECTION.
THREAD BINDING.
THRUST RACE.
1/8" SHEET TIP.
0 1 2 3 4 5 6 7 8 9 10 11 12
SCALE.
INCHES.
POWER: 16 STRANDS 1/4" DUNLOP 52" LONG.
4 5/8"

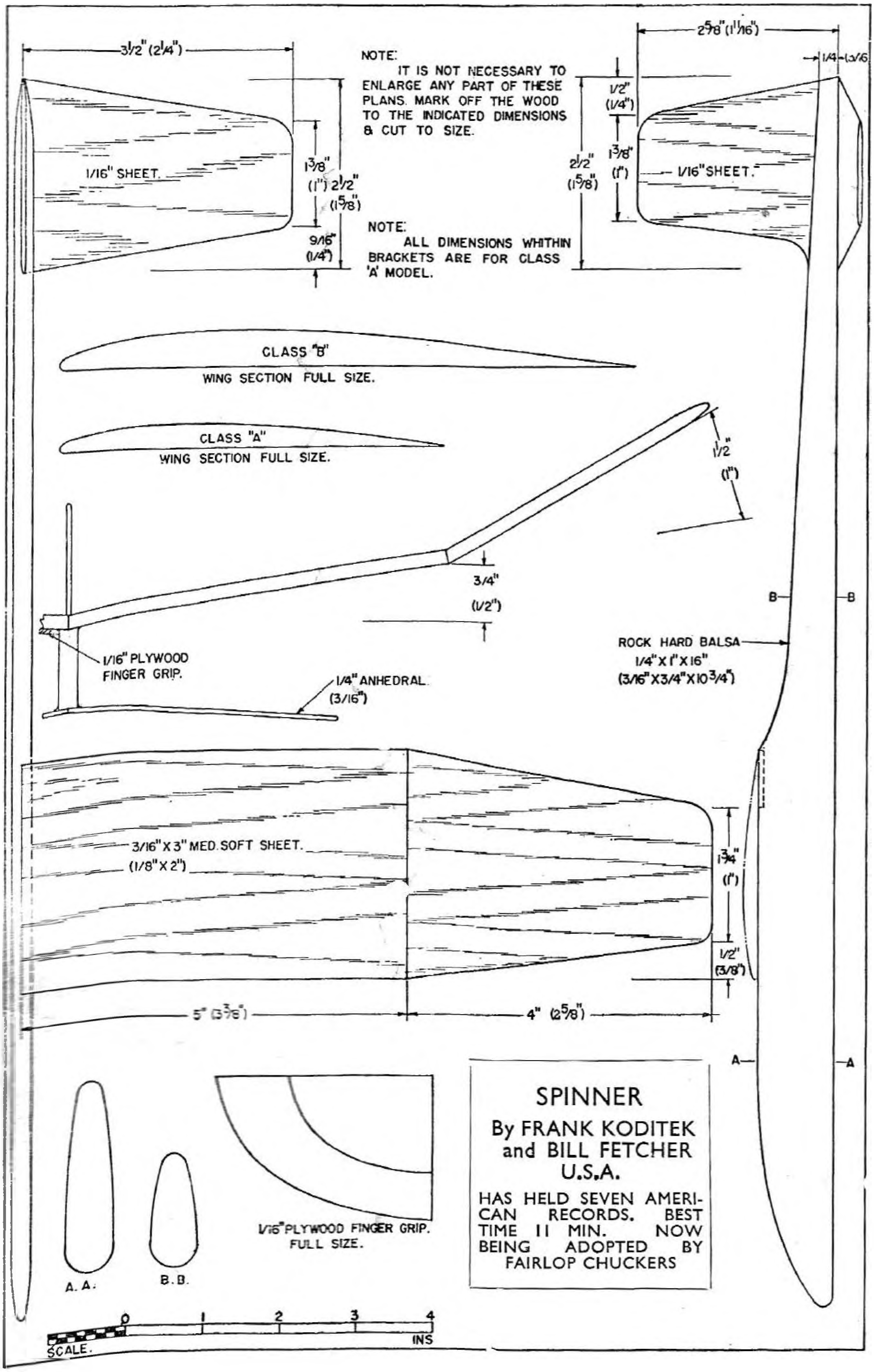
B


PLAY PLANE
ALL BALSA BIPLANE FOR SUB-MINIATURE MOTORS
By DICK STRUHL U.S.A.
DOPE UNDERSIDE OF WINGS TO OBTAIN CAMBER
SILK CEMENTED OVER WING JOINTS
PLATFORM GLUED TO UNDERSIDE OF TOP WING.
FIREWALL 3/32" PLY
PLATFORM GLUED TO TOP SIDE OF LOWER WING.
LOWER WING 1/16" SHEET 3/16" CAMBER AT ROOT
UPPER WING 1/16" SHEET 5/16" CAMBER AT ROOT
1/16" SHEET WING PLATFORMS 1" WIDE. CEMENT TO FUSELAGE
BLOCK BALSA
TAIL PLATFORM
TAILPLANE 1/16" SHEET 3/16" CAMBER AT ROOT
MOUNT FOR SPITFIRE MOTOR
3/32" PLY FIREWALL
HALF FULL SIZE.
1/2" SQUARES
1" X 1/16" TAIL PLATFORM
CUT AWAY TO SUIT MOTOR
3° INC.
1/8" DOWEL
PAINT BLACK TO REPRESENT CABIN
D/T STOP
1/16" SHEET FIN
0° INC.
1/4" SHEET FUSELAGE
BIND & CEMENT
2° INC.
1/8" DOWEL
18 S.W.G. WIRE
16 S.W.G. WIRE
1 3/4" DIA. WHEELS
3 1/4"
3 1/2"
9 3/4"
2 1/4"
6"
13"
4 3/4"
6 3/8"
4 1/4"
3 3/4"
20"
SCALE. INCHES.
0 1 2 3 4 5 6 7 8 9 10



WING SECTION
TAIL SECTION
1/4" x 1/2" DIVISIONS
2 1/2"
1 1/8"
TILT TAIL TO OBTAIN TURN & KILL STALL
7 3/4"
3 5/8"
FUSELAGE BASIC FRAME 1/8" SQ
COVER WITH 1/32" SHEET.
5/16" x 1/2"
1/4" SQ
TOP
16"
8"
1/8" SQ
1/2" x 5/32"
TIP SKID
PERSPECTIVE VIEW OF FUSE CONSTRUCTION.
1/2"
4 1/4"
7"
ALL RIBS 1/16" SHEET.
HALF-A PAYLOAD WINNER
By FRANK EHLING
U.S.A.
SOFT BLOCK
"PASSENGER"
1/16" SHEET FIN
4 OZ "PASSENGER"
PLAN VIEW OF PYLON.
1/16" SHEET SIDES.
'TIP-UP' D/T HOOKS
HALF-A MOTOR
23 1/2"
20G. TIP SKIDS
16G.
1" WHEEL
0 1 2 3 4 5 6 7 8 9 10 11 12
SCALE
INCHES

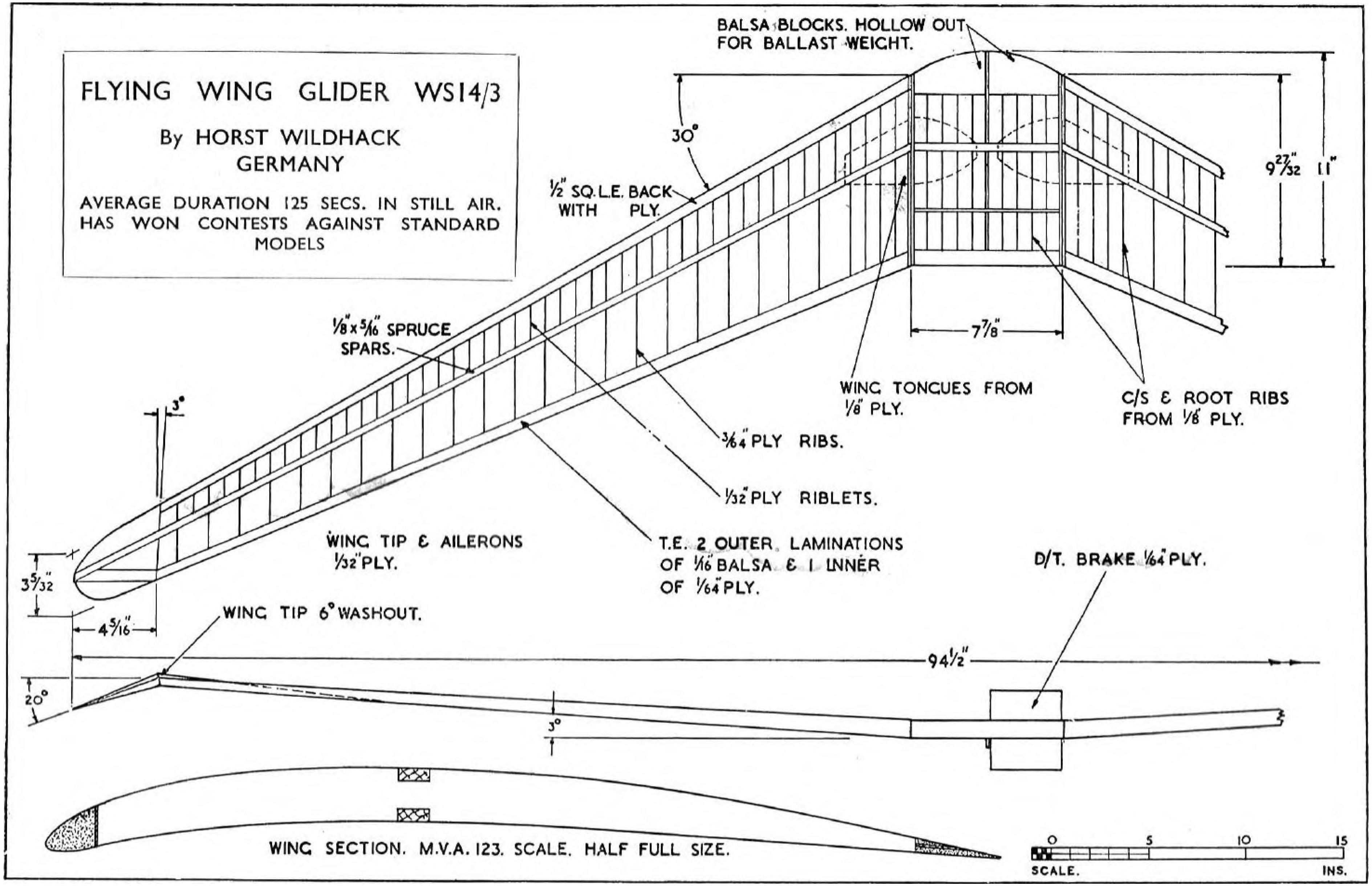

12 S.W.C. U/C LEGS
BALSA BLOCK.
29½"
1/16" PLY TAILPLANE.
PLY TONGUE.
2" DIA. SPINNER.
THIN ALUMN. COWLING.
6 13/16"
PLY ROOT RIB FAIRED WITH BALSA.
1/16" SHEET SKIN.
10½"
5¼"
2¾"
6"
1/16" SHEET, TOP & BOTTOM.
5½"
RIBS 1/16" SHEET.
1/8" X 3/16" STRINGER.
1/2" X 1/8" T.E.
1/8" X 9/16" SPAR.
2"
1/8" SQ.
1/8" SQ. L.E.
1/8" X 3/8" SPAR.
2⅞"
9¾
MUSTANG P.51
CONTROL LINER
FROG 5c.c.
By
FRANCO CONTE
ITALY
¾"
TYPICAL FUSELAGE CROSS SECTION. SCALE: 1/2 SIZE.
1¼"
3¼"
BALSA BLOCK.
2 3/16"
1 11/16"
15/16"
1/8" X 3/16"
1/8" SQ.
1/16" PLY FIN & RUDDER.
5 3/16"
6¾"
4⅜"
½"
3/8" X 1/2" BEARERS.
3/16" PLY PLATE.
WING SECTION. CLARK Y.
5
10
SCALE.
INS.

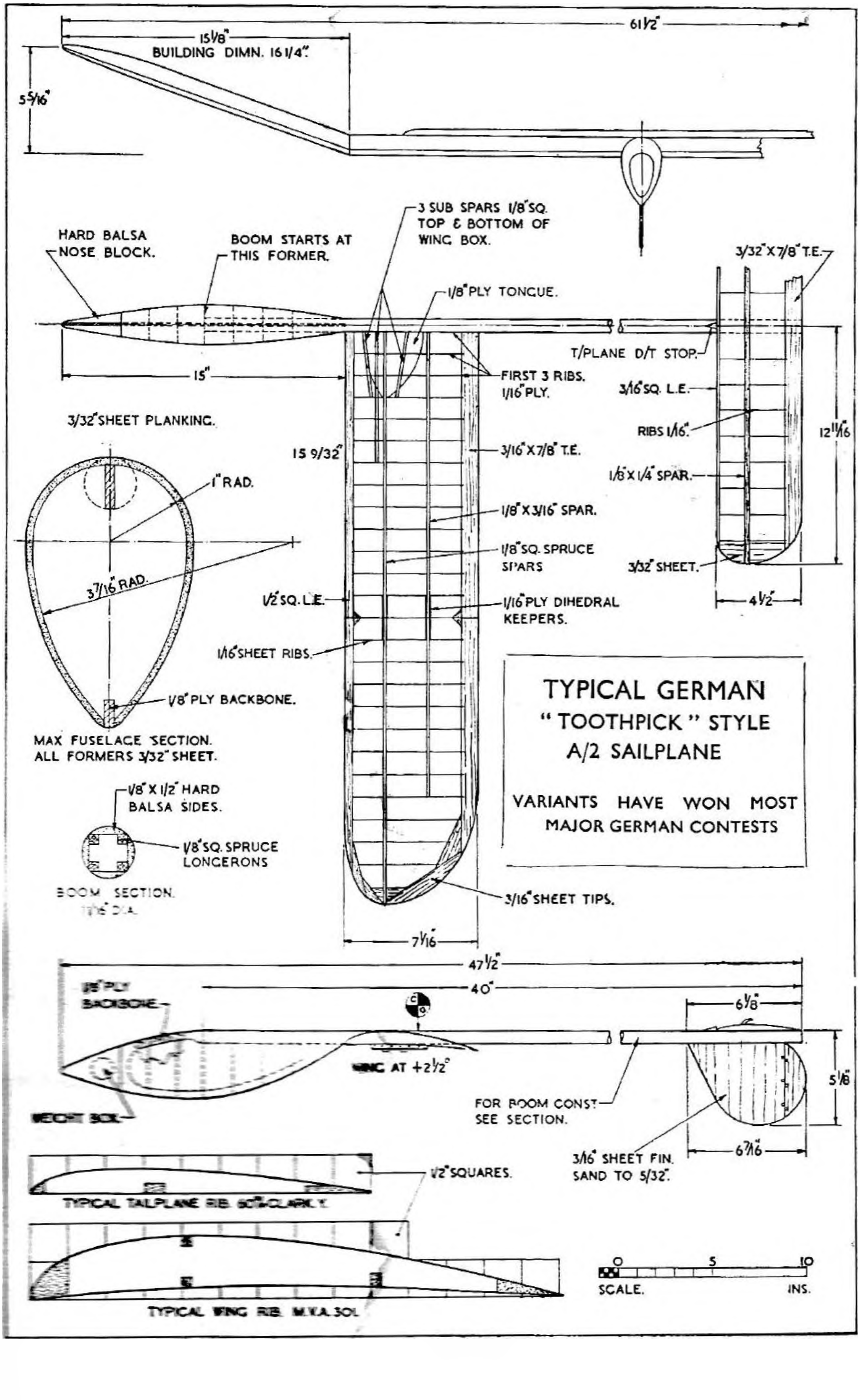


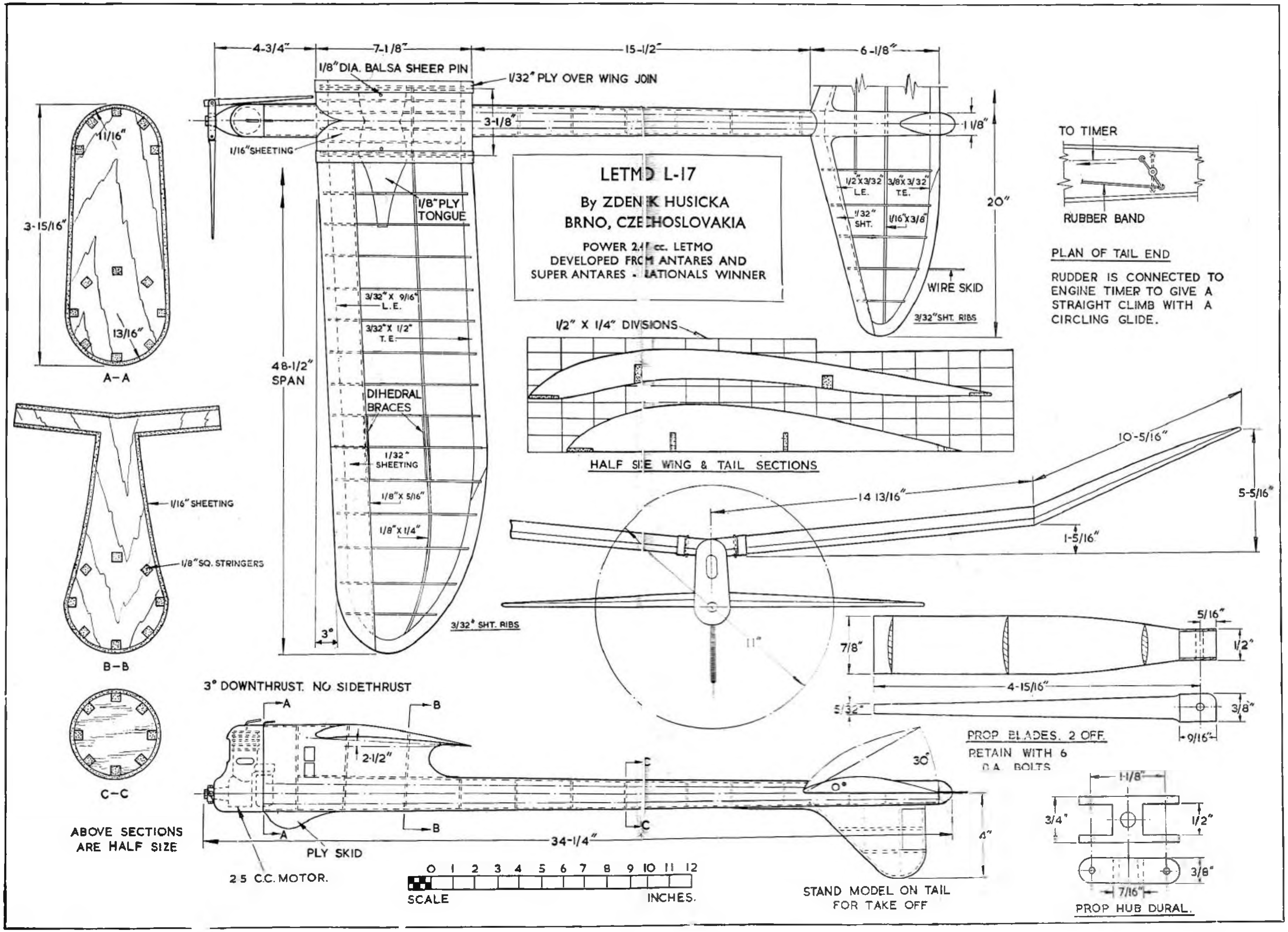
SPINNER

By FRANK KODITEK and BILL FETCHER U.S.A.

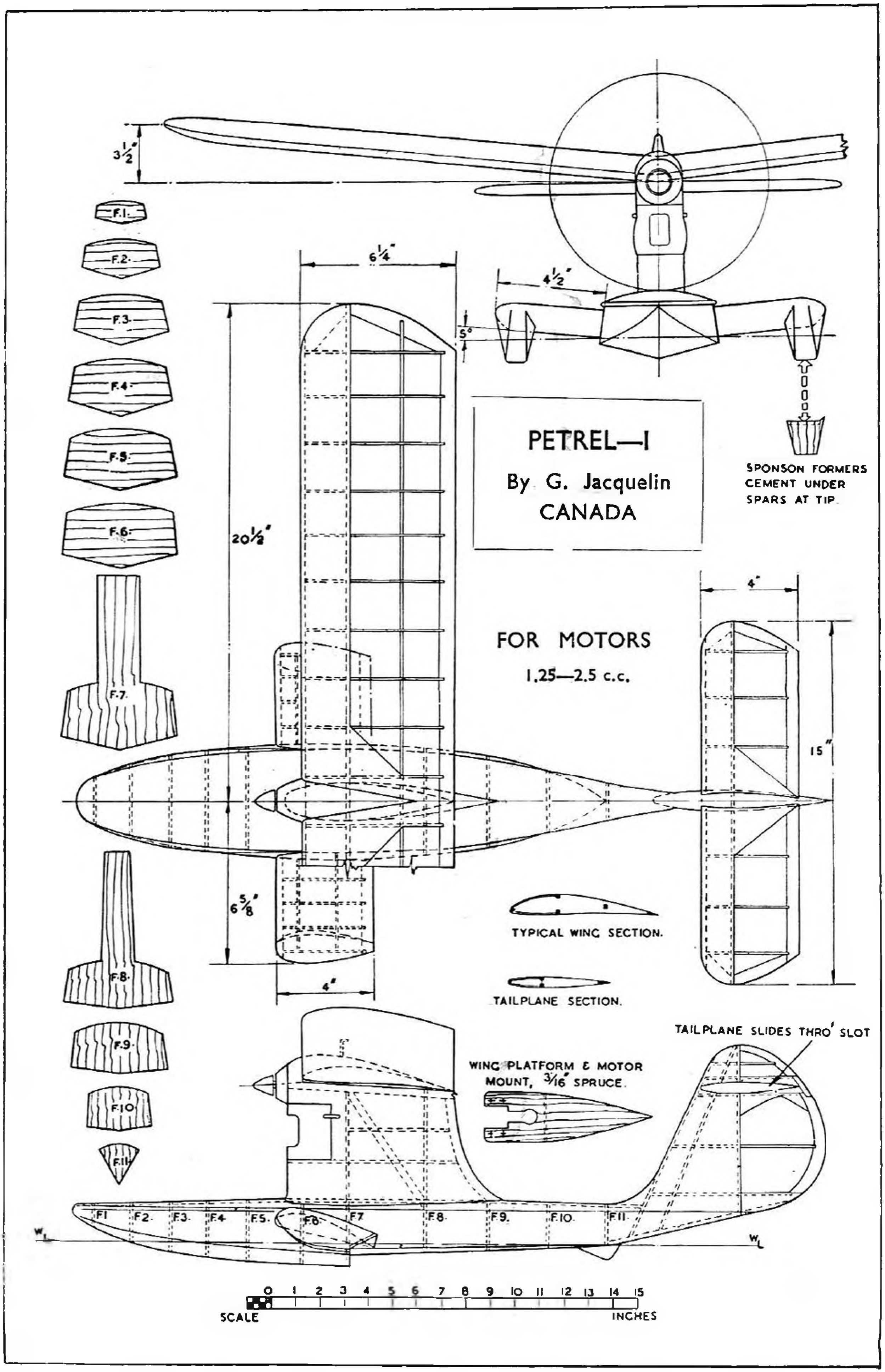
HAS HELD SEVEN AMERICAN RECORDS. BEST TIME 11 MIN. NOW BEING ADOPTED BY FAIRLOP CHUCKERS


FLYING WING GLIDER WS14/3
By HORST WILDHACK
GERMANY
AVERAGE DURATION 125 SECS. IN STILL AIR. HAS WON CONTESTS AGAINST STANDARD MODELS
BALSA BLOCKS. HOLLOW OUT FOR BALLAST WEIGHT.
30°
½" SQ. L.E. BACK WITH PLY.
9 27/32"
11"
7⅞"
⅛" x 5/16" SPRUCE SPARS.
WING TONGUES FROM ⅛" PLY.
C/S & ROOT RIBS FROM ⅛" PLY.
3°
3/64" PLY RIBS.
1/32" PLY RIBLETS.
WING TIP & AILERONS 1/32" PLY.
T.E. 2 OUTER LAMINATIONS OF 1/16" BALSA & 1 INNER OF 1/64" PLY.
D/T. BRAKE 1/64" PLY.
3 5/32"
4 5/16"
WING TIP 6° WASHOUT.
94½"
20°
3°
WING SECTION. M.V.A. 123. SCALE. HALF FULL SIZE.
0
5
10
15
SCALE.
INS.

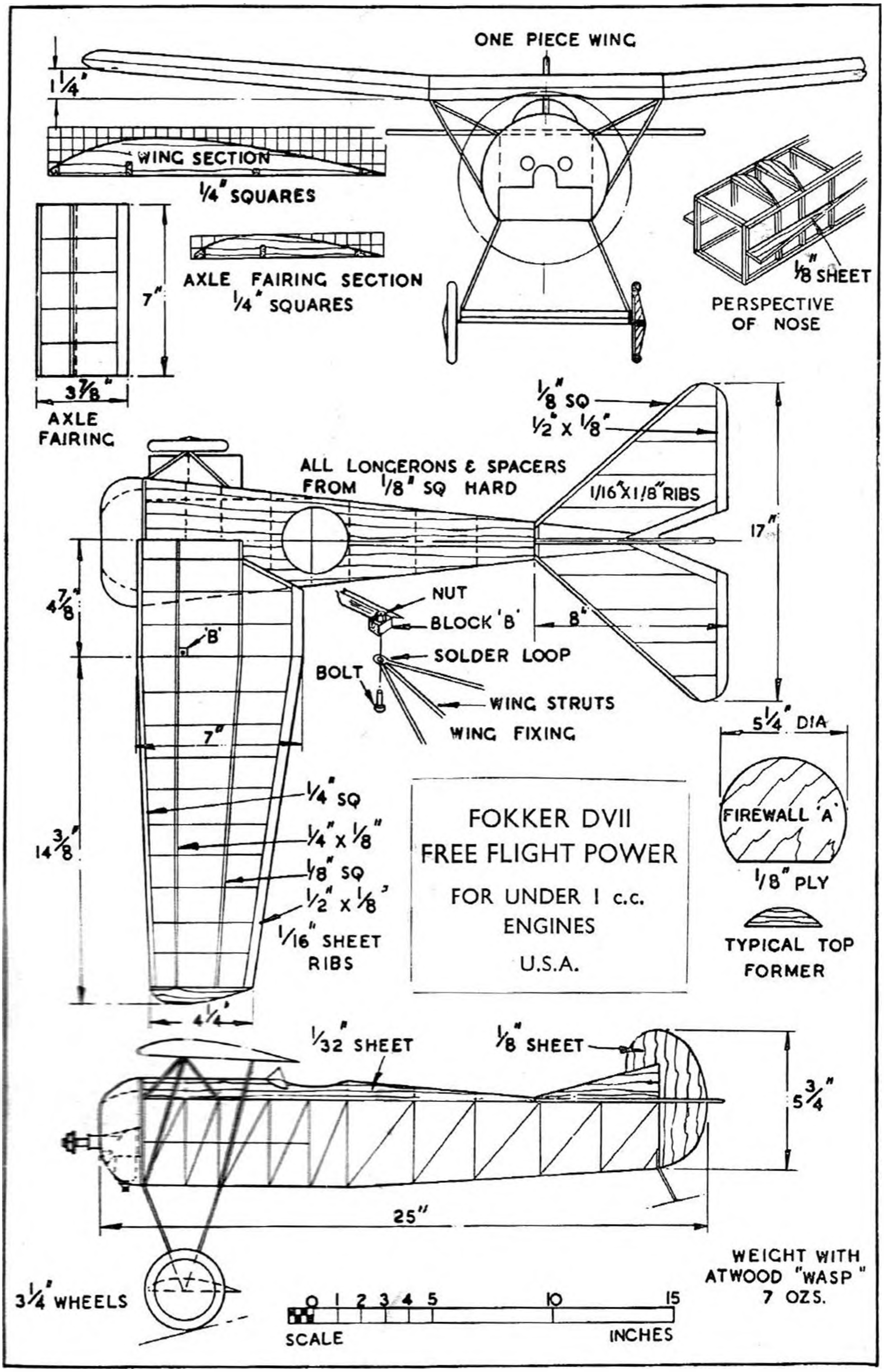

61½"
15⅛"
BUILDING DIMN. 16 1/4"
5 5/16"
HARD BALSA NOSE BLOCK.
BOOM STARTS AT THIS FORMER.
3 SUB SPARS 1/8" SQ. TOP & BOTTOM OF WING BOX.
1/8" PLY TONGUE.
3/32" X 7/8" T.E.
T/PLANE D/T STOP.
15"
FIRST 3 RIBS. 1/16" PLY.
3/16" SQ. L.E.
3/32" SHEET PLANKING.
RIBS 1/16".
12 11/16"
15 9/32"
3/16" X 7/8" T.E.
1/8" X 1/4" SPAR.
1" RAD.
1/8" X 3/16" SPAR.
1/8" SQ. SPRUCE SPARS
3/32" SHEET.
3 7/16" RAD.
1/2" SQ. L.E.
1/16" PLY DIHEDRAL KEEPERS.
4½"
1/16" SHEET RIBS.
1/8" PLY BACKBONE.
TYPICAL GERMAN
" TOOTHPICK " STYLE
A/2 SAILPLANE
MAX FUSELAGE SECTION. ALL FORMERS 3/32" SHEET.
VARIANTS HAVE WON MOST MAJOR GERMAN CONTESTS
1/8" X 1/2" HARD BALSA SIDES.
1/8" SQ. SPRUCE LONGERONS
BOOM SECTION.
3/16" SHEET TIPS.
7 1/16"
47½"
40"
6⅛"
5⅛"
FOR BOOM CONST. SEE SECTION.
6 7/16"
3/16" SHEET FIN. SAND TO 5/32".
1/2" SQUARES.
0 5 10
SCALE. INS.

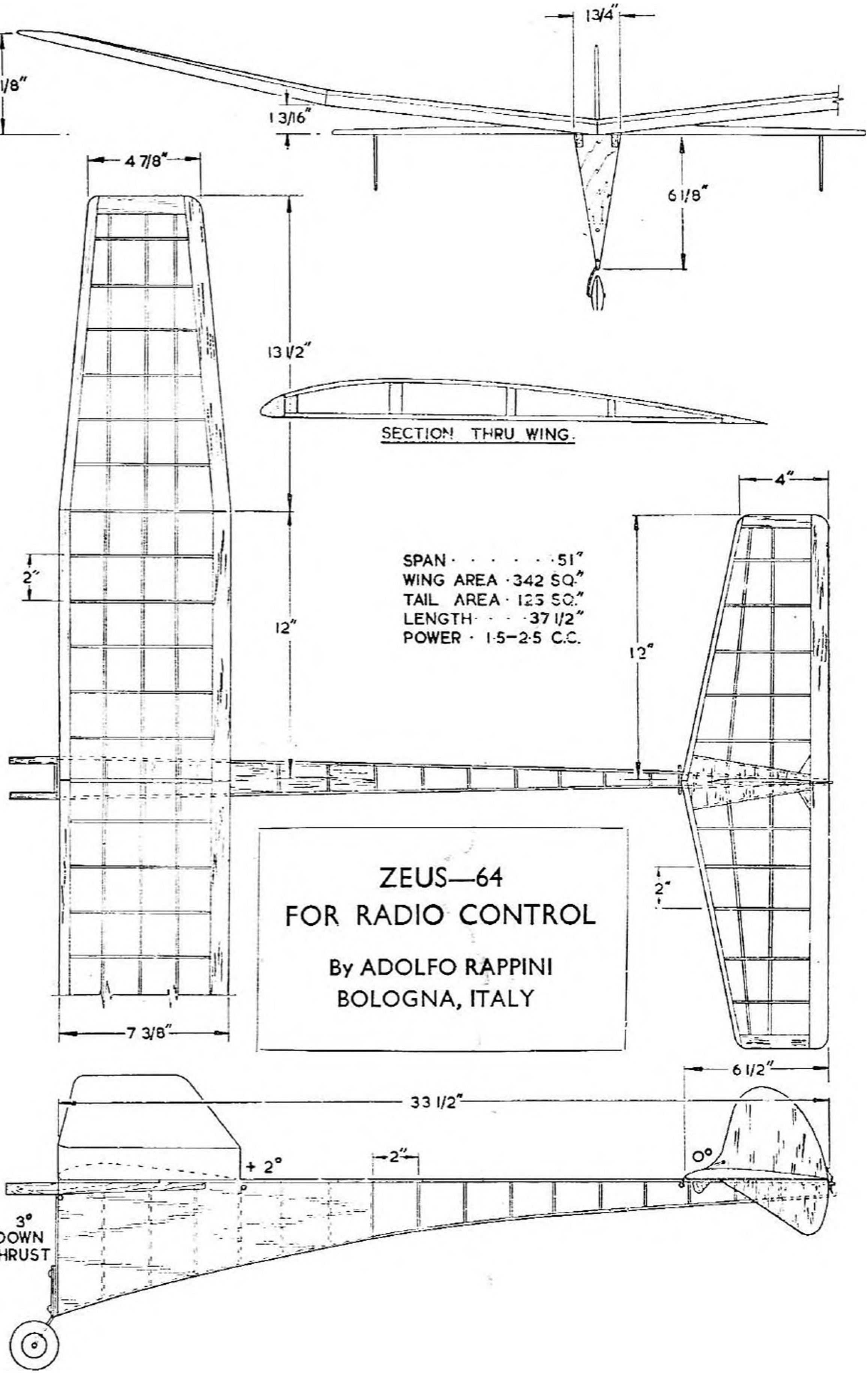


LETMO L-17
By ZDENEK HUSICKA
BRNO, CZECHOSLOVAKIA
POWER 2.5 cc. LETMO
DEVELOPED FROM ANTARES AND
SUPER ANTARES - NATIONALS WINNER
4-3/4"
7-1/8"
15-1/2"
6-1/8"
1/8" DIA. BALSA SHEER PIN
1/32" PLY OVER WING JOIN
3-1/8"
1 1/8"
1/16" SHEETING
1/8" PLY TONGUE
3/32" X 9/16" L.E.
3/32" X 1/2" T.E.
48-1/2" SPAN
DIHEDRAL BRACES
1/32" SHEETING
1/8" X 5/16"
1/8" X 1/4"
3/32" SHT. RIBS
3°
1/2" X 3/32" L.E.
3/8" X 3/32" T.E.
1/32" SHT.
1/16" X 3/8"
20"
WIRE SKID
3/32" SHT. RIBS
TO TIMER
RUBBER BAND
PLAN OF TAIL END
RUDDER IS CONNECTED TO ENGINE TIMER TO GIVE A STRAIGHT CLIMB WITH A CIRCLING GLIDE.
1/2" X 1/4" DIVISIONS
HALF SIZE WING & TAIL SECTIONS
10-5/16"
14 13/16"
5-5/16"
1-5/16"
11"
3-15/16"
11/16"
13/16"
A-A
1/16" SHEETING
1/8" SQ. STRINGERS
B-B
C-C
ABOVE SECTIONS ARE HALF SIZE
3° DOWNTHRUST. NO SIDETHRUST
2-1/2"
30°
0°
34-1/4"
4"
PLY SKID
2.5 C.C. MOTOR.
0 1 2 3 4 5 6 7 8 9 10 11 12
SCALE
INCHES.
STAND MODEL ON TAIL FOR TAKE OFF
5/16"
7/8"
1/2"
4-15/16"
5/32"
3/8"
9/16"
PROP BLADES. 2 OFF.
RETAIN WITH 6 B.A. BOLTS
1-1/8"
3/4"
1/2"
3/8"
7/16"
PROP HUB DURAL.

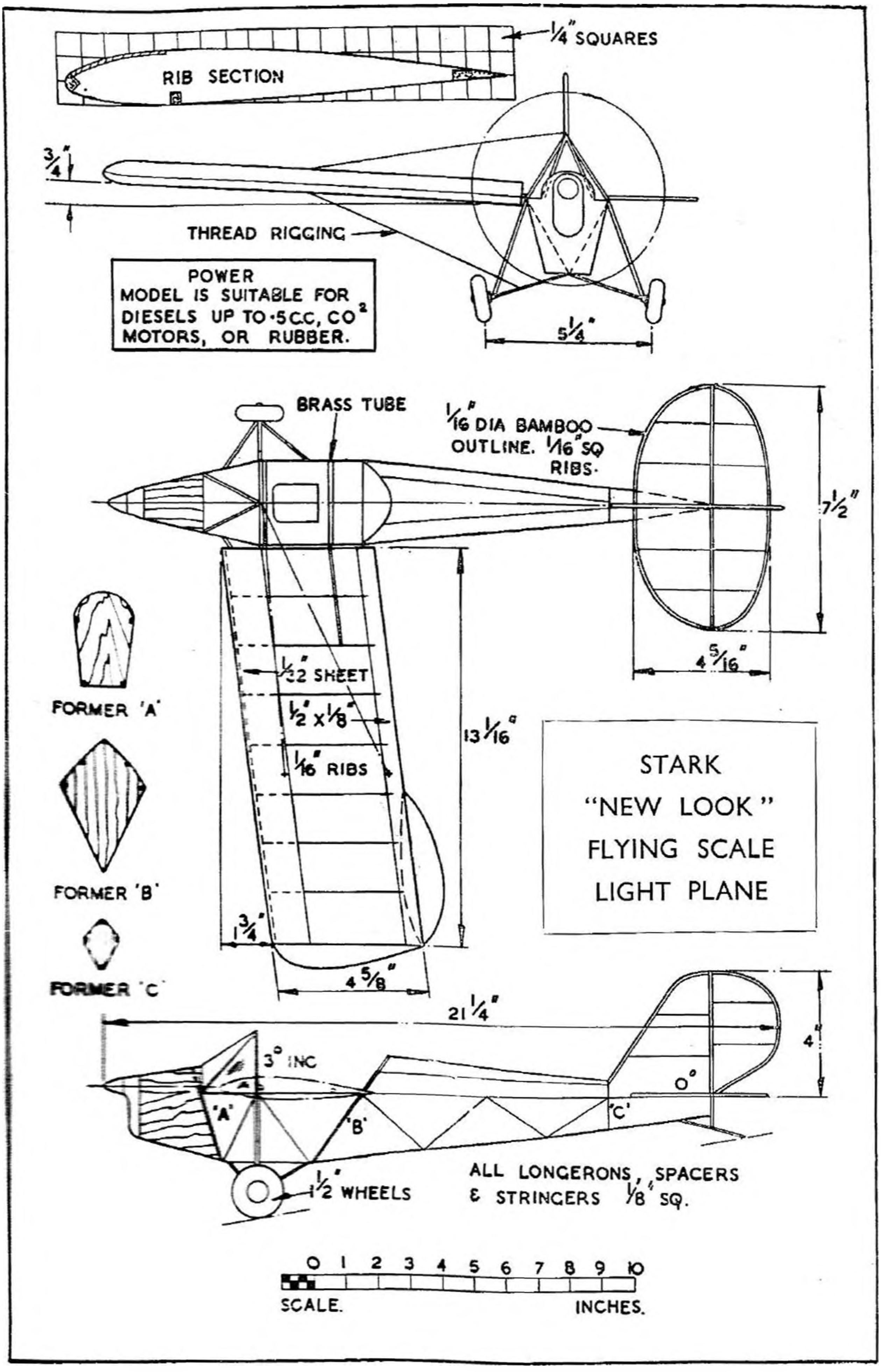


PETREL—I
By G. Jacquelin
CANADA
FOR MOTORS
1.25—2.5 c.c.
SPONSON FORMERS
CEMENT UNDER
SPARS AT TIP.
TYPICAL WING SECTION.
TAILPLANE SECTION.
TAILPLANE SLIDES THRO' SLOT
WING PLATFORM & MOTOR
MOUNT, 3/16" SPRUCE.
F.1.
F.2.
F.3.
F.4.
F.5.
F.6.
F.7.
F.8.
F.9.
F.10.
F.11.
3 1/2"
6 1/4"
4 1/2"
5°
20 1/2"
6 5/8"
4"
4"
15"
WL
WL
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
SCALE
INCHES

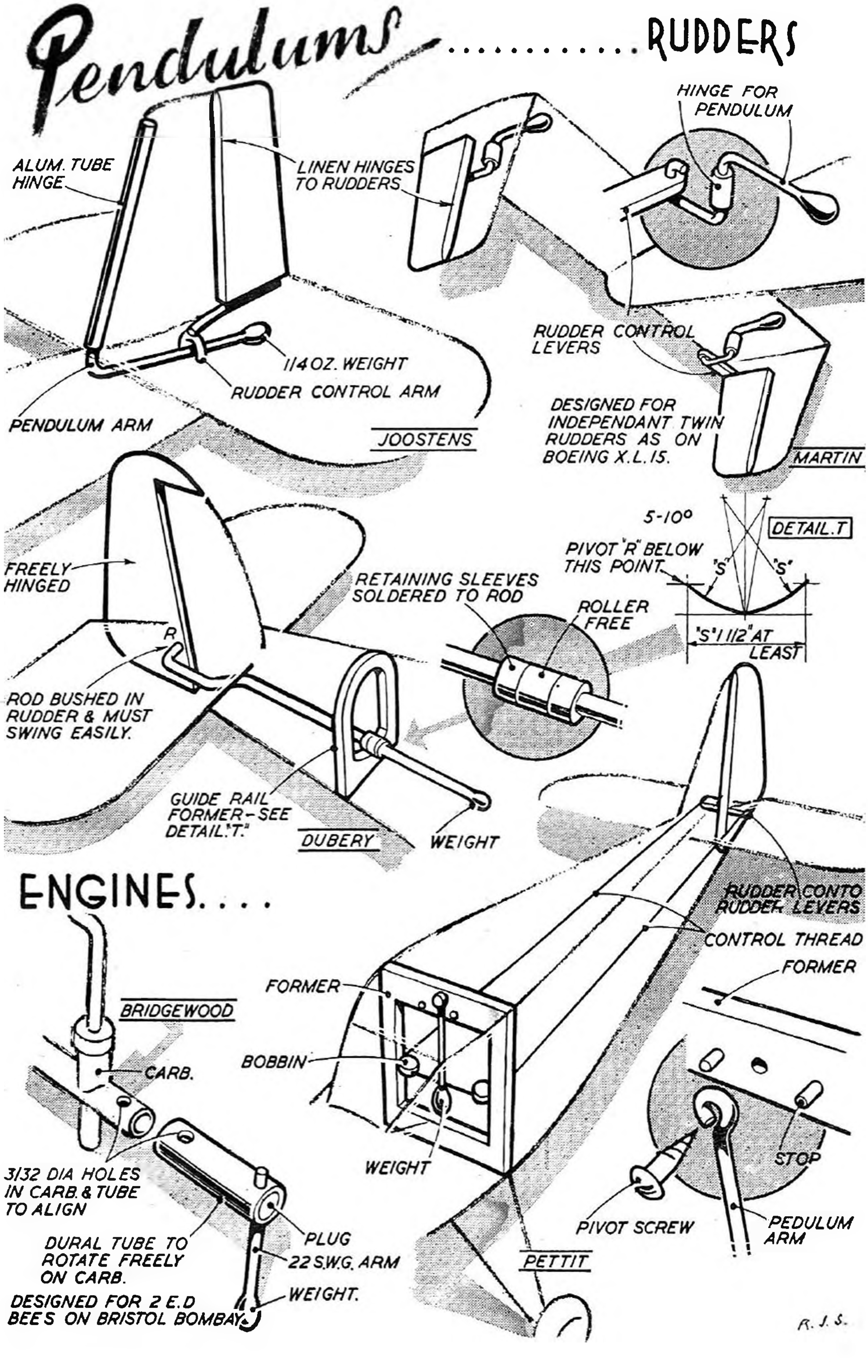

ONE PIECE WING
1¼"
WING SECTION
¼" SQUARES
AXLE FAIRING SECTION
¼" SQUARES
7"
3⅞"
AXLE FAIRING
⅛" SHEET
PERSPECTIVE OF NOSE
⅛" SQ
½" x ⅛"
ALL LONGERONS & SPACERS FROM ⅛" SQ HARD
1/16"X1/8" RIBS
17"
4⅞"
'B'
NUT
BLOCK 'B'
8"
SOLDER LOOP
BOLT
WING STRUTS
WING FIXING
7"
5¼" DIA
FIREWALL 'A'
⅛" PLY
TYPICAL TOP FORMER
¼" SQ
¼" x ⅛"
⅛" SQ
½" x ⅛"
1/16" SHEET RIBS
14⅜"
4¼"
FOKKER DVII
FREE FLIGHT POWER
FOR UNDER 1 c.c. ENGINES
U.S.A.
1/32" SHEET
⅛" SHEET
5¾"
25"
3¼" WHEELS
0 1 2 3 4 5 10 15
SCALE
INCHES
WEIGHT WITH ATWOOD "WASP" 7 OZS.

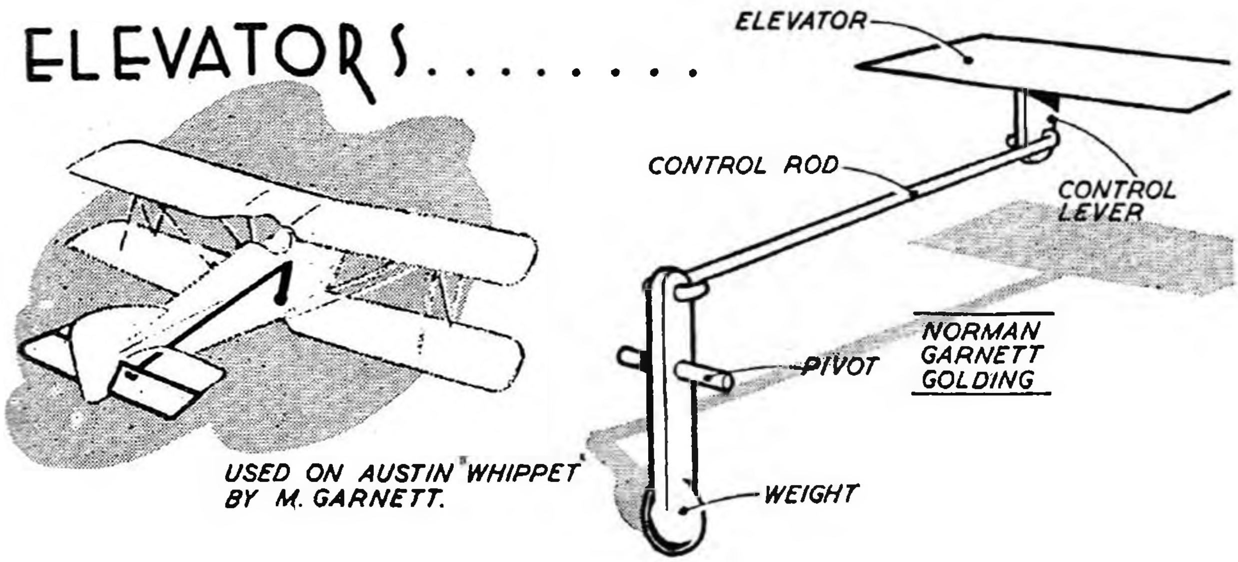


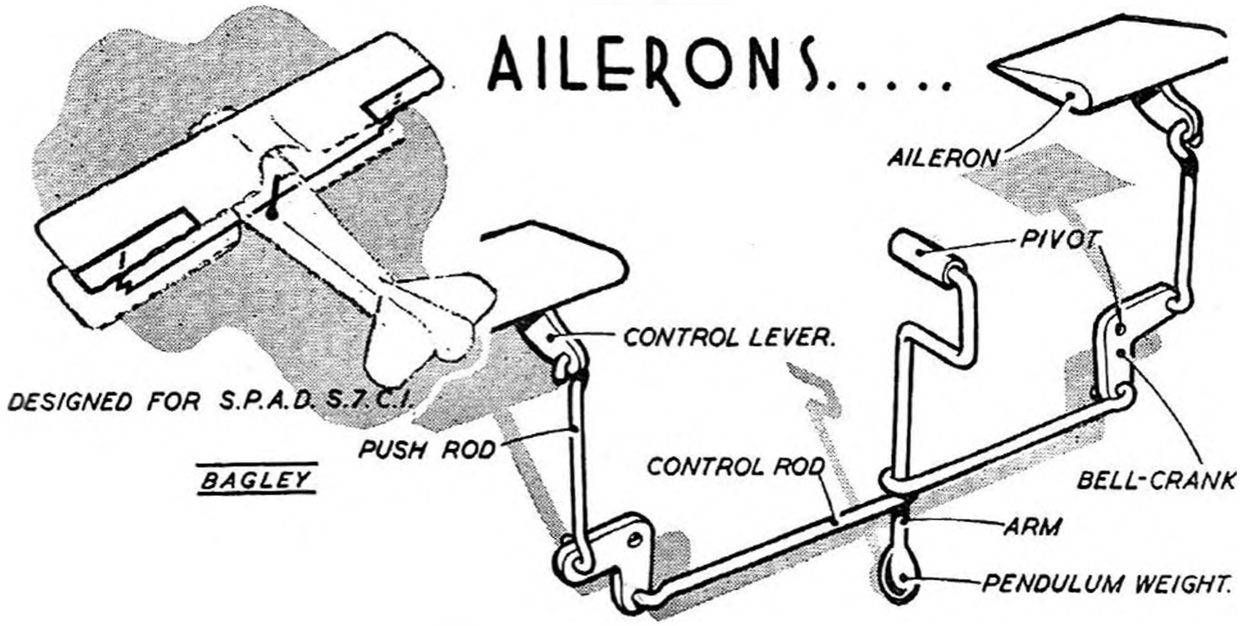
1 3/4"
5 1/8"
1 3/16"
6 1/8"
4 7/8"
13 1/2"
SECTION THRU WING.
4"
2"
12"
SPAN · · · · · · 51"
WING AREA · 342 SQ."
TAIL AREA · 125 SQ."
LENGTH · · · 37 1/2"
POWER · 1.5–2.5 C.C.
12"
2"
7 3/8"
ZEUS—64
FOR RADIO CONTROL
By ADOLFO RAPPINI
BOLOGNA, ITALY
6 1/2"
33 1/2"
+ 2°
2"
0°
3° DOWN THRUST

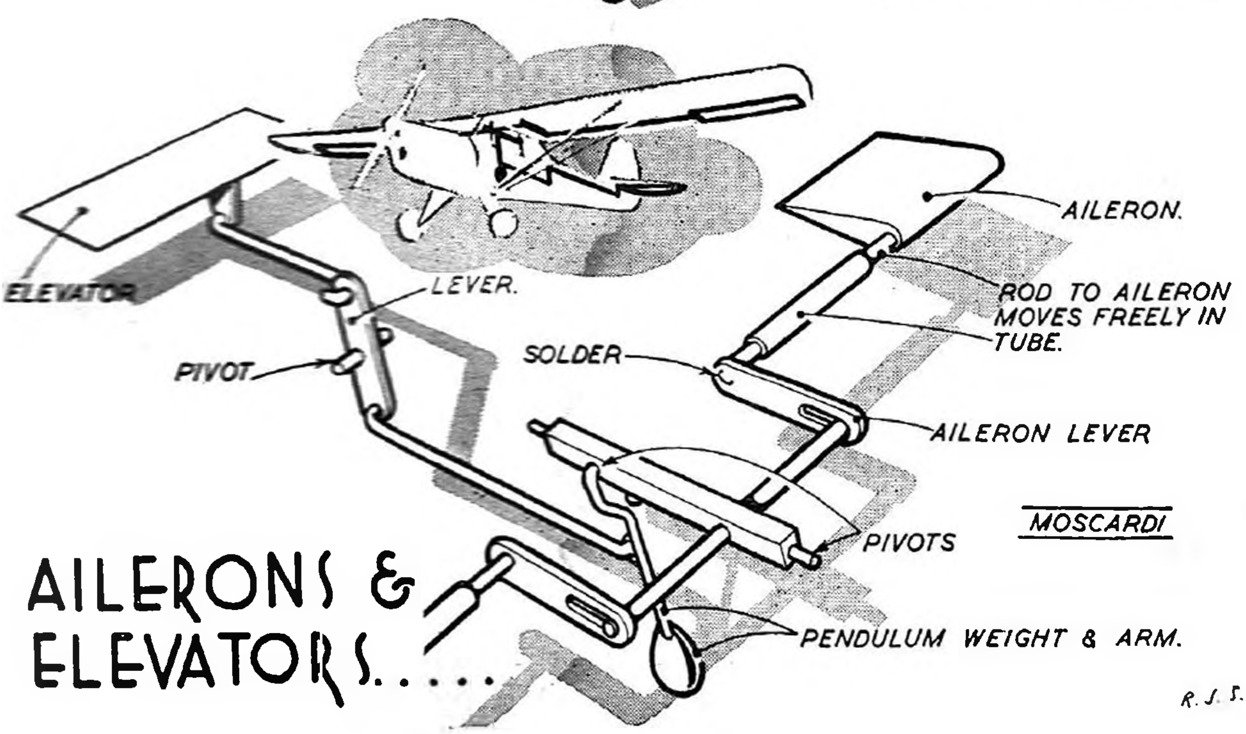


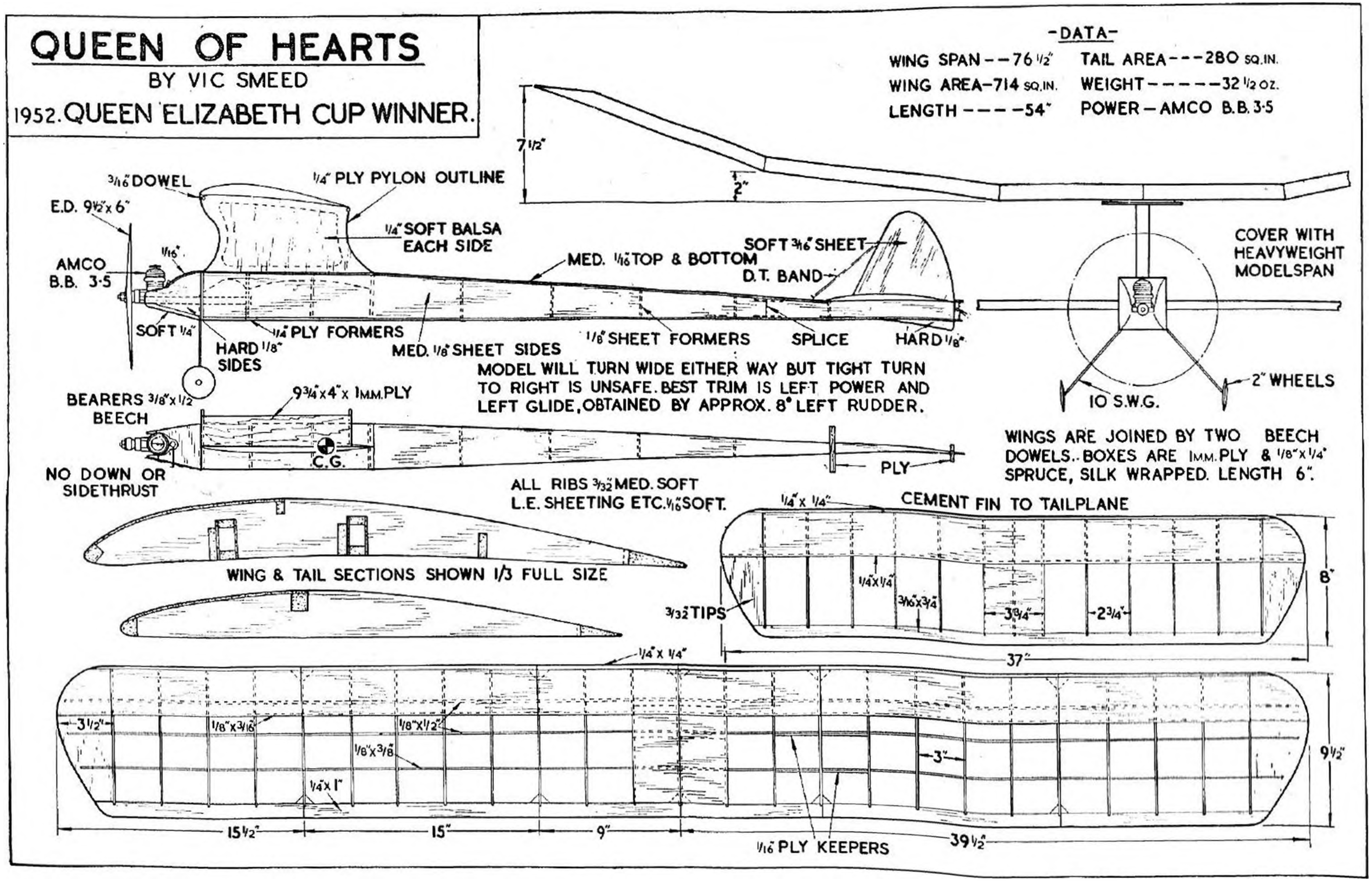
STARK
"NEW LOOK"
FLYING SCALE
LIGHT PLANE


Pendulums............RUDDERS
ALUM. TUBE HINGE
LINEN HINGES TO RUDDERS
1/4 OZ. WEIGHT
RUDDER CONTROL ARM
PENDULUM ARM
JOOSTENS
HINGE FOR PENDULUM
RUDDER CONTROL LEVERS
DESIGNED FOR INDEPENDANT TWIN RUDDERS AS ON BOEING X.L.15.
MARTIN
5-10°
DETAIL.T
PIVOT "R" BELOW THIS POINT
"S"
"S"
"S" 1 1/2" AT LEAST
FREELY HINGED
RETAINING SLEEVES SOLDERED TO ROD
ROLLER FREE
R
ROD BUSHED IN RUDDER & MUST SWING EASILY.
GUIDE RAIL FORMER - SEE DETAIL "T."
DUBERY
WEIGHT
ENGINES....
RUDDER CONTO RUDDER LEVERS
CONTROL THREAD
FORMER
FORMER
BRIDGEWOOD
BOBBIN
CARB.
WEIGHT
STOP
3/32 DIA HOLES IN CARB. & TUBE TO ALIGN
PLUG
PIVOT SCREW
PEDULUM ARM
DURAL TUBE TO ROTATE FREELY ON CARB.
22 S.W.G. ARM
PETTIT
WEIGHT.
DESIGNED FOR 2 E.D BEES ON BRISTOL BOMBAY
R. J. S.


ELEVATORS.........
ELEVATOR
CONTROL ROD
CONTROL LEVER
NORMAN GARNETT GOLDING
PIVOT
WEIGHT
USED ON AUSTIN "WHIPPET" BY M. GARNETT.


AILERONS.....
AILERON
PIVOT
CONTROL LEVER.
DESIGNED FOR S.P.A.D. S.7.C.1.
PUSH ROD
CONTROL ROD
BELL-CRANK
BAGLEY
ARM
PENDULUM WEIGHT.


ELEVATOR
LEVER.
PIVOT
AILERON.
ROD TO AILERON MOVES FREELY IN TUBE.
SOLDER
AILERON LEVER
PIVOTS
MOSCARDI
AILERONS &
ELEVATORS......
PENDULUM WEIGHT & ARM.
R.J.S.


QUEEN OF HEARTS
BY VIC SMEED
1952. QUEEN ELIZABETH CUP WINNER.
-DATA-
WING SPAN--76 1/2"
TAIL AREA---280 SQ.IN.
WING AREA-714 SQ.IN.
WEIGHT------32 1/2 OZ.
LENGTH----54"
POWER-AMCO B.B. 3·5
7 1/2"
2"
3/16" DOWEL
1/4" PLY PYLON OUTLINE
E.D. 9 1/2"x 6"
1/4" SOFT BALSA EACH SIDE
1/16"
AMCO B.B. 3·5
MED. 1/16" TOP & BOTTOM
SOFT 3/16" SHEET
D.T. BAND
COVER WITH HEAVYWEIGHT MODELSPAN
SOFT 1/4"
1/4" PLY FORMERS
HARD 1/8" SIDES
MED. 1/8" SHEET SIDES
1/8" SHEET FORMERS
SPLICE
HARD 1/8"
MODEL WILL TURN WIDE EITHER WAY BUT TIGHT TURN TO RIGHT IS UNSAFE. BEST TRIM IS LEFT POWER AND LEFT GLIDE, OBTAINED BY APPROX. 8° LEFT RUDDER.
10 S.W.G.
2" WHEELS
BEARERS 3/8"x 1/2" BEECH
9 3/4"x 4" x 1MM.PLY
C.G.
PLY
NO DOWN OR SIDETHRUST
WINGS ARE JOINED BY TWO BEECH DOWELS. BOXES ARE 1MM. PLY & 1/8"x 1/4" SPRUCE, SILK WRAPPED. LENGTH 6".
ALL RIBS 3/32" MED. SOFT
L.E. SHEETING ETC. 1/16" SOFT.
1/4" x 1/4"
CEMENT FIN TO TAILPLANE
WING & TAIL SECTIONS SHOWN 1/3 FULL SIZE
1/4"x 1/4"
3/16"x 3/4"
3/32" TIPS
3 3/4"
2 3/4"
8"
37"
1/4" x 1/4"
3 1/2"
1/8"x 3/16"
1/8"x 1/2"
1/8"x 3/8"
1/4"x 1"
3"
9 1/2"
15 1/2"
15"
9"
1/16" PLY KEEPERS
39 1/2"

FIELD REPAIRS

THE damage resulting from a crash landing on the flying field is seldom as disastrous as it may appear at first sight. Very often a model with fuselage crushed, wing in two pieces, has been made airworthy again with less than half an hour's field repairs—and even gone on to win a competition !

Field repairs can be of several different kinds. There are the simple repairs to torn or damaged tissue resulting from landing in a bush or tree—or perhaps wing covering split in a dethermalised landing onto a hard surface. No structural damage is involved and the repair consists simply of running a line of cement along the tear in the covering and letting it dry. Cement contracts as it dries and so the covering is drawn up taut again, virtually as good as new. A " cement " repair on such a job is often neater than a patch doped on. In fact a patch is only really called for where a considerable area of tissue has been damaged and the edges cannot be drawn together again conveniently—Fig. 1. The one objection to " cement " repairs is that if the air or covering is damp, the cement may blush and dry out as a white streak.

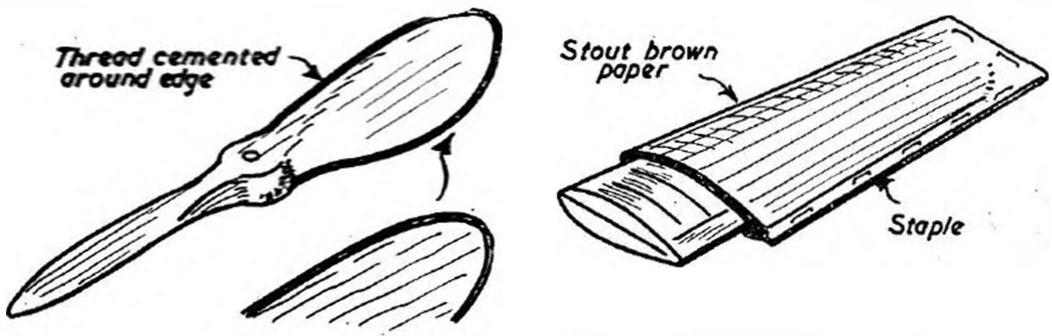
Structural damage resulting from a crash may be of a minor or major nature. " Minor " damage covers damage to members which are not normally highly stressed or, if slightly distorted, will not affect the trim of the model. These can readily be dealt with on the spot and flying recommenced almost before the cement is dry again, if necessary.

A wing leading edge broken in, is a typical example. Often it is possible to pull this out, coat with cement and pin through to unbroken wood and carry on flying. Or that bay can be cut out, replaced by another piece of wood carved to rough shape on the spot and cemented in place with an added patch of covering material—Fig. 2. A proper repair job can then be carried out later in the workshop.

A broken trailing edge is often readily dealt with by strapping top and bottom with sheet or thin ply, pinned and cemented in place. Again, this is a temporary repair to enable you to go on flying. The proper repair job can be carried out later when you get home and have better facilities.

" Major " damage is where a main structural member is broken. Wings are often broken in half when a model cartwheels on to its back on landing, particularly in windy weather. A reasonably strong repair is called for if the model is to fly again that day. The best plan of attack is to open up the cover-

PREVENTION IS BETTER THAN CURE!

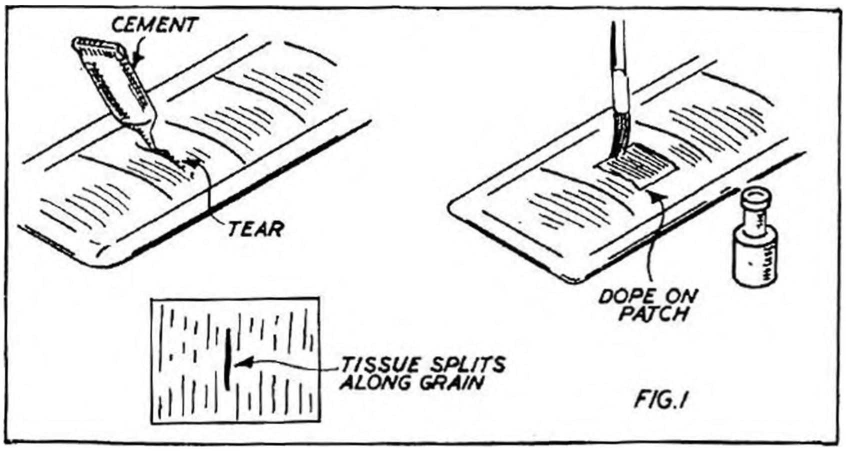


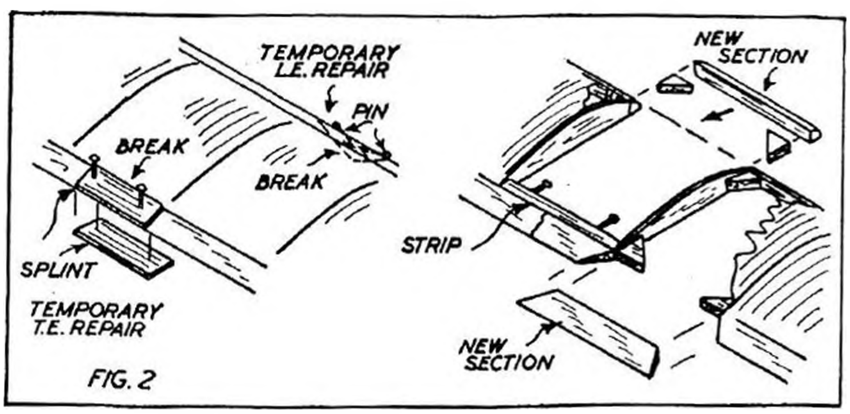
Thread outline protects prop.

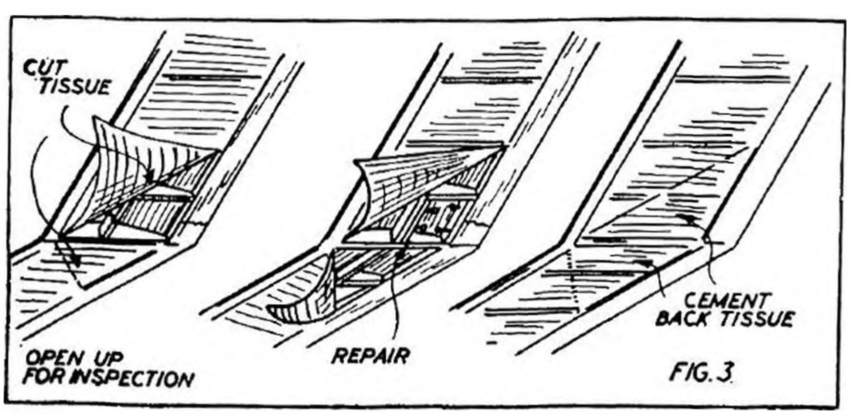
Slip covers protect wings, tail etc.

ing on the undersurface, as shown in Fig. 3, so that you can inspect the damage. Then you can set about bracing spars across breaks with hard balsa strip, pinning the reinforcements in place as well as cementing, just to make sure that the joint will hold. Use cement liberally, but not excessively. If you apply too much cement, it may take too long to dry. When you have completed the interior repair work, lay the tissue back in place again and cement along the cut lines. To all intents and purposes, your wing should be as strong as new again when the cement has dried properly. Give everything a chance to set and leave your next flight for as long a time as possible.

Rubber model fuselages have often been almost completely rebuilt on the flying field. The most disastrous sort of break is where a rubber motor parts under full turns and tears much of the fuselage to matchwood. Provided the longerons remain intact, however, a field repair is at least a possibility. You must simply tackle the job methodically, cutting and cementing in new spacers to replace all the broken ones, tearing away joints where necessary to reach the joints and re-covering with tissue when completed. You will not have time to water-spray and dope the repaired fuselage, so draw the covering taut when you apply it. Use cement to stick the tissue in place and, if you have any dope, a quick coat applied over the new covering will help. If the weather is cold or damp and drying is retarded, then a suitable "warm spot" is under the bonnet of a car. Run the car engine for a while to heat up, then stop it and place the fuselage, or other component, under the bonnet.



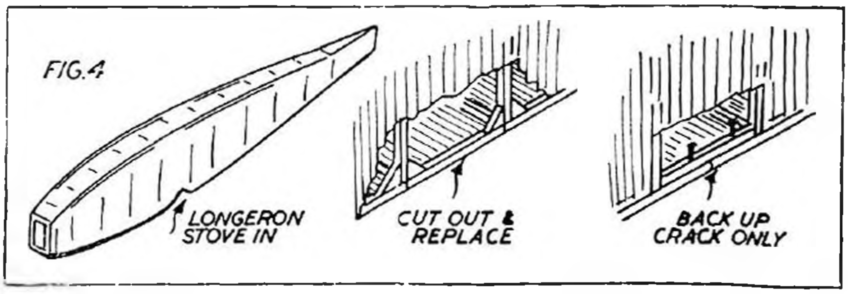


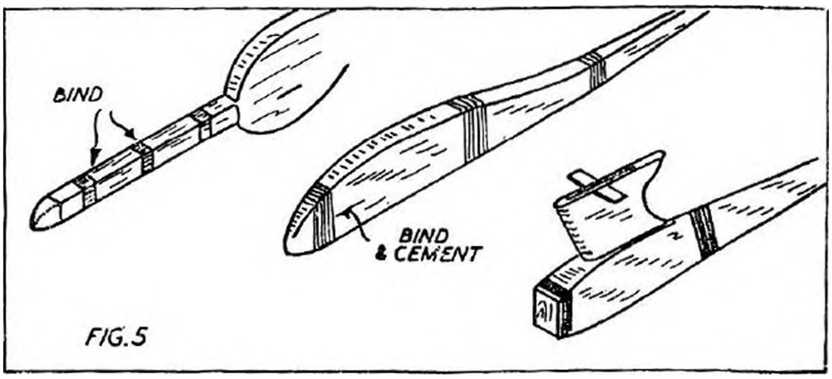


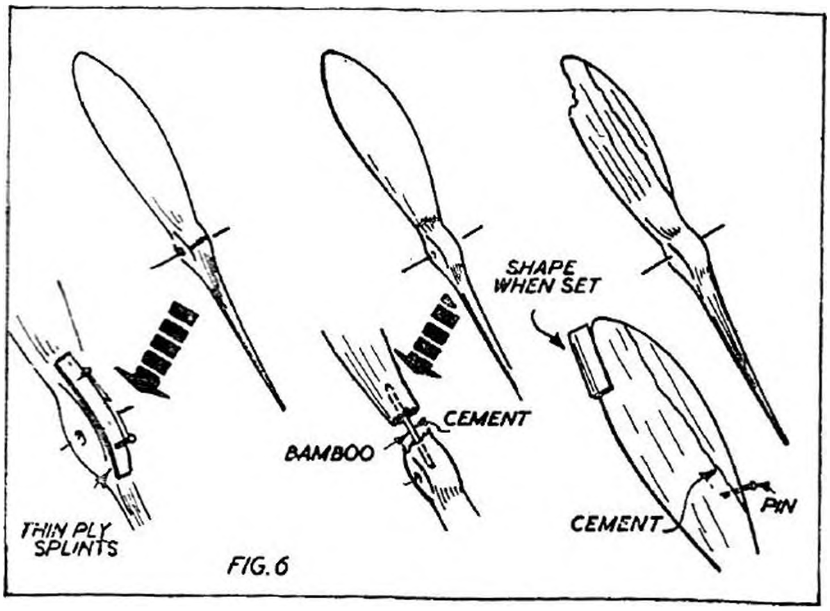
Repairs to broken longerons are also illustrated in Fig. 3. These have to be done carefully to avoid distorting the fuselage, if a rubber model is concerned. Push the fuselage out of shape with the repair job and you may affect the thrust line trim or the tailplane incidence. The tissue covering will be a good guide. When your replacement part stretches the covering perfectly taut in the damaged bay, then almost certainly you are back to the original alignment. Back up all longeron repair jobs, too, with extra material. A new length of longeron simply butt-jointed in place may be strong enough, but make sure that it is more than strong enough with a bit of extra bracing. The weight you are adding is nothing compared with the added safety factor.

Sheet fuselages which split in a heavy landing offer a simple repair job. Usually they can be cemented back in place quite satisfactorily, but just to make sure, add a binding of cotton or cellulose tape. This will considerably strengthen the repair job and make the fuselage far less liable to "open up" on another hard landing—Fig. 5.

Back to rubber models again, probably the component which is most frequently broken is the propeller. One rough landing and the blades fly to pieces. Without a replacement your flying seems over for the day—and maybe it was your first flight, too ! But first, before we go home, let us have a look at the pieces.







The worst type of break is where the propeller parts across the centre. The propeller is, literally, in two halves. Fortunately this is comparatively rare with a properly made propeller. The hub is the region where the greatest blade thickness is usually concentrated and the usual break is *near* the hub, as in the second sketch of Fig. 6. Here the repair is relatively simple. The two parts are cemented back together over a length of hardwood or bamboo (for preference) to reinforce the joint. A further external binding of cotton can also be used as an added safeguard. Such a repair, with bamboo inset, can be regarded as permanent. The repaired blade is generally stronger than the unbroken one, once the cement has properly set.

With the first type of break described there is really no adequate field repair, although you may get by by splinting the two parts as shown in the sketch and binding with cotton. Remember to carry out this job with the propeller assembled on the shaft. Otherwise you may end up with a propeller in one piece again with no means of getting it back on the shaft, short of bending a new shaft!

It is a good idea, in any case, to carry a spare propeller shaft in your model box. Either end of the finished shaft generally has bends which are too tricky to attempt on the model field with limited equipment. If the more difficult end is already bent on the wire—generally the winder loop and free-wheel loop, the rubber hook can be roughly bent to satisfactory shape with ordinary pliers on the field. You can thus replace a shaft which has, perhaps, become hopelessly bent and defies all efforts to straighten it again.

As a general rule, a major repair job should only be attempted on the field in case of strict necessity. It is difficult to work accurately in the open air, using the top of a model box as a building board. You may, in such large-scale rebuilding, upset the trim of the model and write it off completely in taking your delayed competition flight. Had the same repair work been carried out, unhurried, in your workshop, the model might have come out again as good as new. Where the chance of winning a contest depends on getting the model airborne for a last flight, on the other hand, that is the "strict necessity" mentioned which warrants "having a go." Ordinary field repairs should be accepted as a matter of course, for the best of models can suffer accidental damage through no fault of their own.

The wise modeller goes prepared. He takes along with him in his model box ample supplies of repair material. There should be no necessity, on the field, to have to rush around trying to borrow materials or tools to deal with a minor emergency.

A selection of strip and sheet wood of the same sizes as employed in the model is a necessity. So also is a tube or two of cement, ample supplies of pins, cotton, coloured tissue (as used on the models again—save the offcuts when covering), cotton, cellulose tape, and at least one or two razor blades, preferably supplemented by a modelling knife. Spare lengths of wire, duplicate wire fittings, a reserve of rubber bands and so on take up very little room and there is no telling when they might prove useful.

Radio flyers might do well to invest in one of the new pencil-type soldering irons which can be operated off an ordinary car battery. This may make all the difference between a full day's flying and the model being "grounded" for most of the time. A collection of small tools, as far as convenient, such as pliers, spanners, screwdriver, should also be carried. Also, of course, spares for the model, where applicable.

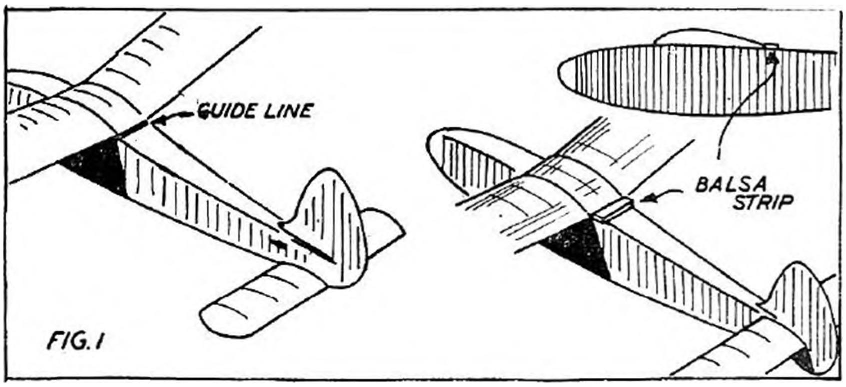
As far as possible the model box wants to be a self-contained servicing unit—or you can carry your spares and repair kit in a separate box. It is better if you can keep everything together. Far less chance then of leaving one box behind. The wise modeller foresees possible troubles which may occur on the flying field. Most likely the majority will never happen, if he services his models properly at home, but he cannot entirely escape accidental damage. Field repairs then are usually easy—provided the necessary tools for the job are at hand.

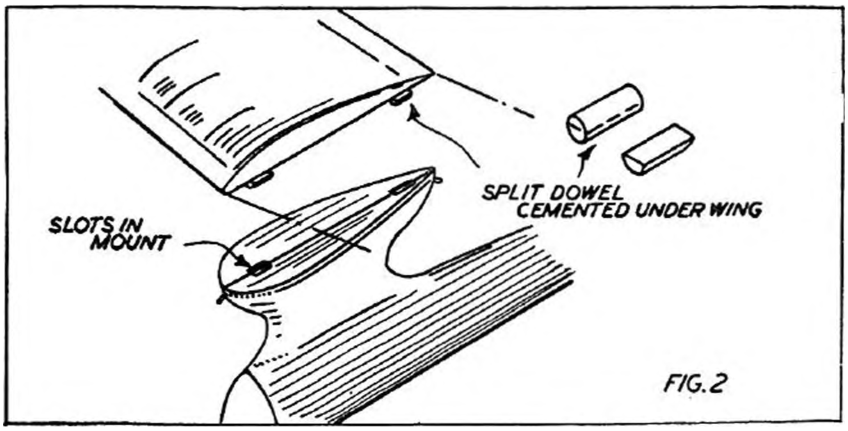
aft position each time. A fraction of an inch forward and the model may stall ; a fraction back may cause a dive.

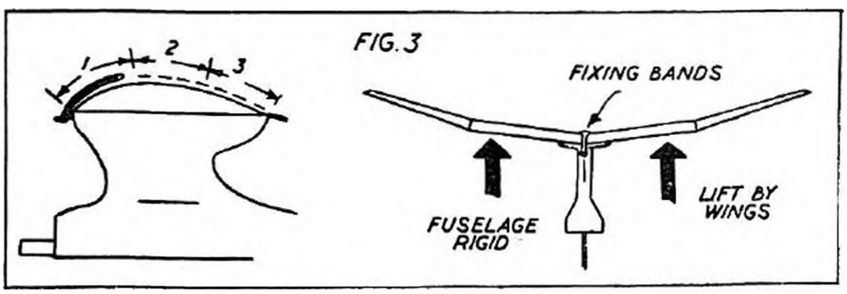
Once the correct wing position has been found by trimming, a guide line right across the fuselage, aligning the trailing edge, for preference, is a minimum requirement—Fig. 1. A better idea would be a definite "stop"—something against which the trailing edge of the wing rests when in position. A thin strip of wood cemented to the top of the fuselage and standing slightly proud of the wing trailing edge when in position would have no adverse aerodynamic effect. It would, however, positively locate the wing.

Where the wing sits on top of a built-up mount, as in a pylon power model, good practice is to cement small "keys" to the bottom of the centre of the wing which locate in slots cut in the wing mount itself. If these are made from split dowels they will still allow the wing to be knocked off readily in a bad landing. But when the wing is assembled it will only rest flush with the wing mount without rocking when the keys are engaging their respective slots. Again this will eliminate troubles which might result from the wing being accidentally out of line.

Wings mounted with rubber bands to hold them in place are supposed to be "crashproof." Yet often in a bad landing such a wing fails to knock off or slew round and is badly damaged. Why?







Generally the answer is quite simple. It has been strapped on so tightly that, to all intents and purposes, the assembly is perfectly rigid. It cannot knock off without some part of the structure breaking away.

Ideally, wing fastening rubbers should be elastic bands with an unstretched length equal to about one-third of the distance between hold-down points—Fig. 3. Enough of these bands should be used to hold the wing *reasonably* rigid, so that it is possible to lift the model up by the wings and rock it without separate movement of the fuselage. The wing rubbers will then be slack enough to allow the wing to slew if a tip hits the ground first.

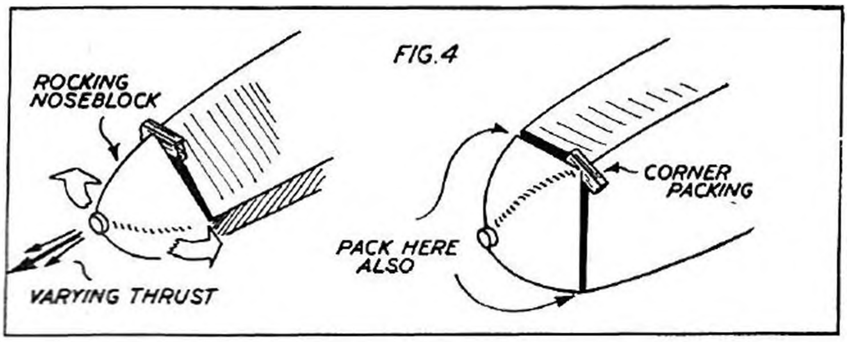
Very rarely one sees the wings part company with the rest of the model in the air. But this does still happen. The wing bands have failed. If this has ever happened to you, for goodness sake, find out why! Then you need never have that trouble again.

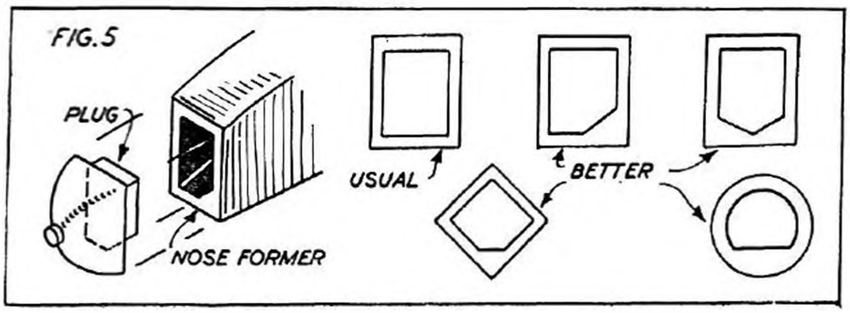
Many people *ask* for such a failure. We have seen power model wings held in place with a single band, and this frayed and oil-soaked. Rubber bands stand a lot of abuse, but they soon begin to part up under oil or fuel (unless they are made of synthetic rubber). Stretched bands also tend to "pop" in the heat from strong sunlight. It always pays to inspect bands carefully before you use them, particularly if the model has been standing around in the sun for a while.

Similar remarks apply to tail unit fixings, where this part of the model is also assembled with rubber bands. Again, too, the tailplane and fin (if detachable) should be made so that it assembles in a positive manner and can only be set up in that way each time. The basic rule for all detachable surfaces is correct alignment initially and then ensure that the fixings are strong enough to take care of all flight loads without letting the component shift, but still free enough to knock off in a crash landing and minimise the risk of damage. Above all, aim at simplicity in such fittings. There is then less that can go wrong.

During the course of trimming a model, various pieces of packing are generally used. Perhaps a piece of packing under the leading edge of the wing, or the trailing edge of the tail. Once the correct packing has been determined, cement it in on the spot. Standard wood thicknesses can differ just that much to upset things. That piece of 1/16 in. packing you used on the field, for example, and threw away was not the same as that piece of 1/16 in. strip you took out of the scrapbox at home and remembered to cement in. That might make all the difference on the flying field next time, especially if you had used it as packing for the thrust line on a contest rubber model.

We could, in fact, quote quite a number of apparent "mysteries" in connection with downthrust and sidethrust packing used when trimming rubber models. If a piece of packing is applied across one edge of the noseblock, as in Fig. 4, it may appear to give the right thrust setting, but the trim has a habit of varying on the odd flight. The reason is not hard to find. The packing lets the noseblock rock slightly from side to side. This rocking is irregular, and governed by the uneven tension of the unwinding motor. Consequently the trim is inconsistent. Once this is appreciated the remedy is obvious.





Then there is the case of the rubber model, properly trimmed and all packing cemented in. Next flight, wound right up, it stalls horribly, or spins straight in. Why? One of the most common faults of all—the noseblock has been replaced upside down. Very seldom is the shaft absolutely at right angles to the back face of the noseblock and this has altered the thrust line setting.

This is a very strong argument in favour of making the plug-in part of the noseblock so that it can only fit in the nose former one way round. Then you can never go wrong. Otherwise you must mark which is the top of the noseblock *quite* clearly so that it is readily identified in the heat of the moment.

Still dealing with rubber models—for it is with this type of model that most of the little things seem to go wrong—winding up the motor with the winder engaged in the loop at the end of the shaft, the shaft suddenly tries to climb around the winder hook. Pull it straight again and continue winding. In a matter of seconds it has "climbed" again. Yet other people do not have this trouble. Why again?

The answer is that the winding loop on the shaft is too big. This should be a fairly snug fit around the wire forming the winder hook. Then it has no chance to climb out of line. Give the shaft loop plenty of free play on the winder hook and it will climb. We have seen quite a number of elaborate winding gadgets made to combat this fault when the real explanation is so simple and the cure so direct.

There are many other examples of the failure of detail fittings which have led to disaster. In most cases a little thought, careful examination of *how* that particular fitting failed and how much stronger, or how differently shaped it wants to be will eliminate that fault in the future. Any such fittings about which you have any doubts—such as feathering propeller "gadgetry" you are using for the first time—should be tested out thoroughly before being tried out on the model. Try winding up a motor outside the fuselage, for example, and approach full turns to test the propeller fittings. Preferably use a stronger motor, so that you will be testing to a greater strength than necessary. If it stands up to that all right you know you have a useful safety factor in hand.

The power model "detail fitting" which most commonly goes wrong is the timer. Then you get an over-long power run and probably an out of sight flight. Any form of mechanical timer is liable to this failure, but the better the installation and the more carefully you maintain the actual timer, the less likely you are to suffer in this respect. Airdraulic timers need frequent re-checking and cleaning, especially if fuel thrown out of the exhaust gets on them. Even the clockwork timers benefit from an occasional cleaning and re-oiling. If a timer ever fails on you there is a reason. When you get the model back, check first why the engine cut-out did not work and, if the timer was at fault, try to find out why. Behind every failure there is a reason of some sort or another.

No experienced aero-modeller *really* believes that bad luck alone is behind a succession of failures. Luck, good or bad, does enter into model flying, but usually when anything goes wrong it is not bad luck, but some definite, and often traceable, fault which is the basic cause. If you are content to rely on the "luck" theory you may be laying up a store of future trouble. That is why it is so important to develop an analytical mind over failures. Make sure that any fault which has happened to you need never happen again and you will find your hobby or sport, whichever attitude you take towards model flying, all the more pleasurable.

THE AEROMODELLER'S SKETCH BOOK

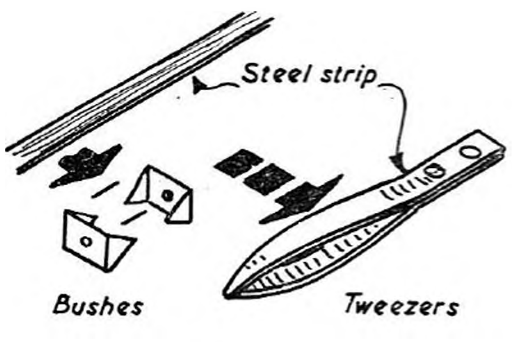
EVERY aeromodeller has his own little store of ideas, his own particular way of doing certain jobs, and the longer he practises his hobby the greater his stock of useful knowledge. There is no standard textbook that catalogues this vast list of helpful ideas—for the most part it stays put in the mind to come into play when required. We have always wanted to include a really good measure of such hints and tips in an AEROMODELLER ANNUAL, but one thing and another has until now prevented it.

This year we were determined to provide this feature, and quite early in the year asked Ron Warring to devote some time and energy to compiling it. Here it is, giving a generous measure of all those notions that make for easier and more successful modelling. We should, of course, like to stress the point that while Ron Warring, with his wide experience, has a good start on most of us in the matter of a private stock of ideas, he would be the last person to claim originality for more than a part of them.

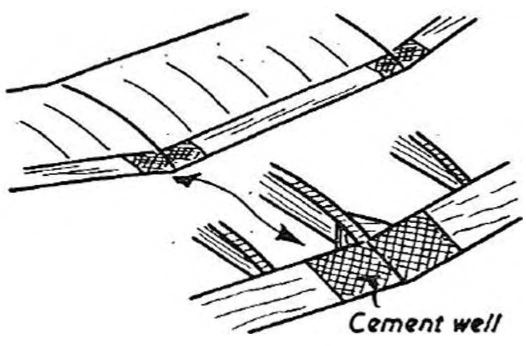
In some cases a summary is provided of the accepted ways of doing a job, as for example with wings, while as a contra item, we have geodetic construction which Ron has made his special favourite and devoted considerable time to its successful adaptation to aeromodelling use. Generally, we should say that we have successful experience of well over fifty per cent of the ideas suggested, a casual acquaintance with another twenty-five per cent, and welcome the balance as new to us.

How this proportion will vary with our readers we cannot say, but, in any event, their inclusion in this volume will provide a constant ready reference for those who do not wish to remember them all.

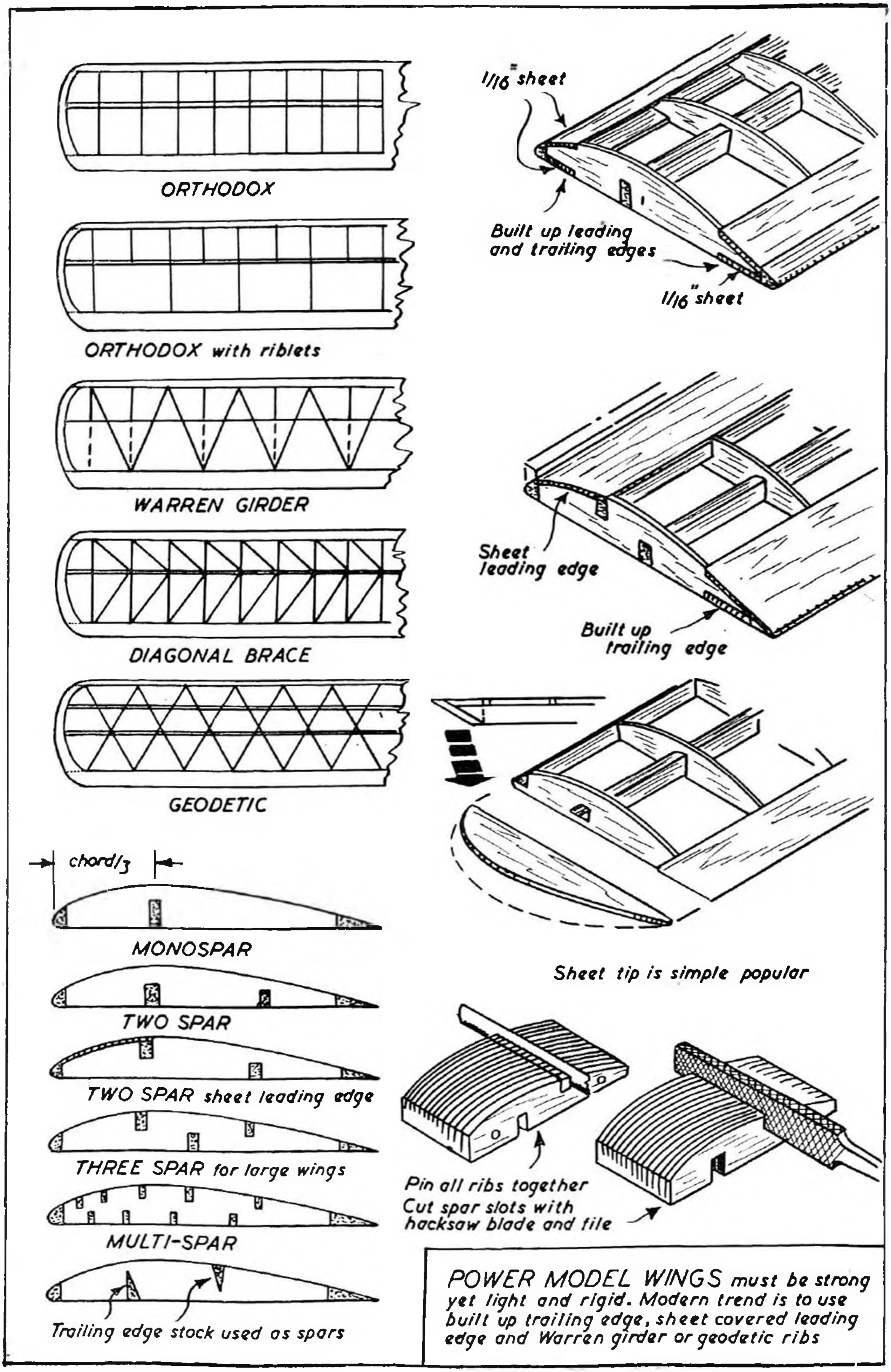
The following pages cover Power Wings and Geodetic Wing Construction, Free Flight Tanks, Cutouts and timing connections, Stunt, Speed and Team Race Control Line Tanks, Wing Tips, Hooks, Economies in Building, Fingersaving Devices, and Engine accessories, Auto Rudders, Fuselage Construction, including Pylons, Propeller Carving and blank layout, Feathering Propellers, Folding Propellers, and appropriate stops, in fact a measure of interest for everybody. Elsewhere, wherever there is a short page, other hints and tips from the Aeromodeller's Sketch Book are included to remind you of the short cuts to more successful flying.



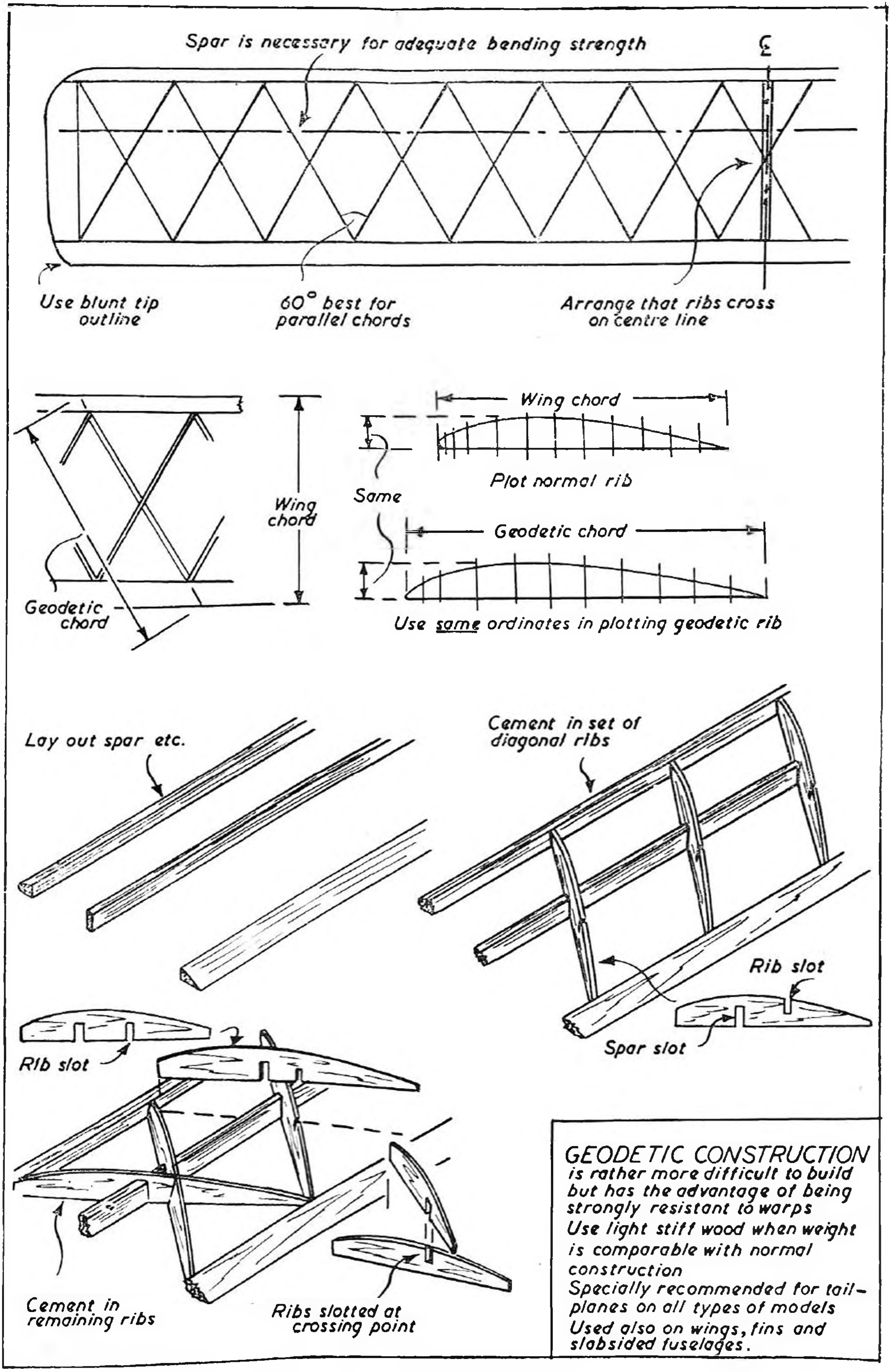
Steel packaging strip is useful material

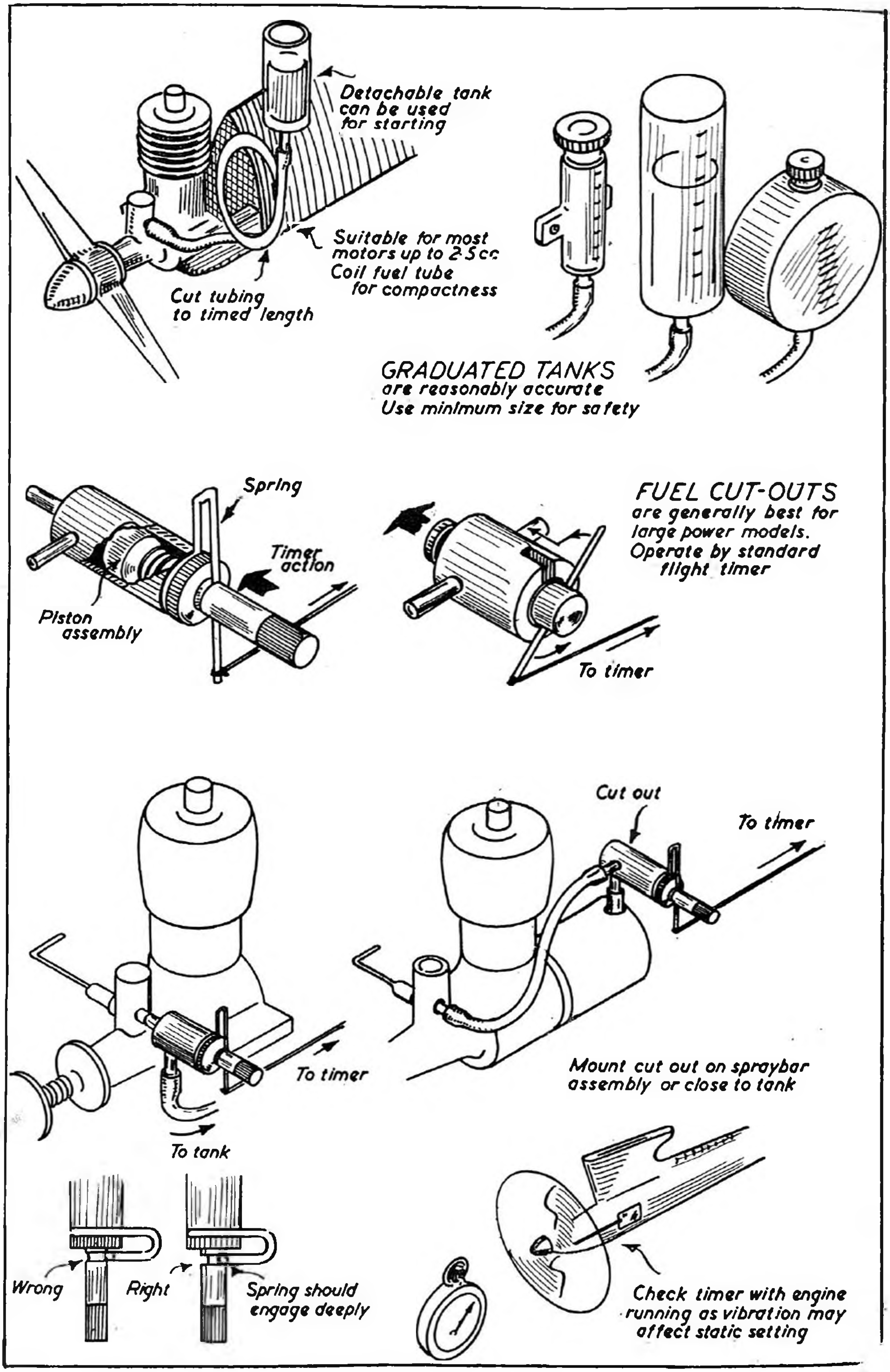


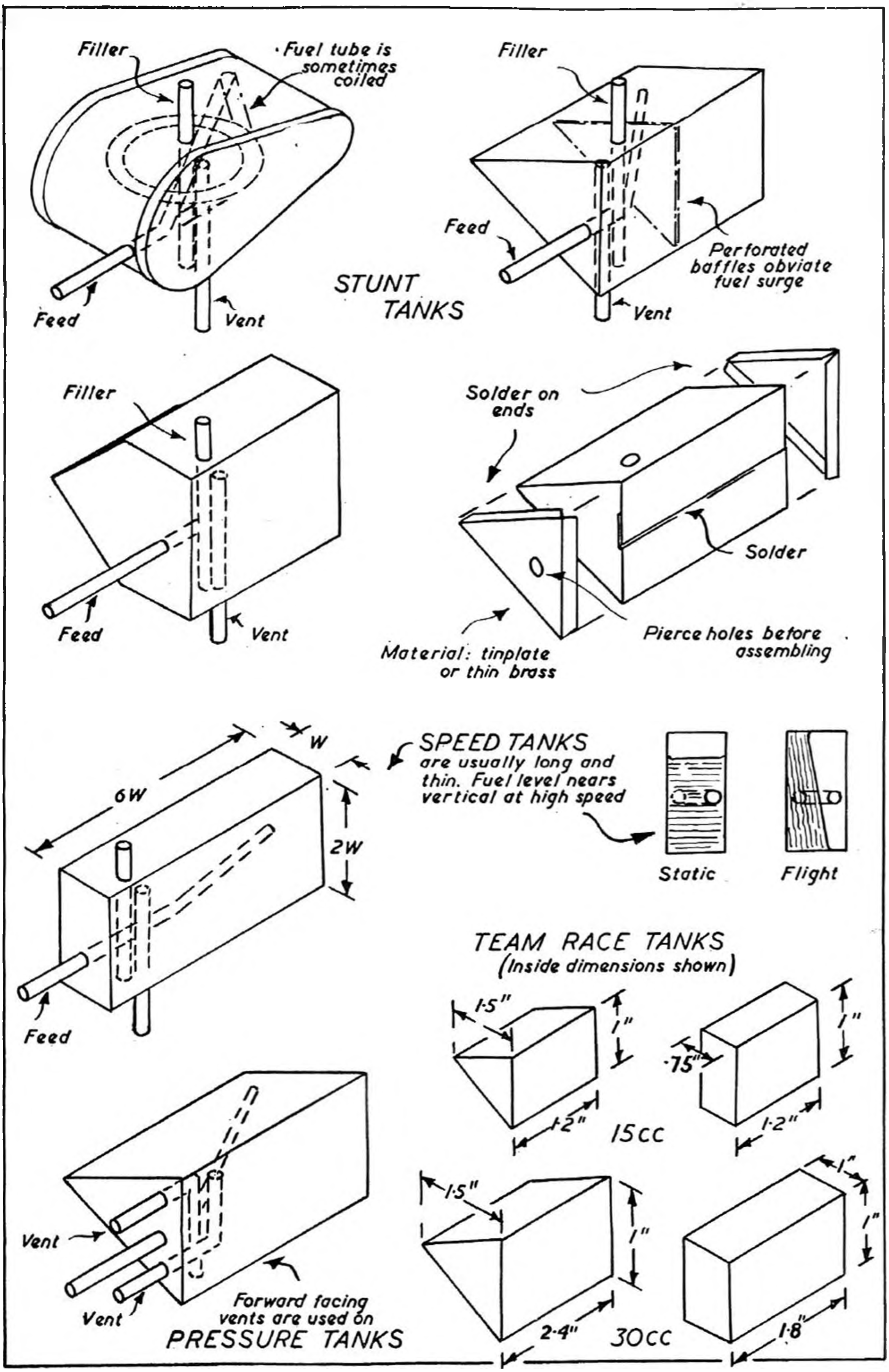
Bandage binding strengthens joints

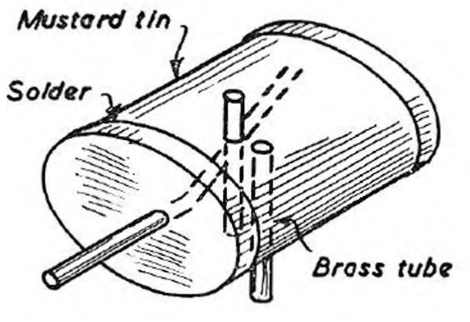


POWER MODEL WINGS must be strong yet light and rigid. Modern trend is to use built up trailing edge, sheet covered leading edge and Warren girder or geodetic ribs

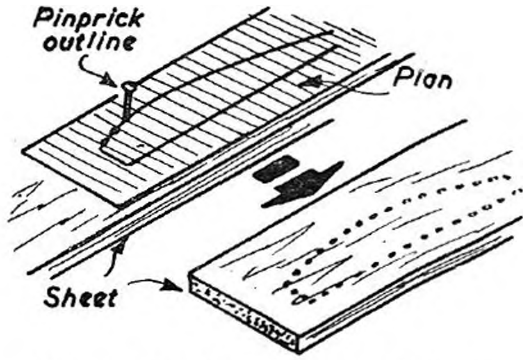

Spar is necessary for adequate bending strength
℄
Use blunt tip outline
60° best for parallel chords
Arrange that ribs cross on centre line
Wing chord
Geodetic chord
Wing chord
Same
Plot normal rib
Geodetic chord
Use same ordinates in plotting geodetic rib
Lay out spar etc.
Cement in set of diagonal ribs
Rib slot
Spar slot
Rib slot
Cement in remaining ribs
Ribs slotted at crossing point
GEODETIC CONSTRUCTION
is rather more difficult to build but has the advantage of being strongly resistant to warps
Use light stiff wood when weight is comparable with normal construction
Specially recommended for tail-planes on all types of models
Used also on wings, fins and slabsided fuselages.


Detachable tank can be used for starting
Suitable for most motors up to 2·5cc
Coil fuel tube for compactness
Cut tubing to timed length
GRADUATED TANKS
are reasonably accurate
Use minimum size for safety
Spring
Timer action
Piston assembly
FUEL CUT-OUTS
are generally best for large power models.
Operate by standard flight timer
To timer
Cut out
To timer
To timer
To tank
Mount cut out on spraybar assembly or close to tank
Wrong
Right
Spring should engage deeply
Check timer with engine running as vibration may affect static setting

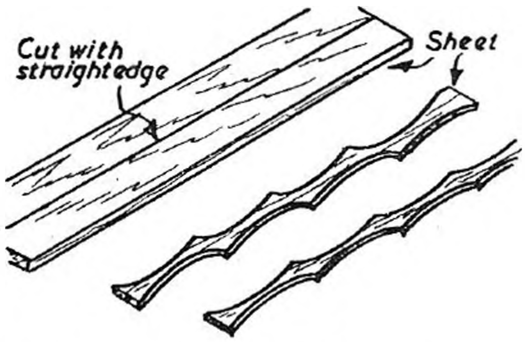

Filler
Fuel tube is sometimes coiled
Feed
Vent
STUNT TANKS
Filler
Feed
Perforated baffles obviate fuel surge
Vent
Filler
Feed
Vent
Solder on ends
Solder
Pierce holes before assembling
Material: tinplate or thin brass
W
6W
2W
Feed
SPEED TANKS are usually long and thin. Fuel level nears vertical at high speed
Static
Flight
TEAM RACE TANKS (Inside dimensions shown)
1·5"
1"
1·2"
15cc
·75"
1"
1·2"
1·5"
1"
2·4"
30cc
1"
1"
1·8"
Vent
Vent
Forward facing vents are used on
PRESSURE TANKS



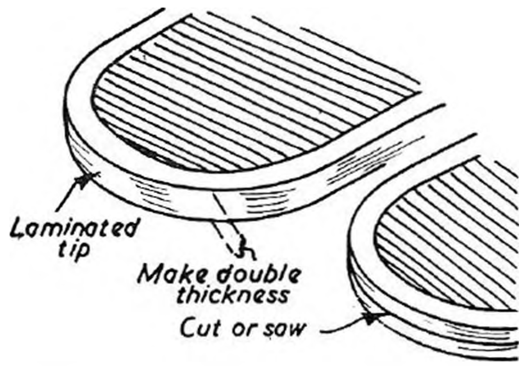
Control line tank from mustard tin



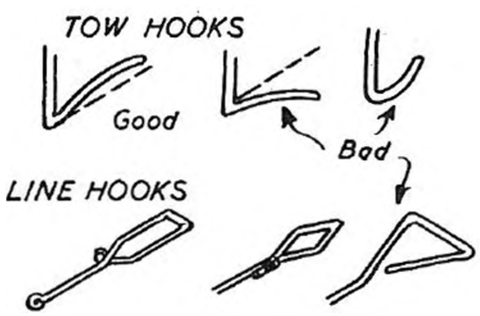
Easy method of tracing with a pin



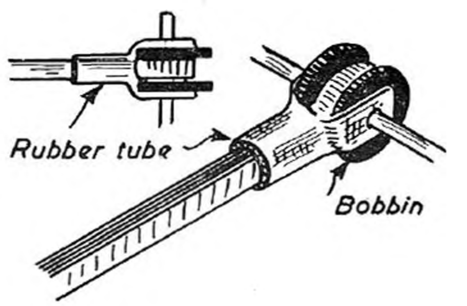
Economy rib cutting from sheet



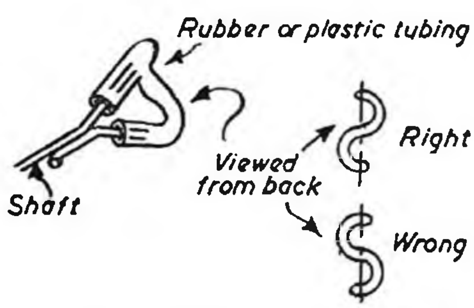
Make a pair of tips at a time



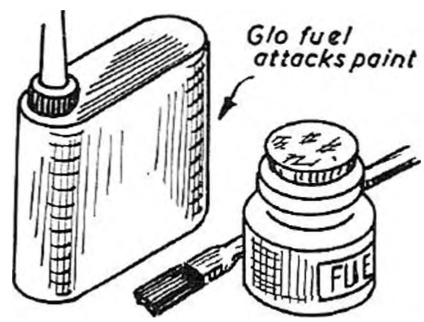
Line fittings for model gliders



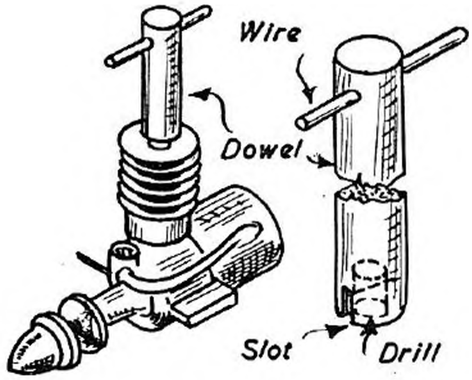
Anti-bunch fitting used with bobbin



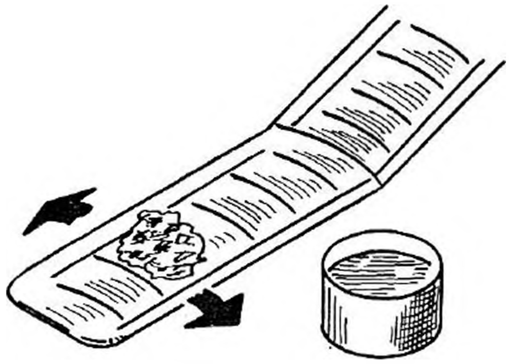
S-hooks prevent motor climbing



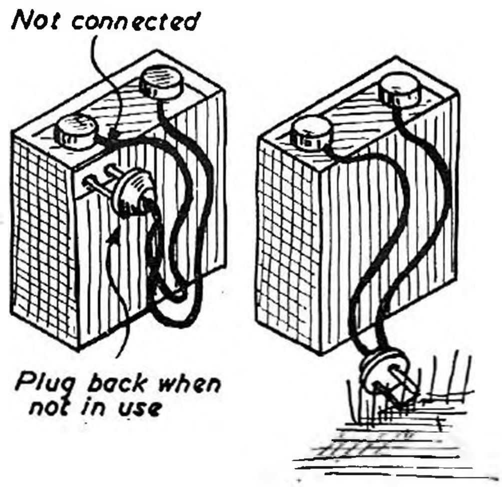
Fuel proof filler can as well as model



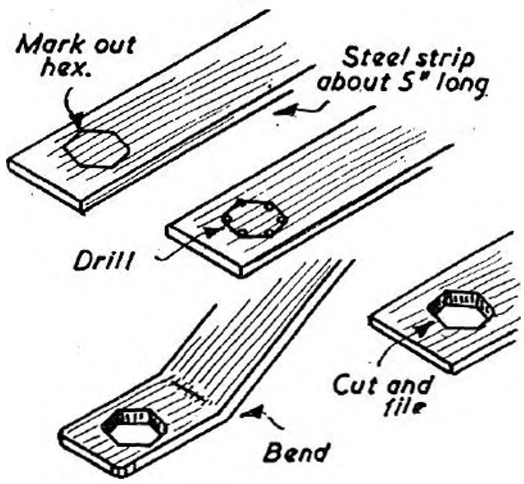
Save your fingers. Use this simple tool for adjustment of baby motors



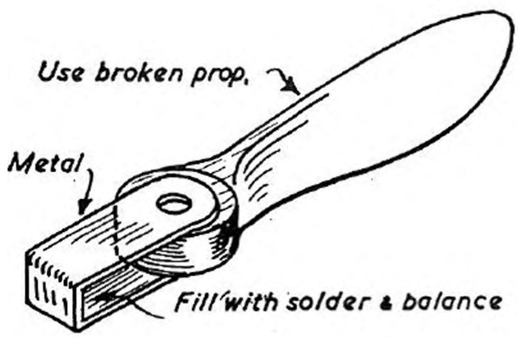
Swab of cotton wool makes effective substitute for dope or water brush



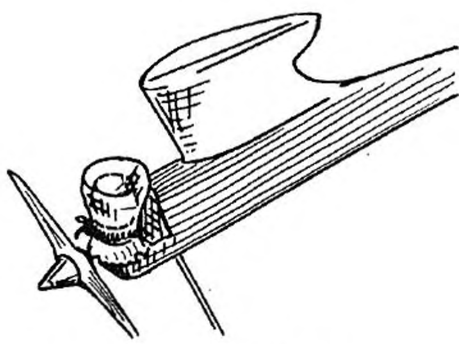
Battery leads can short in damp grass



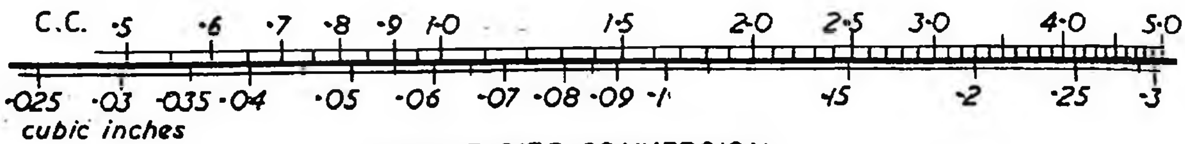
Handy propeller nut spanner



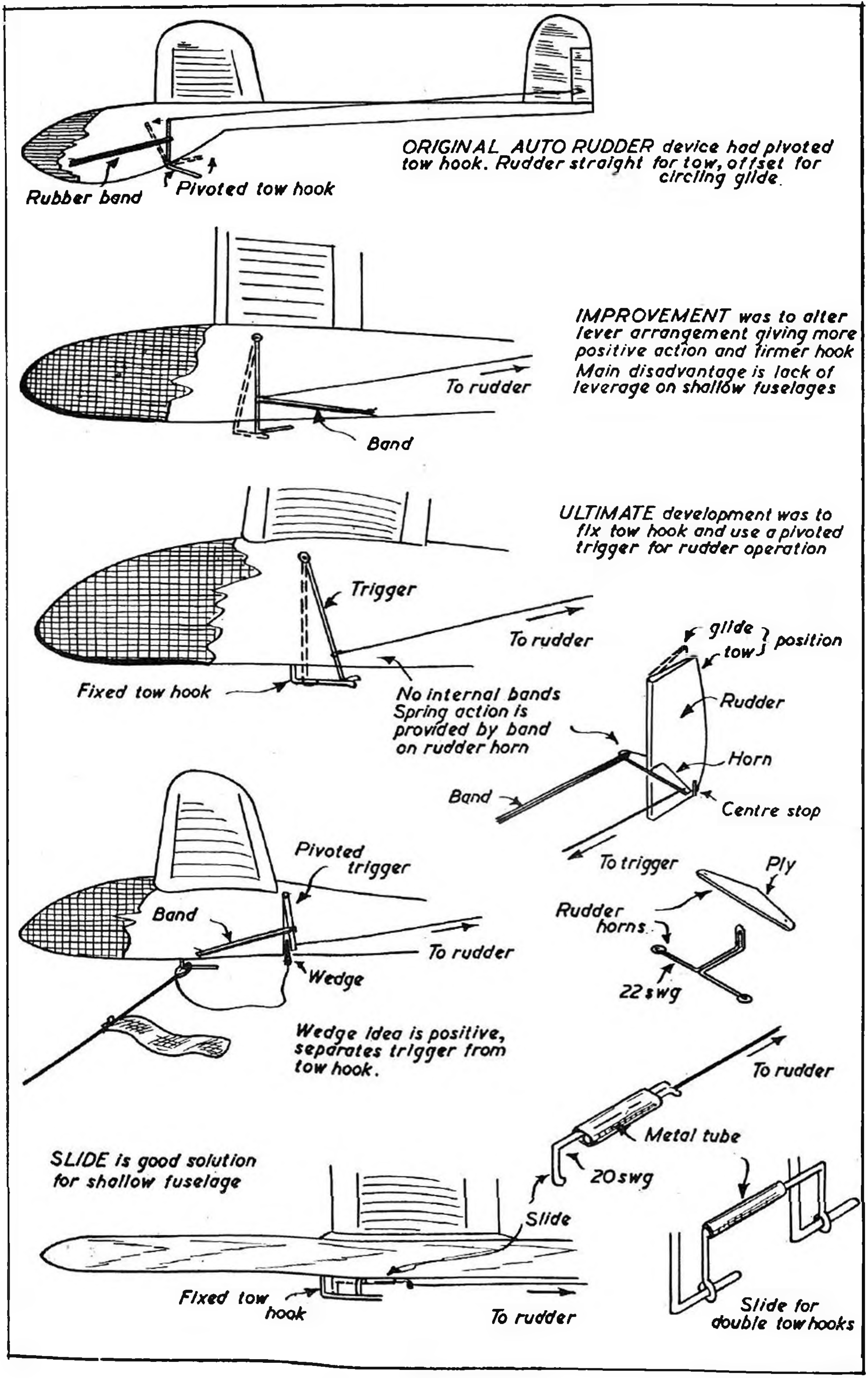
Making single blade propellers



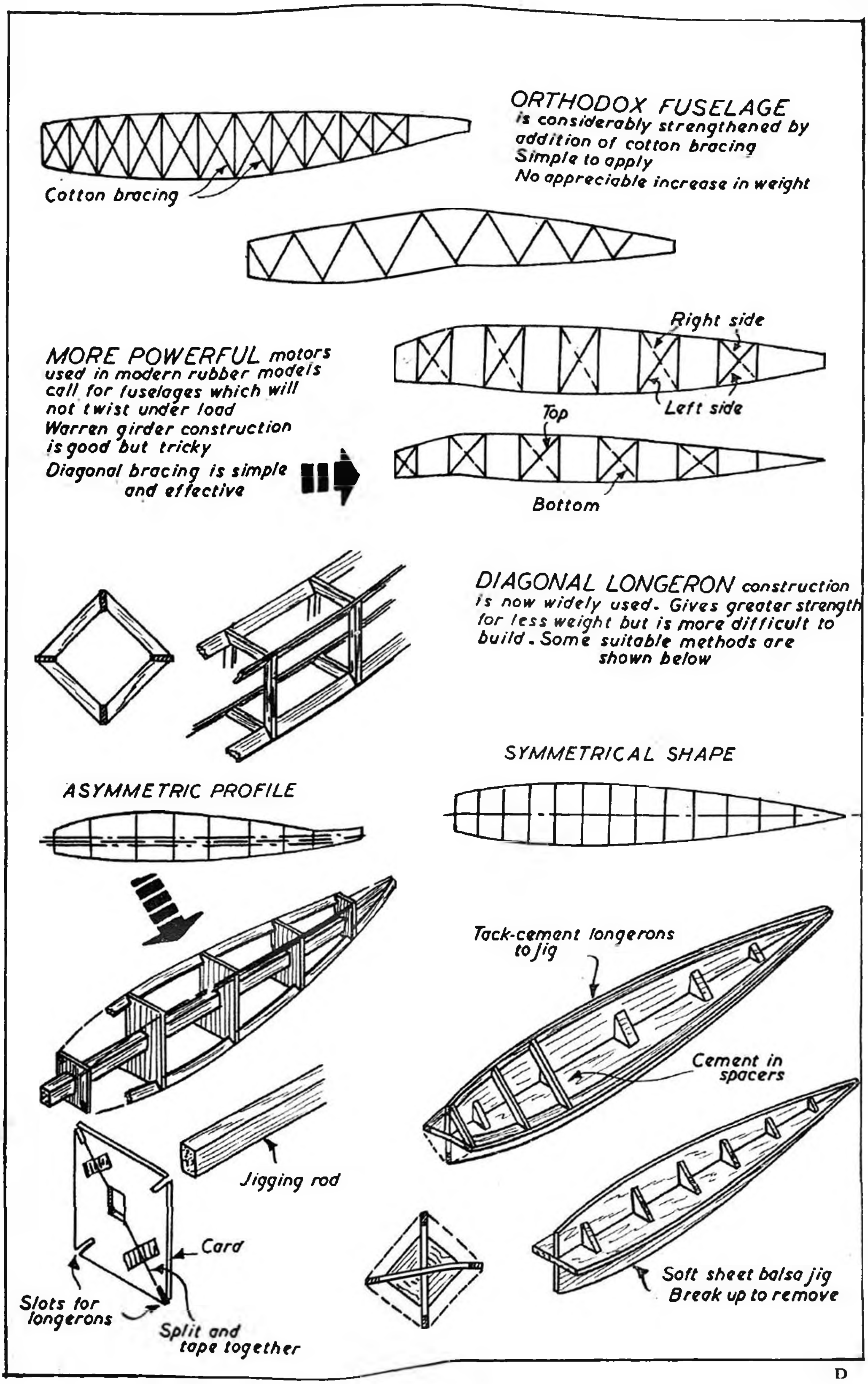
Cover engine when not in use

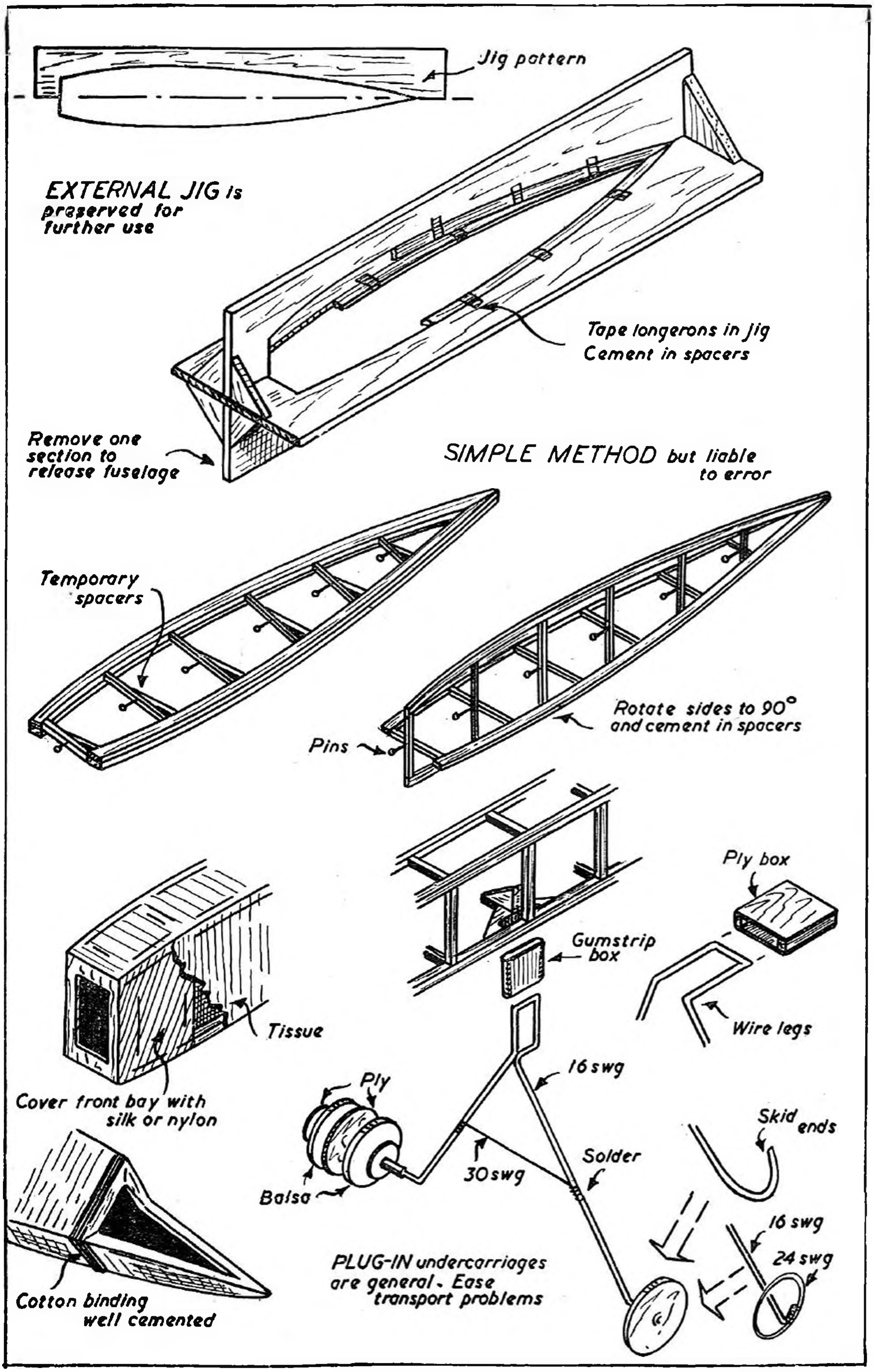


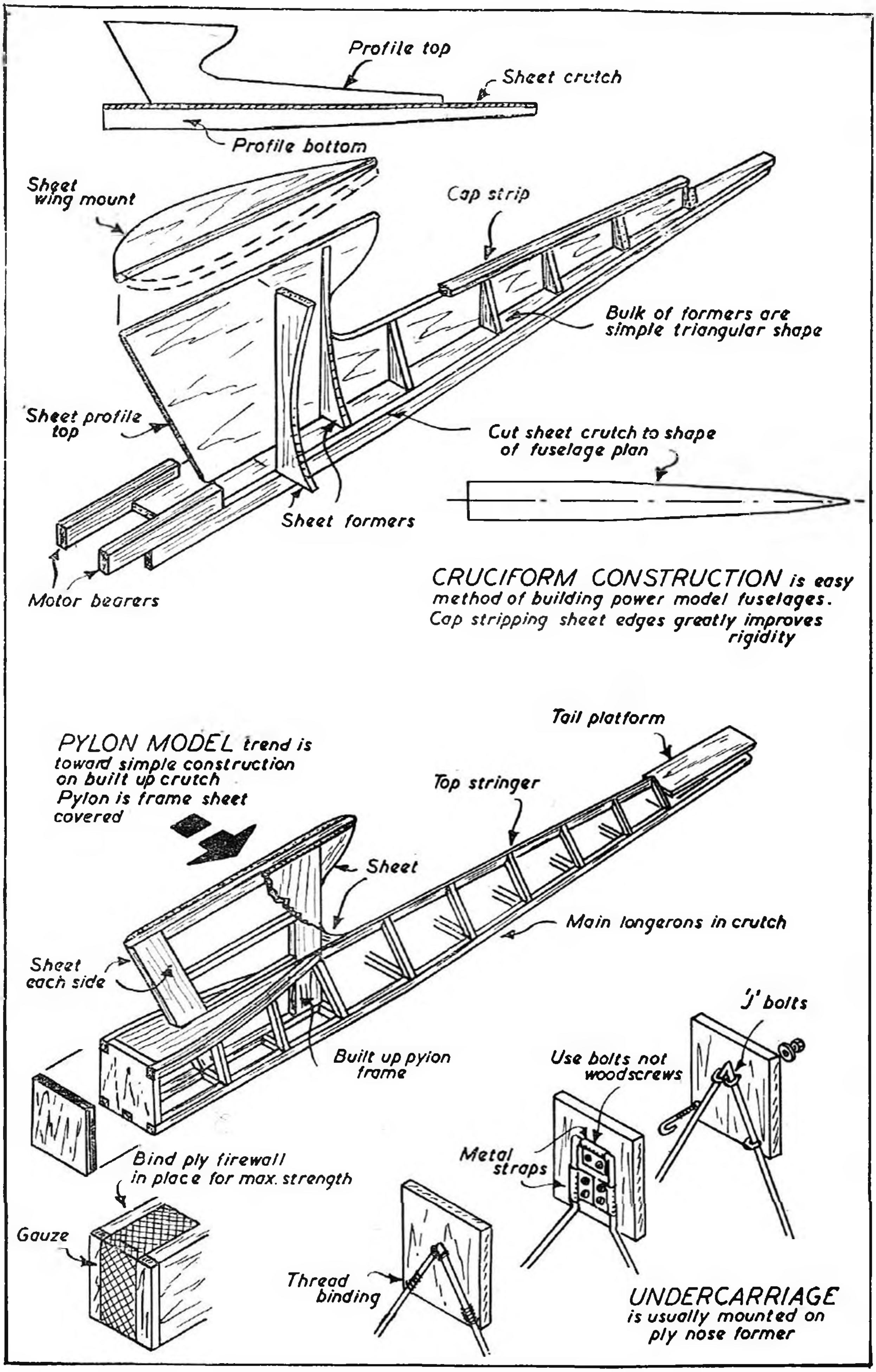
ENGINE SIZE CONVERSION

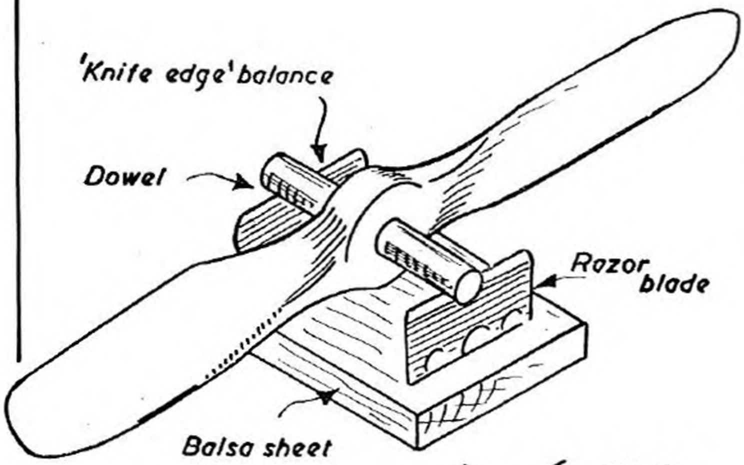


ORIGINAL AUTO RUDDER device had pivoted tow hook. Rudder straight for tow, offset for circling glide.
Rubber band
Pivoted tow hook
IMPROVEMENT was to alter lever arrangement giving more positive action and firmer hook
Main disadvantage is lack of leverage on shallow fuselages
To rudder
Band
ULTIMATE development was to fix tow hook and use a pivoted trigger for rudder operation
Trigger
To rudder
Fixed tow hook
No internal bands
Spring action is provided by band on rudder horn
glide
tow
position
Rudder
Horn
Band
Centre stop
To trigger
Ply
Rudder horns
22 swg
Pivoted trigger
Band
To rudder
Wedge
Wedge idea is positive, separates trigger from tow hook.
To rudder
Metal tube
20 swg
SLIDE is good solution for shallow fuselage
Slide
Fixed tow hook
To rudder
Slide for double tow hooks


ORTHODOX FUSELAGE
is considerably strengthened by addition of cotton bracing
Simple to apply
No appreciable increase in weight
Cotton bracing
MORE POWERFUL motors used in modern rubber models call for fuselages which will not twist under load
Warren girder construction is good but tricky
Diagonal bracing is simple and effective
Right side
Left side
Top
Bottom
DIAGONAL LONGERON construction is now widely used. Gives greater strength for less weight but is more difficult to build. Some suitable methods are shown below
SYMMETRICAL SHAPE
ASYMMETRIC PROFILE
Tack-cement longerons to jig
Cement in spacers
Jigging rod
Card
Slots for longerons
Split and tape together
Soft sheet balsa jig
Break up to remove

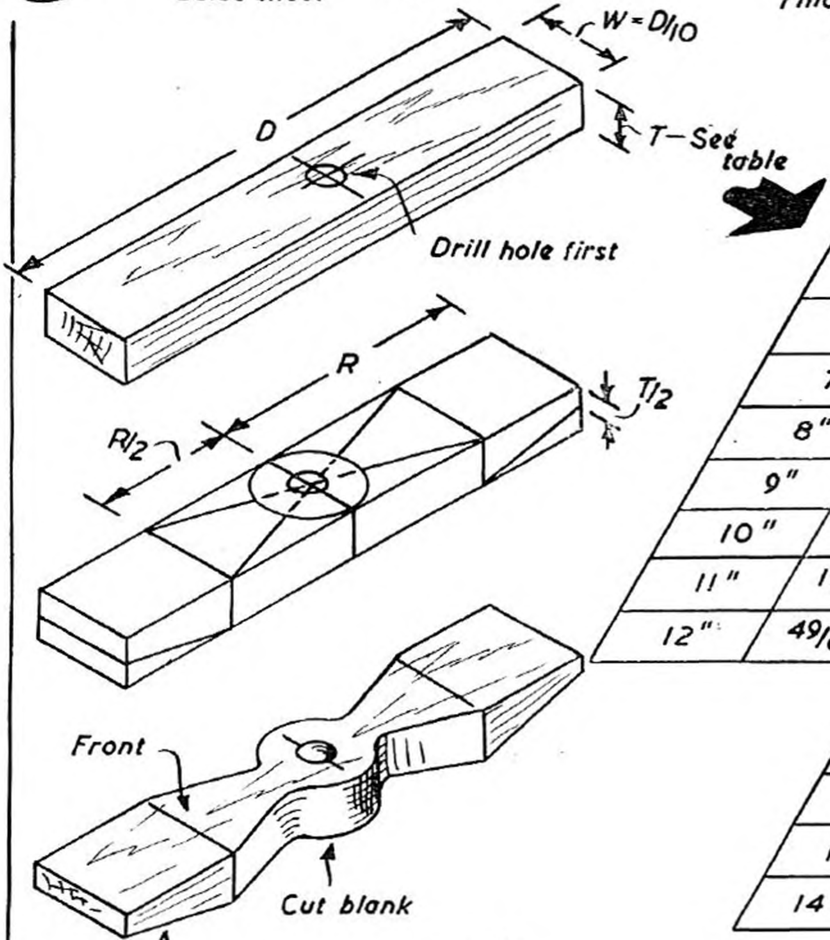

Jig pattern
EXTERNAL JIG is preserved for further use
Tape longerons in jig
Cement in spacers
Remove one section to release fuselage
SIMPLE METHOD but liable to error
Temporary spacers
Rotate sides to 90°
and cement in spacers
Pins
Ply box
Gumstrip box
Wire legs
Tissue
Cover front bay with silk or nylon
16 swg
Ply
Skid ends
Solder
30 swg
Balsa
16 swg
24 swg
PLUG-IN undercarriages are general. Ease transport problems
Cotton binding well cemented


Profile top
Sheet crutch
Profile bottom
Sheet wing mount
Cap strip
Bulk of formers are simple triangular shape
Sheet profile top
Cut sheet crutch to shape of fuselage plan
Sheet formers
Motor bearers
CRUCIFORM CONSTRUCTION is easy method of building power model fuselages. Cap stripping sheet edges greatly improves rigidity
Tail platform
PYLON MODEL trend is toward simple construction on built up crutch
Pylon is frame sheet covered
Top stringer
Sheet
Main longerons in crutch
Sheet each side
'J' bolts
Built up pylon frame
Use bolts not woodscrews
Metal straps
Bind ply firewall in place for max. strength
Gauze
Thread binding
UNDERCARRIAGE is usually mounted on ply nose former



BALANCE IS IMPORTANT
with power model propellers
Check balance on simple knife edge assembly
Unbalance will cause vibration and loss of power

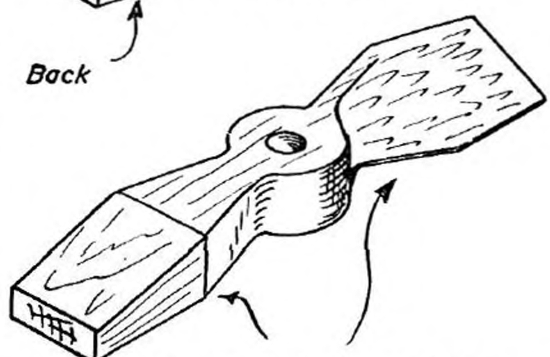
STANDARD PROPELLER
layout is straightforward
Block width is 1/10th diameter
Thickness for different pitches given in table



PITCH	T
3"	3/16"
4"	1/4"
5"	5/16"
6"	3/8"
7"	7/16"
8"	33/64"
9"	37/64"
10"	41/64"
11"	11/16"
12"	49/64"

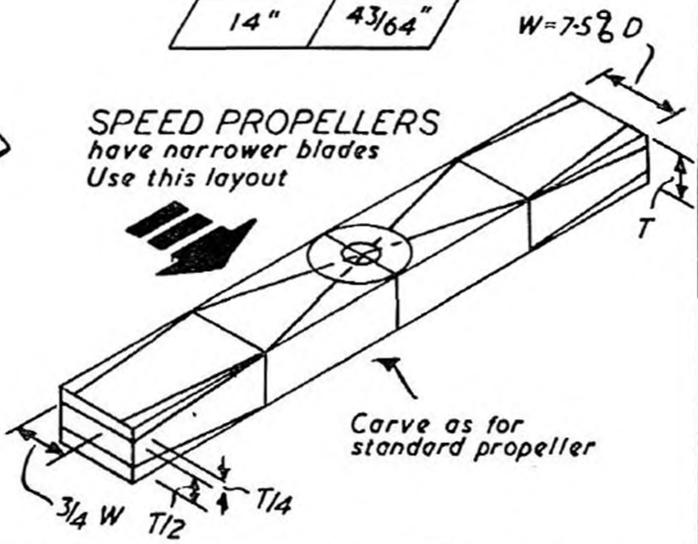
SPEED

PITCH	T
6"	9/32"
7"	21/64"
8"	3/8"
9"	27/64"
10"	31/64"
11"	17/32"
12"	37/64"
14"	43/64"

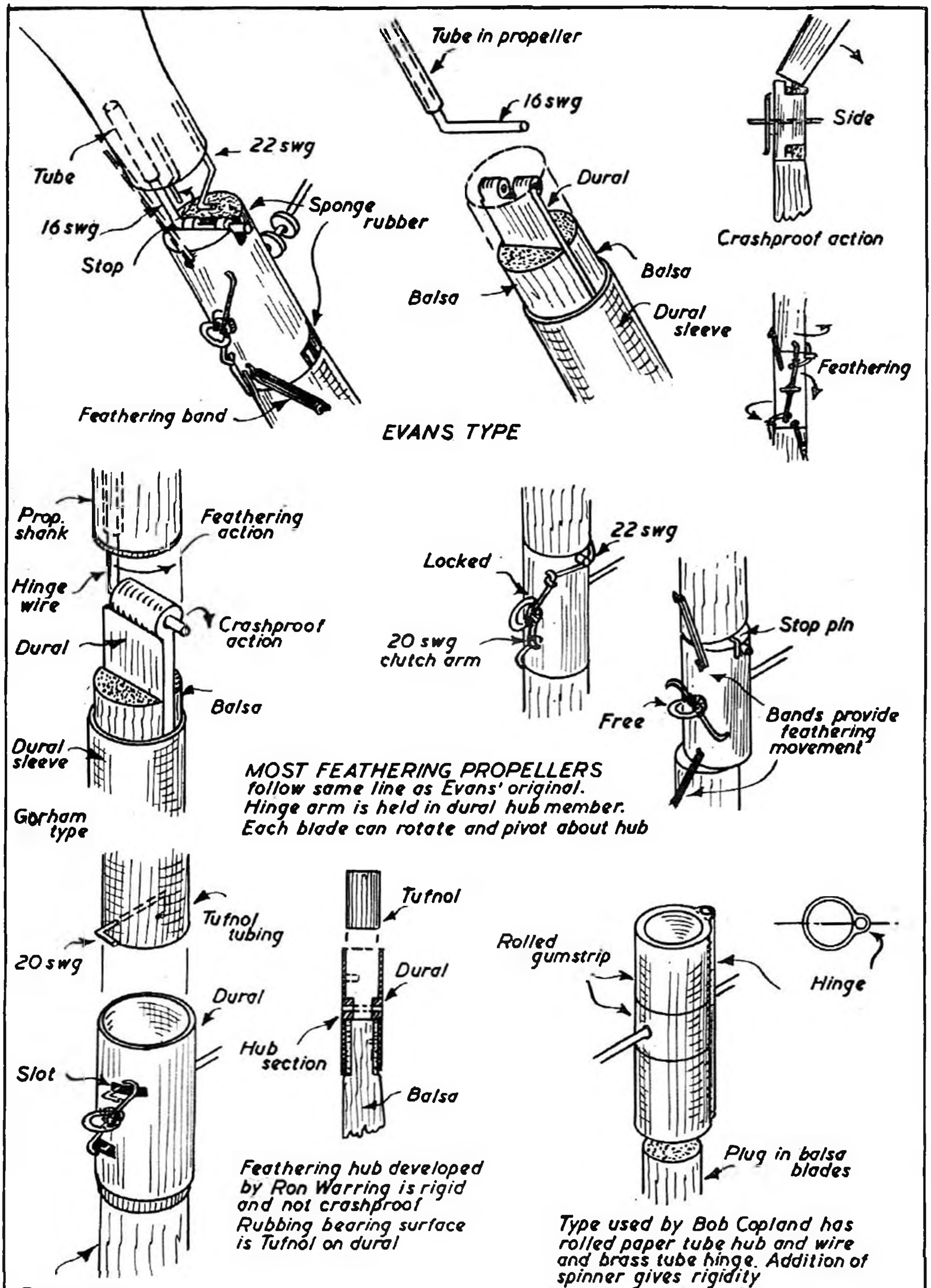


Carve back of each blade first turn over and carve blade fronts
Finish with rasp & sandpaper

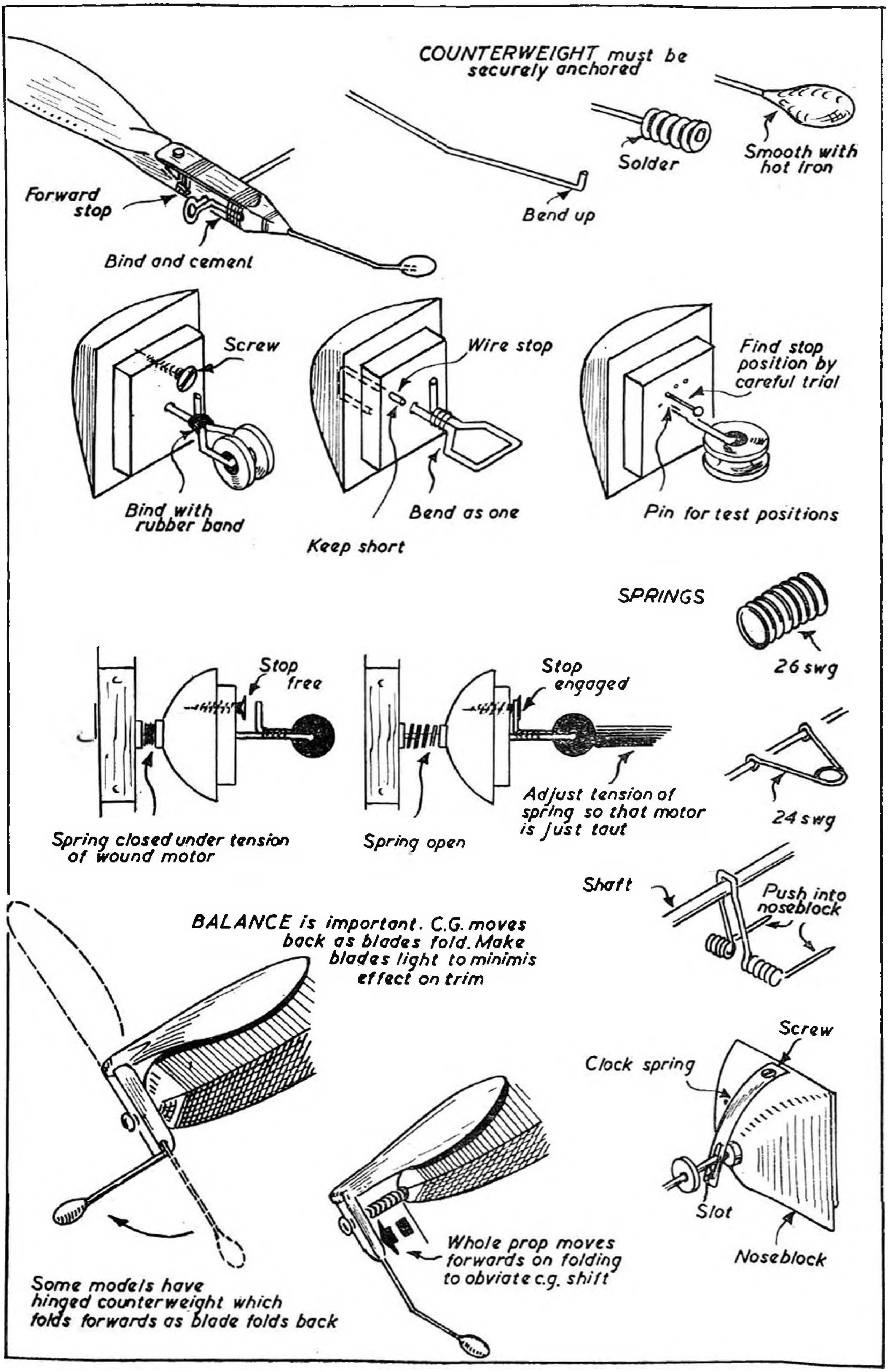
SPEED PROPELLERS
have narrower blades
Use this layout

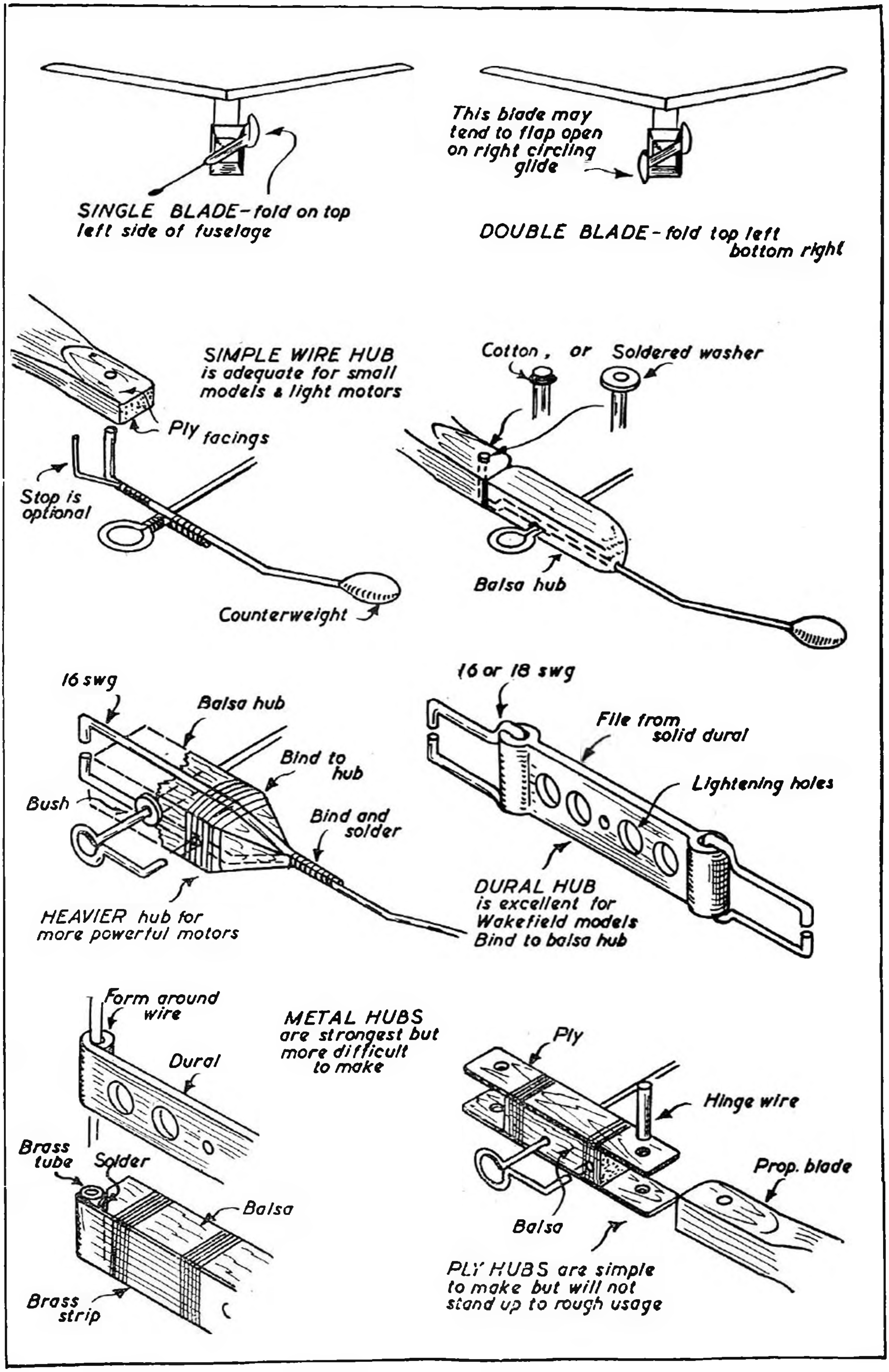


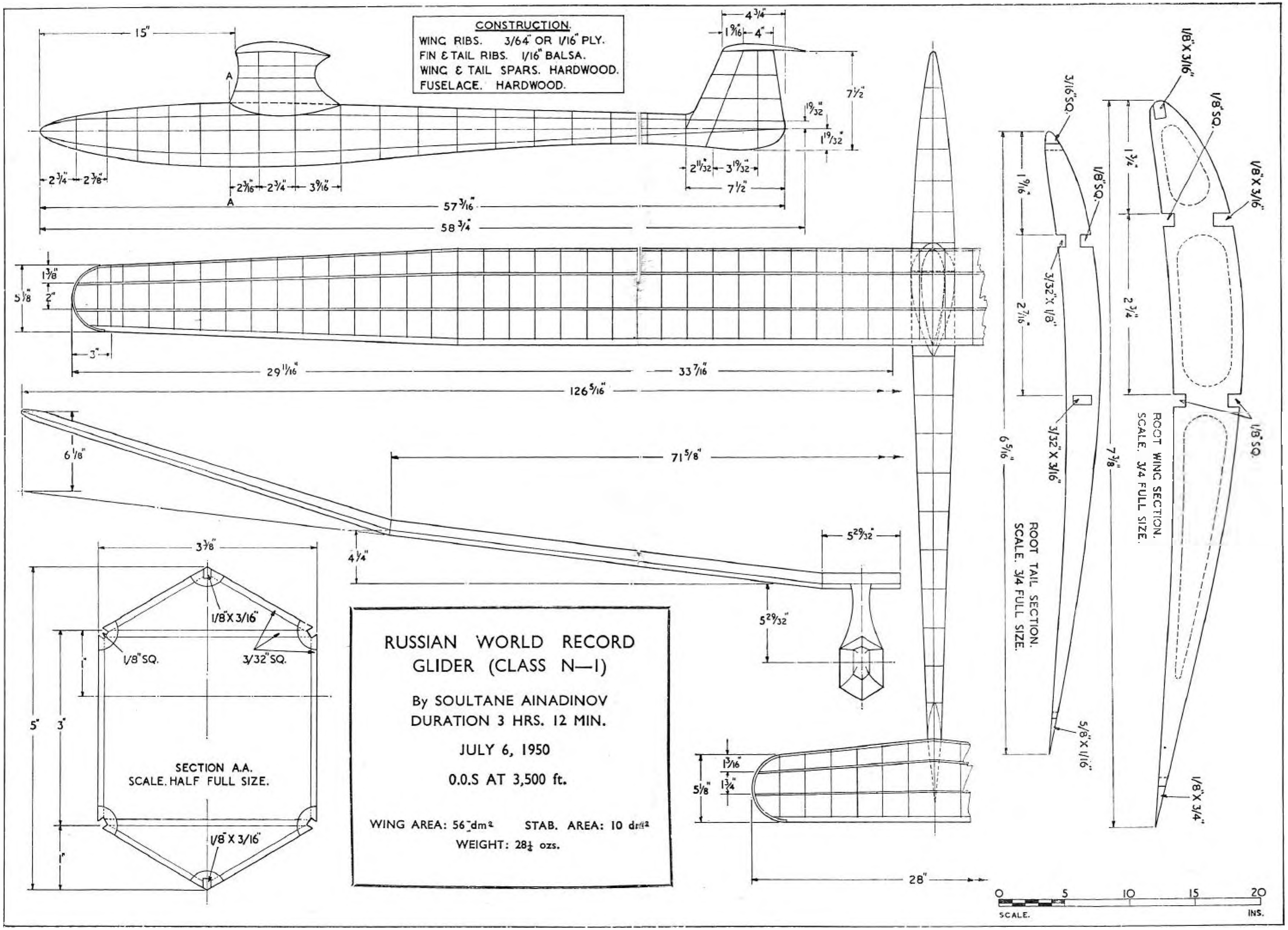
Carve as for standard propeller



FEATHERING PROPELLERS have been developed for contests and are usually model engineering projects. Simpler types with wire hub assemblies generally suffer from lack of rigidity. A possible fault with all types is that if the feathered pitch of each blade is not the same the model will be directionally unstable on the glide.


COUNTERWEIGHT must be securely anchored
Solder
Smooth with hot iron
Bend up
Forward stop
Bind and cement
Screw
Bind with rubber band
Wire stop
Bend as one
Keep short
Find stop position by careful trial
Pin for test positions
SPRINGS
26 swg
24 swg
Stop free
Spring closed under tension of wound motor
Stop engaged
Spring open
Adjust tension of spring so that motor is just taut
Shaft
Push into noseblock
BALANCE is important. C.G. moves back as blades fold. Make blades light to minimis effect on trim
Screw
Clock spring
Slot
Noseblock
Some models have hinged counterweight which folds forwards as blade folds back
Whole prop moves forwards on folding to obviate c.g. shift


SINGLE BLADE—fold on top left side of fuselage
This blade may tend to flap open on right circling glide
DOUBLE BLADE—fold top left bottom right
SIMPLE WIRE HUB is adequate for small models & light motors
Ply facings
Stop is optional
Counterweight
Cotton, or Soldered washer
Balsa hub
16 swg
Balsa hub
Bind to hub
Bush
Bind and solder
HEAVIER hub for more powerful motors
16 or 18 swg
File from solid dural
Lightening holes
DURAL HUB is excellent for Wakefield models Bind to balsa hub
Form around wire
Dural
METAL HUBS are strongest but more difficult to make
Brass tube
Solder
Balsa
Brass strip
Ply
Hinge wire
Prop. blade
Balsa
PLY HUBS are simple to make but will not stand up to rough usage


CONSTRUCTION.
WING RIBS. 3/64" OR 1/16" PLY.
FIN & TAIL RIBS. 1/16" BALSA.
WING & TAIL SPARS. HARDWOOD.
FUSELAGE. HARDWOOD.
RUSSIAN WORLD RECORD GLIDER (CLASS N—1)
By SOULTANE AINADINOV
DURATION 3 HRS. 12 MIN.
JULY 6, 1950
0.0.S AT 3,500 ft.
WING AREA: 56 dm²
STAB. AREA: 10 dm²
WEIGHT: 28¼ ozs.
SECTION A.A.
SCALE. HALF FULL SIZE.
ROOT WING SECTION.
SCALE. 3/4 FULL SIZE.
ROOT TAIL SECTION.
SCALE. 3/4 FULL SIZE.
1/8" SQ.
3/32" SQ.
1/8" X 3/16"
3/16" SQ.
3/32" X 1/8"
3/32" X 3/16"
5/8" X 1/16"
1/8" X 3/4"
57 3/16"
58 3/4"
126 5/16"
71 5/8"
29 11/16"
33 7/16"
28"
SCALE.
INS.

MAKING GLIDER WINCHES

There have been very few glider winches on the market and those commercial articles which have appeared have been rather too expensive for the average modeller's pocket. Yet the winch is one of the most essential features of pleasurable glider flying. A line which has to be reeled in, hand over hand, or wound on to a spool inevitably gets tangled or snagged, with consequent breakage. More often than not the whole line is soon lost.

A satisfactory glider winch is not all that easy to make, yet this is a project which any modeller should be able to tackle with success. The ideal is a winch which winds fast enough for the line to be reeled in completely before it falls to the ground after release from the model. In other words, a geared-up winch. A winch which winds much slower means that most of the reeling in has to be carried out with the line being dragged through the ground. The line may then easily catch up on tufts of grass, further delaying the process.

The simplest type of ready-made gear unit available is a small hand grindstone, examples of which are available in many hardware stores at a cost of five shillings or so. Gear ratio is something of the order of eight or ten to one. You do not want a large, heavy grinder as this will be uncomfortable to hold. At the same time it is very important that the gears themselves be enclosed, as in a grinder, as some nasty accidents have occurred on home-made units with exposed gears. Fingers have been trapped between the rapidly revolving gears.

The grindstone part of the commercial grinder is no longer required. This is replaced by a spool on which the line is wound. The best type of spool is shown in Fig. 1. This consists of two discs joined by a solid hub and a series of spacers near the circumference. It gives, in effect, a light spool of large diameter for faster winding. The actual diameter of the discs should be as large as practicable, say between 6 and 8 inches for preference, although a smaller spool will do.

If the discs are cut from sheet metal (aluminium or dural for preference, being light) the actual edges should be smoothed and rounded. A sharp or jagged rim rotating at high speed could inflict a nasty cut. The metal spool will, of course, be more difficult to make, but has the advantage over a wooden spool in being more robust. Very often a winch has to be thrown away to release the model quickly when on tow. Wood spools have a habit of splitting under such rough treatment. This is something that cannot be avoided.

Attachment of the finished spool to the grinder shaft should present no difficulties. The overall width of the spool is governed by the length of shaft available, leaving sufficient shaft length for the locking nut. Use a stop nut of some kind so that the spool will not become loose on the shaft.

To complete the winch you will need to attach a guide for the line and a suitable handle for holding. Without a suitable guide the line will become hopelessly tangled when reeling in. Usually it will run off the spool and wind itself around the shaft. The guide always feeds the line on to the centre of the spool and prevents such trouble.

A length of wire anchored to the body of the grinder will form a suitable guide, the free end being made off in a closed loop, through which the line is passed. The end of the line, of course, is tied to one of the spacers on the spool.

The shape of the handle—the actual part of the winch you hold during tow-launching—should be tailored to fit the hand comfortably and provide a suitable anchorage to the grinder casing. The fitting at the bottom of this casing is designed to clamp on to a horizontal surface. The handle is to be in the vertical position. A little ingenuity will soon provide a satisfactory answer to the problem, perhaps anchoring the handle directly to the side of the casing or making off the top of the handle after the fashion shown in the sketch. Remember, once again, the assembly has to be strong enough to withstand being thrown down. And the lighter you can make it the more comfortable it will be to handle.

If you are looking for a light, cheap winch and are prepared to sacrifice the advantage of fast reeling in, then the simple type shown in Fig. 3 will be found a good answer. This uses a built-up spool, like its more elaborate counterpart—again preferably of metal—but this spool is simply mounted directly on to a shaped wooden handle, cut from ply at least ¼ in. thick. The shaft for the spool is provided by a bolt screwed through the handle and held in place with a stop nut (or an ordinary nut " locked " with a touch of solder on the threads, after assembling). Assemble the spool with thin washers on either side and tighten down the outer stop nut, allowing slight play on the shaft for easy spinning action.

A guide wire is attached to the handle, this guide being made from 18 or 16 s.w.g. wire, and for winding purposes a small " free" handle is attached to the side disc of the spool on the opposite side to the main handle. This can be fitted in a similar manner to the attachment of the spool on its spindle, this time using a smaller diameter bolt. The sketches should make the assembly quite clear.

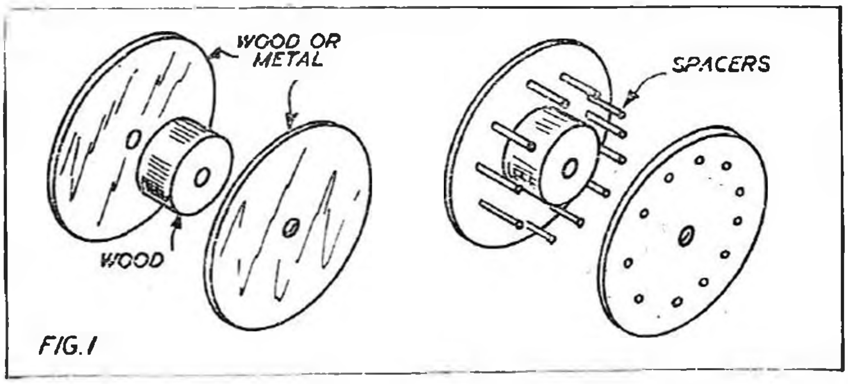


FIG. 1

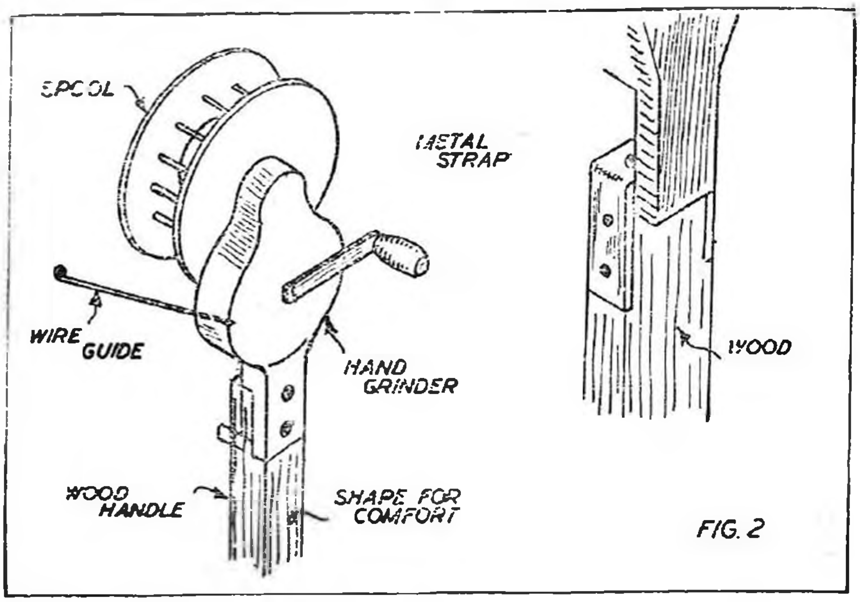


FIG. 2

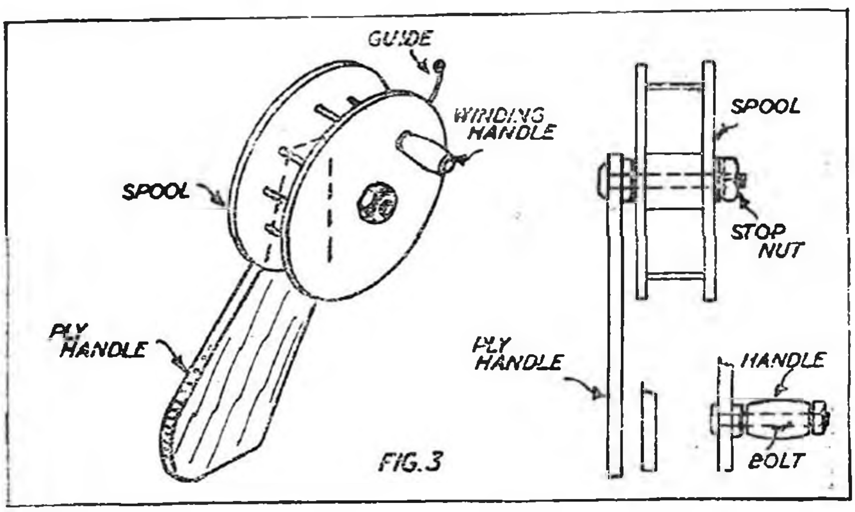


FIG. 3

HOW TO MAKE SOLIDS

The expert builder of solid scale models needs no instructions as to how to go about his work. He is, in fact, a craftsman. But the less experienced modeller often comes to grief in attempting to duplicate such models—often because he has only a vague idea of how a solid model is built up.

Most solid fans have been brought up on kit designs which, admirable in their way, follow the traditional, and not entirely satisfactory, method of cutting wings, tailplane, etc., to outline shape, carving the fuselage from block and then butt-jointing all the components together. The possibility of error is considerable, particularly as regards wing position and dihedral. The true solid model is designed *as a model.*

There is a wealth of detail available to the solid model enthusiast. Literally hundreds of scale plans are available to him, any one of which can give him all the details necessary to complete a highly satisfactory model. With care he can make the model at least as accurate as the plan. If he takes the trouble to seek out photographs and further details of that particular aircraft, there is no reason at all why the finished model should not become a true exhibition piece.

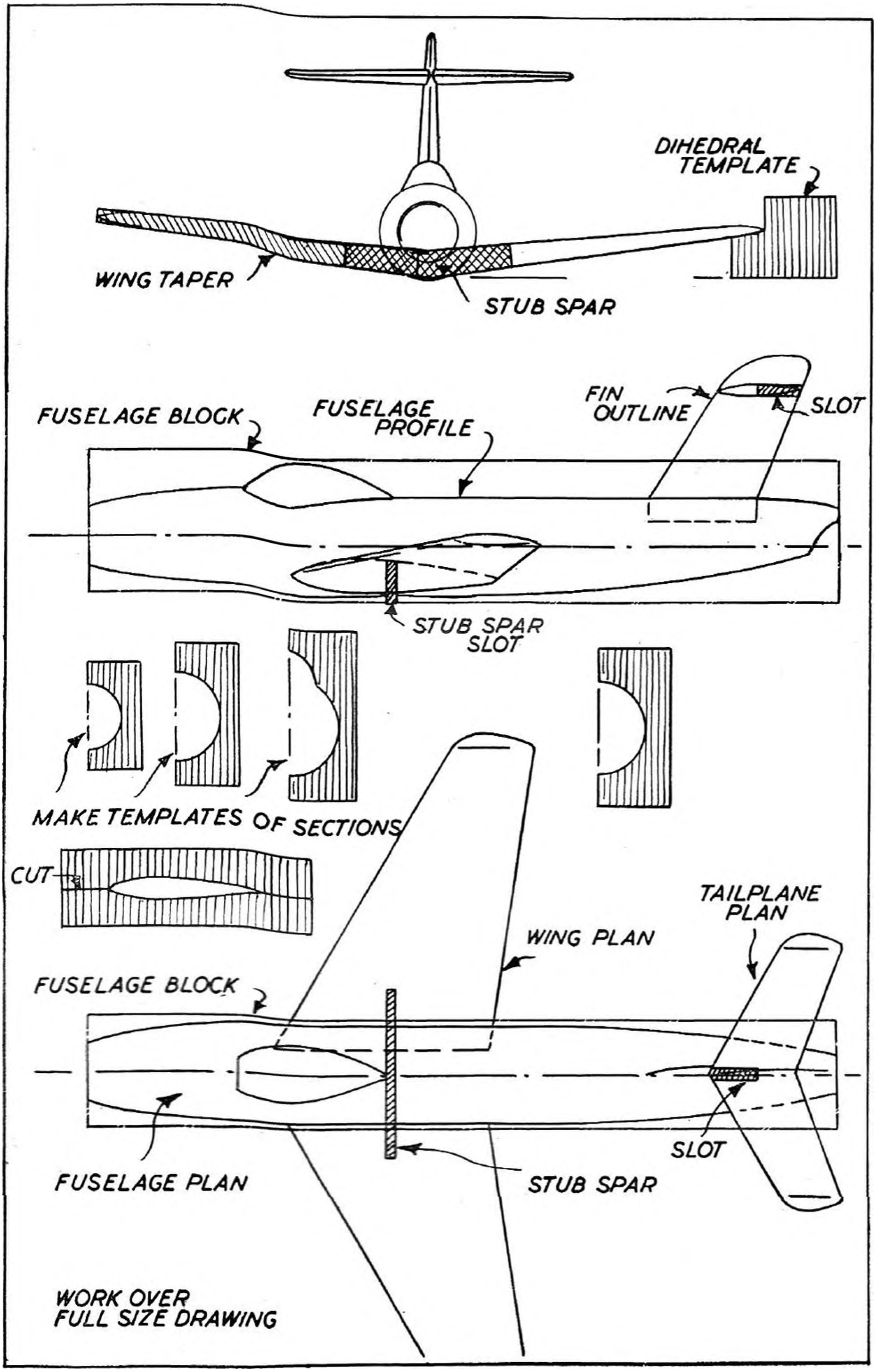
Before we start to turn a plan into a scale model, first a word or two about scale. The almost universal scale for solids is 1/72nd full size (one inch equals six feet). If a whole range of solids is contemplated, including single-seaters and multi-engined bombers and airliners, for example, and the desire is to keep all models to the same scale, 1/72nd scale is about the best. But sticking strictly to one scale throughout is not entirely satisfactory. It means, for instance, that a small lightplane or fighter model might span four or five inches whilst a scale Brabazon would span nearly forty inches. This may give a true comparison of the relative sizes of the two aircraft, but extremely fine detail work is called for on the smaller models to produce a finished appearance equivalent to that possible on the larger jobs.

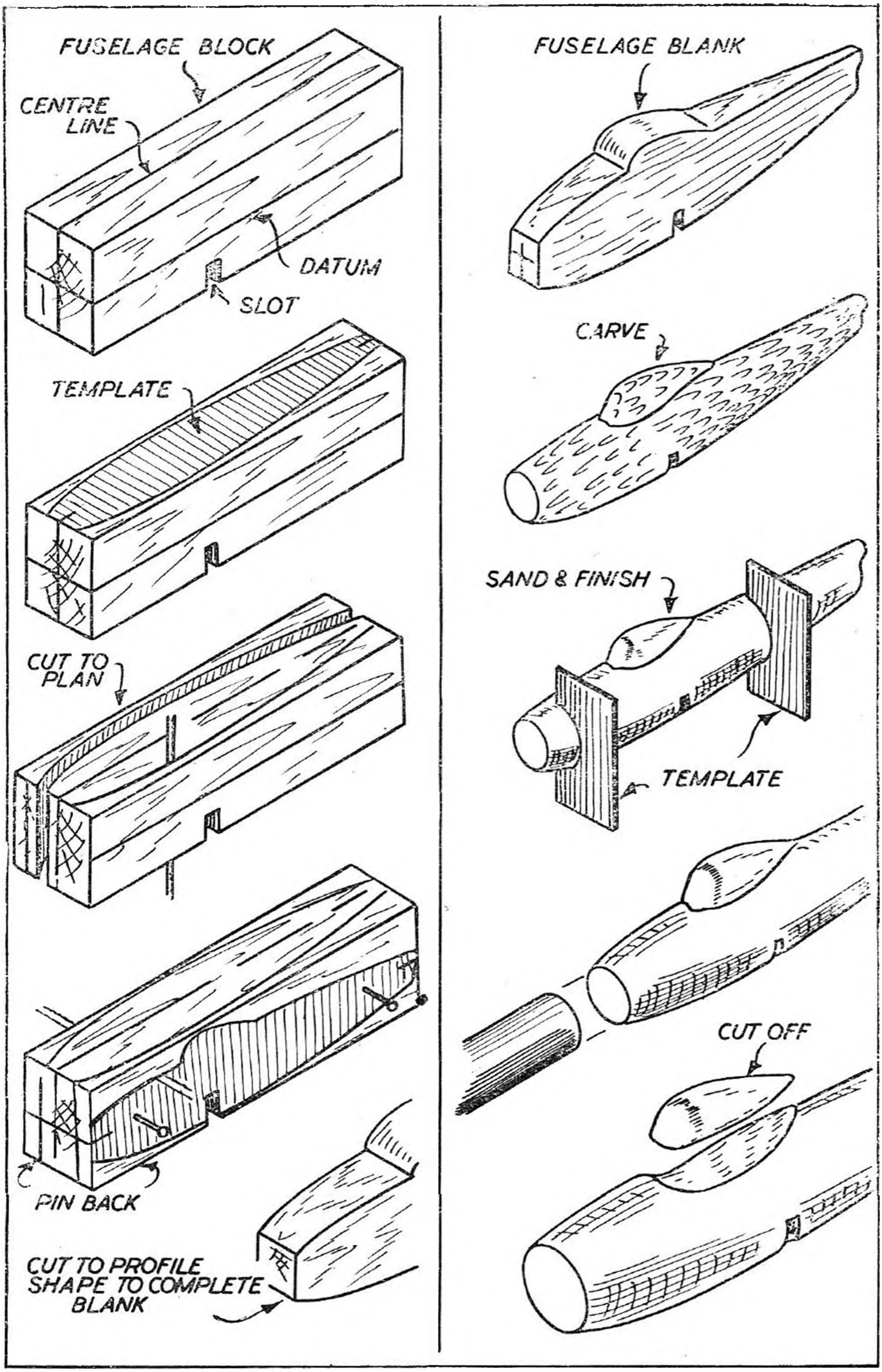
For exhibition purposes, it is generally better to adopt a larger scale for the smaller aircraft—1/36th is about the ideal for the modern jet fighters and gives far more scope for the incorporation of finer detail. Whatever scale is chosen, however, the procedure is basically the same.

The plan provides all the outline shapes required, and the shapes of the various sections. The drawing shows how to work over a scale plan to produce templates for marking out these shapes onto wood. The various stages in shaping and assembly are described in the following pages.

For accuracy and ease of assembly, where two-piece wings are used, these should be joined by a stub spar cut from hardwood or ply. The shape of this is determined from the *front elevation drawing*. It is slotted into the fuselage, the position of this slot being determined by laying out the spar in the best position over the *plan view.* Outline shapes of the wing, tailplane and fin are readily determined and the dimensions of the required block for the fuselage found. This is made slightly oversize in height and width. The wing taper is also determined from the front elevation and the templates necessary for checking the final shapes are made from the section drawings.

It is a very good idea to have *two* plans to work with. One is used for reference. The other is marked out in the manner shown and then *cut up* to make the necessary outline templates, etc. The templates used for checking the sections should be pasted on to card for rigidity. This method will save


DIHEDRAL TEMPLATE
WING TAPER
STUB SPAR
FIN OUTLINE
SLOT
FUSELAGE BLOCK
FUSELAGE PROFILE
STUB SPAR SLOT
MAKE TEMPLATES OF SECTIONS
CUT
TAILPLANE PLAN
WING PLAN
FUSELAGE BLOCK
SLOT
FUSELAGE PLAN
STUB SPAR
WORK OVER FULL SIZE DRAWING


FUSELAGE BLOCK
CENTRE LINE
DATUM
SLOT
TEMPLATE
CUT TO PLAN
PIN BACK
CUT TO PROFILE SHAPE TO COMPLETE BLANK
FUSELAGE BLANK
CARVE
SAND & FINISH
TEMPLATE
CUT OFF

a lot of re-drawing and makes for accuracy. Broadly speaking, the main requirement of a solid scale model is that it should be *accurate.* However much detail is later added, if the outline shapes are wrong the model itself will look wrong, in the eyes of a man who knows his aeroplanes.

Fuselage Construction

THE fuselage block size having been determined from the original drawings, cut out accurately, and square, to these dimensions and then mark the *centre line* on top and bottom faces and the *datum line* on the two sides. These lines are used to position the *plan* and *profile* templates accurately.

The plan shape should not be marked out on the block. Better than tracing this shape, cut a template from the original plan and paste or pin in place. Cut the block down to plan shape after you have marked and cut the slot for the wing stub spar, using your side elevation template as reference. It will be advisable to mark the plan shape on the bottom of the block, also as a guide to square cutting, if you are using hand tools. Trace round the template to give this outline.

A fretsaw or small coping saw is best for cutting the fuselage block to shape. Then the two side pieces can be removed intact. These are then pinned back in place to restore the block to its normal rectangular shape.

The side elevation template is then stuck or pinned onto the side of the block, duplicating the outline on the other side, or cutting an identical template and fixing in place, as a guide. The reason for the oversize fuselage block will now be obvious. It enables the side pieces to be removed in one and then replaced so that you are working with a " squared " block to cut both plan and profile shapes. This makes for far greater accuracy than cutting one shape first and then marking the other out on the resulting curved surface, often having to guess the required outline. If you are in a hurry, and are not so bothered about extreme accuracy, then the profile shape is the most important one and this is the one to cut while the block is still " square." Plan shape can then be drawn on the curved shape resulting.

After cutting to fuselage plan and profile shape you will have a fuselage *blank.* This you now have to carve down to the required cross section—a job which require care and patience. Use a very sharp knife and remove only small chips of wood at a time. Never try to take large cuts as the knife may open a split along the grain and remove material from within the required finished outline. Finish carving whilst all the sections are still slightly over-size, as checked against the fuselage templates you have made. The rest of the finishing down to the final section should be made with sandpaper. During the sand-papering stage, use the templates frequently to make sure that the correct curvature of the cross section is maintained. If you do carve or sand away too much material, then it will be best to go back and start again with a new fuselage block, rather than attempt to bodge the job up, particularly if you want your finished model to be an exhibition piece.

When you are satisfied with the shape of the fuselage, give a preliminary coat of grain filler and sand down smooth again with the finest sandpaper. This will show up any imperfections remaining which still require attention. If you are going to use a plastic cockpit canopy, too, now is the stage to cut out the carved cockpit. Otherwise, leave this for finishing in matt black, as described later.

As to materials for the fuselage block, a fairly light, close-grained wood is best. Balsa is not an ideal material, although it is commonly used. Being soft, balsa is readily dented. For preference, use a harder wood, but one which is still easy to carve and work.

Wings, Tailplane and Fin

HAVING determined the size of the panel required for each wing, mark the position of the slot for the stub spar and cut this out. Then mark the wing taper (if there is any) on the leading edge of the panel and plane or work down to this taper. Your wing panel is then ready for cutting to outline shape.

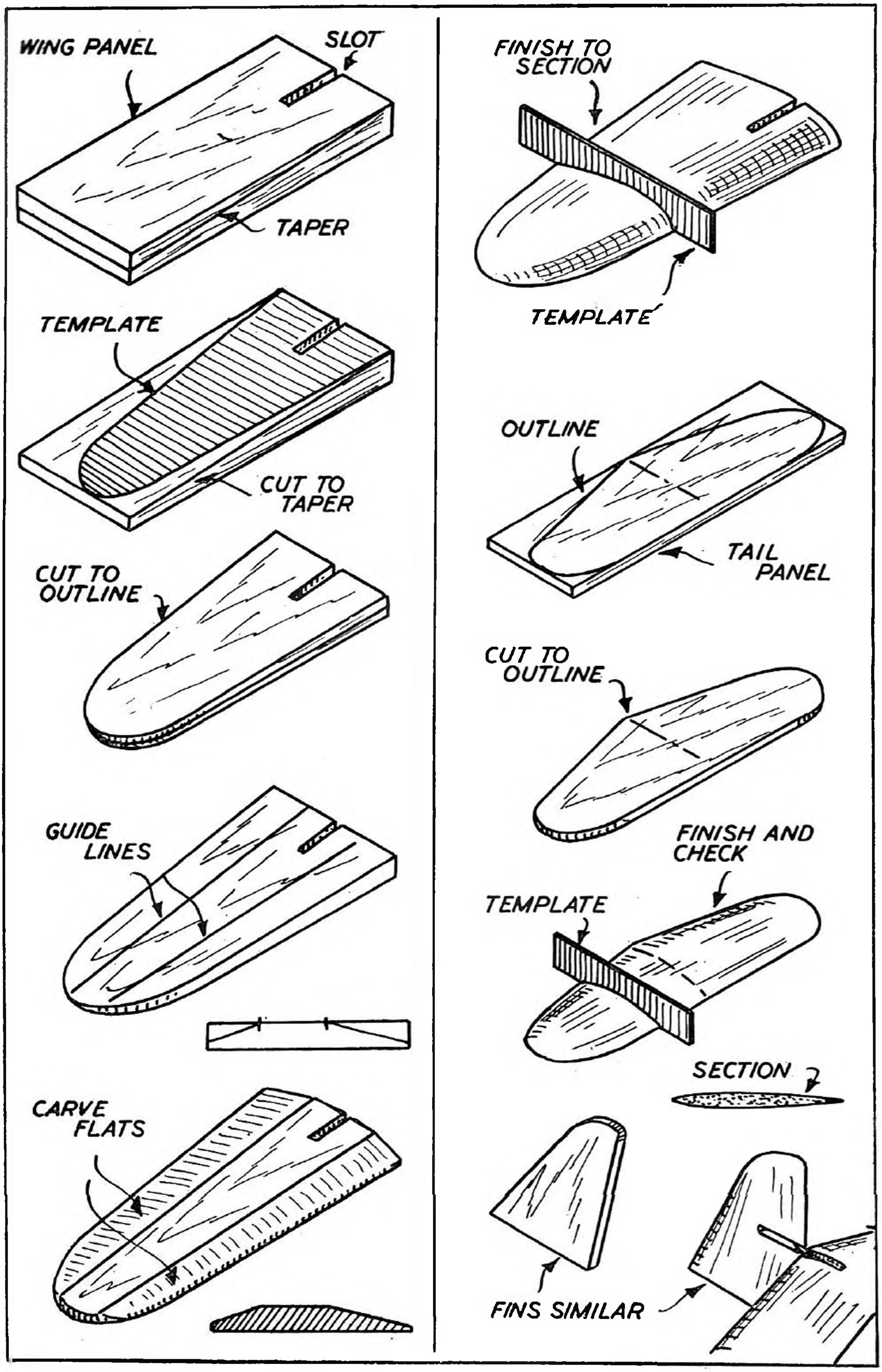
Again it is best to use a paper template for marking out the wing outline rather than trying to trace or re-draw this on the wood. The same template can be used to mark each wing panel and, when the two have been cut to outline shape, they can be placed together and lightly sanded around the outline to produce two identical shapes. Alternatively, you can use one finished wing panel as a template to mark out and cut the other. Do take care, however, to get each wing panel the same shape. Having done this, remember these panels are "handed." One is for the right wing and the other for the left wing. It is easy to forget and carve two "right-handed" or two "left-handed" wings.

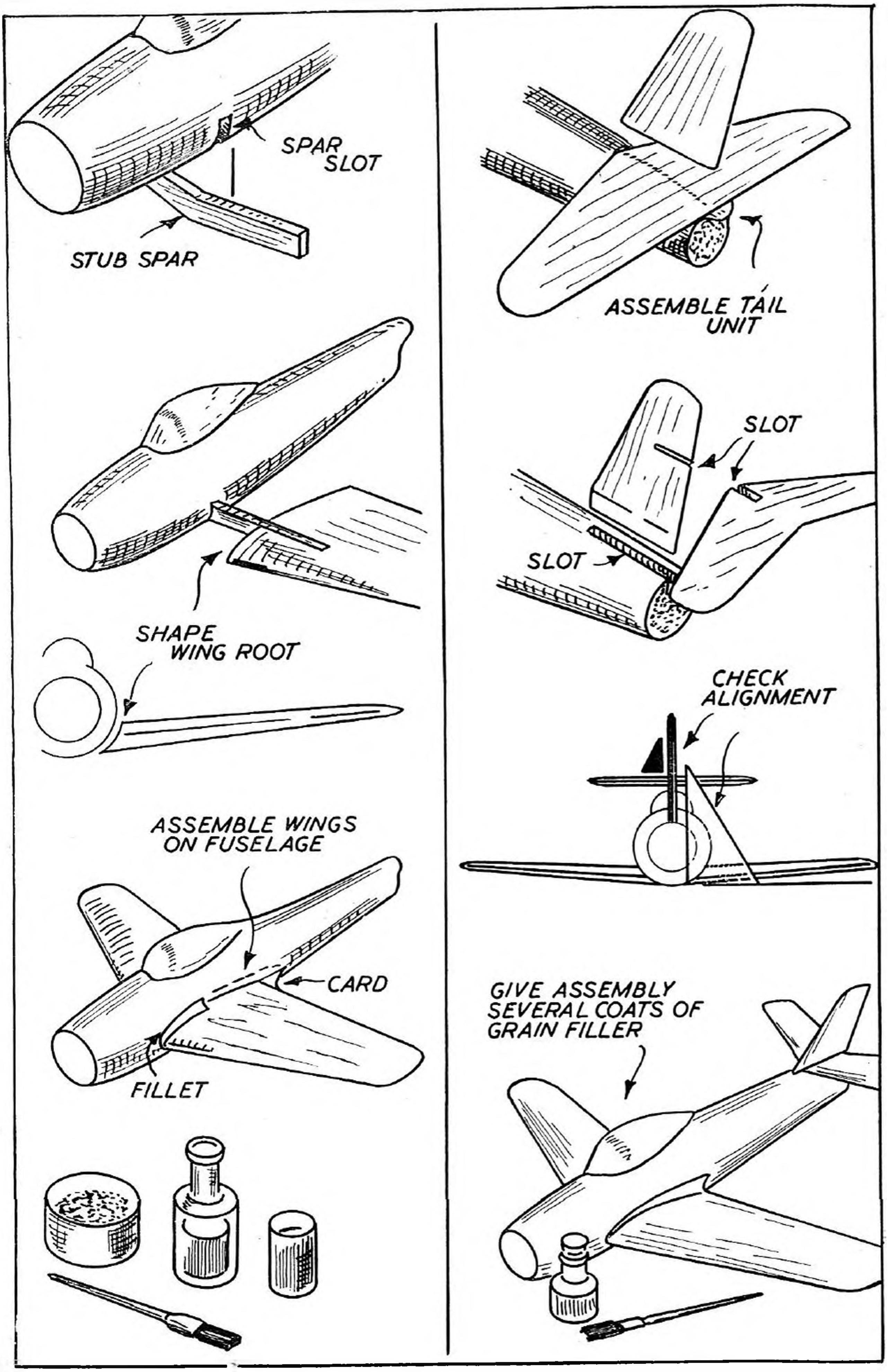
Many people have trouble in carving wings to a good aerofoil shape. There is quite a simple system whereby much of the wood can be removed in "flats" and then rounded off, as shown in the diagrams. Depending on whether the required section is basically flat underneath or more nearly symmetrical, these "flats" are planed or carved on the upper surface only, or on both surfaces.

First mark the position of the leading and trailing edges of the finished aerofoil around the edges of the wing panel. In the example illustrated the required aerofoil has a flat undersurface, so only the upper surface of the panel needs treatment. On this surface, draw two guide lines, one at approximately one-quarter of the chord from the leading edge and the other roughly two-thirds chord. Plane down so that the resulting section consists of three flats and then simply finish off with sandpaper to produce the required aerofoil section. This should be checked at various stations along the span by means of templates.

Tailplanes and fins are prepared in an exactly similar manner, except that it is seldom necessary to go to similar pains to produce the required aerofoil section. Almost invariably tail sections are symmetrical and quite thin. All that is necessary is to sandpaper away to the required section, using a template again. It may well be necessary on larger tailplanes, however, to first taper the panel, just like the wings. In this case, the taper usually has to be worked in on both upper and lower surfaces of the panel, otherwise your finished tail will have an unwanted, if slight, dihedral angle. Apart from that, you can regard the tail surfaces as similar to the wings, but much simpler.

If possible, the tailplane should always be made in one piece from tip to tip. Then it can be slotted into the fuselage or fin, as required, to make a rigid assembly. In some cases it may be best to assemble the tailplane on a small stub spar, just like the wings. This is particularly useful where the tailplane has a dihedral angle and sprouts from the side of the fuselage in the prototype aircraft. Otherwise dihedral may be incorporated in a one-piece tailplane by partially cutting through at the centre line, cracking and cementing to the required angle.


WING PANEL
SLOT
TAPER
TEMPLATE
CUT TO TAPER
CUT TO OUTLINE
GUIDE LINES
CARVE FLATS
FINISH TO SECTION
TEMPLATE
OUTLINE
TAIL PANEL
CUT TO OUTLINE
FINISH AND CHECK
TEMPLATE
SECTION
FINS SIMILAR


SPAR SLOT
STUB SPAR
SHAPE WING ROOT
ASSEMBLE WINGS ON FUSELAGE
CARD
FILLET
ASSEMBLE TAIL UNIT
SLOT
SLOT
CHECK ALIGNMENT
GIVE ASSEMBLY SEVERAL COATS OF GRAIN FILLER

Assembly

ASSEMBLING the basic model is one of the most interesting stages in the construction of a solid. A certain amount of trimming to fit will be necessary and this must be carried out with patience and care, otherwise your previous work may be ruined. A neatly assembled model, too, is a far better base to work on for your final paint finish than one with cracks or gaps between the various components.

Start by cutting the stub spar and cementing this accurately in the fuselage slot. Check that this stub spar has the correct amount of dihedral on each side, making up a special template for this job, if necessary. Then offer up each wing in turn and, by a process of trial, trim the root of the wing panel until it fits snugly and properly against the side of the fuselage. The wings can then be cemented in place and should again be checked for correct dihedral.

Most wings on modern aircraft have a fillet between the actual root and the fuselage. This is often difficult to duplicate on a model without looking amateurish. If you have any doubts as to your ability to produce a good fillet, omit it entirely. The model will look better than one with an obvious putty-like fairing, quite out of scale.

The actual shape of the fillet at the trailing edge junction should be cut from card and stuck in place. The fillet itself can then be built up of a thick paste of model dope and " filler " mixed with very fine sawdust. The " filler," in this case, need be nothing more elaborate than good quality baby powder or talc. Build up, layer on layer, until the required shape is produced. Never try to produce the whole fillet shape with one application of filler, as almost certainly this will crack or develop holes when dry. You can work on the other parts of the model while the fillet layers are drying.

Another " don't " is, do not use plastic wood. This usually contracts on drying, forms a very hard surface, which is almost impossible to work down smooth for the final finish and generally produces a poor job.

Assembly of the tail unit calls for care for these components are usually on the small side. If the tailplane fits on top of the fuselage, or in a convenient slot in the fuselage, this will be relatively easy and make a good, firm joint. The fin then cements in place on top.

On many modern aircraft, however, the tailplane is mounted on the fin. For a rigid assembly the fin should first be slotted into the fuselage, when tailplane and fin are assembled over a half joint, each slotting into the other. Use sharp tools for cutting these slots and work very accurately.

A common error is to get the tail unit out of truth with the rest of the model, so check the alignment carefully immediately after assembly and before the cement has had time to set. Prop the model up so that the wings are level and and use a set-square to check that the fin is truly vertical. Then check that the tailplane is square with the fin. Check, also, that the tail unit is square with the rest of the model in plan view.

The basic assembly is now complete and can be prepared for finishing by giving several coats of grain filler, allowing to dry between each and sanding or rubbing down perfectly smooth each time. Continue until the whole of the model has a perfectly smooth, matt appearance with no wood grain showing. With care, too, grain filler can be used to build up the tiny fillets between fin and tailplane or fin and fuselage.

Detail and Finishing

Before painting, detail lines can be scored into the wood to represent control surface outlines, panels, and so on. These should be marked out very carefully and scored with a sharply pointed instrument. The ends of the actual control surfaces, such as ailerons and elevators, can be cut with a razor blade, if desired. All scoring must be done without damaging the main surface of the model. Colours can then be applied, starting with the lightest colours first, working up to the darker colours later.

Failing spray painting, almost equally good results can be obtained with a brush, with adequate care. You need a good quality soft brush, not too large, which is always kept clean and supple. The surest way of getting a streaky paint finish is to use a brush with stiff bristles.

All finishes will be improved by a subsequent rubbing down and polishing, unless the colour scheme calls for a matt surface. Good quality silver dope can be brought up to an excellent metallic finish by polishing with metal polish. This takes time and effort, but is generally worth the trouble.

Ordinary aircraft dopes are quite suitable for colouring. These are available in a wide range of colours, many duplicating the actual colours used on full size aircraft. This is only to be expected, for many of the model aircraft dopes are, in fact, produced by full size aircraft dope manufacturers. Use well thinned down with the appropriate thinners and use up to eight or ten coats, as necessary, to get a good, smooth covering.

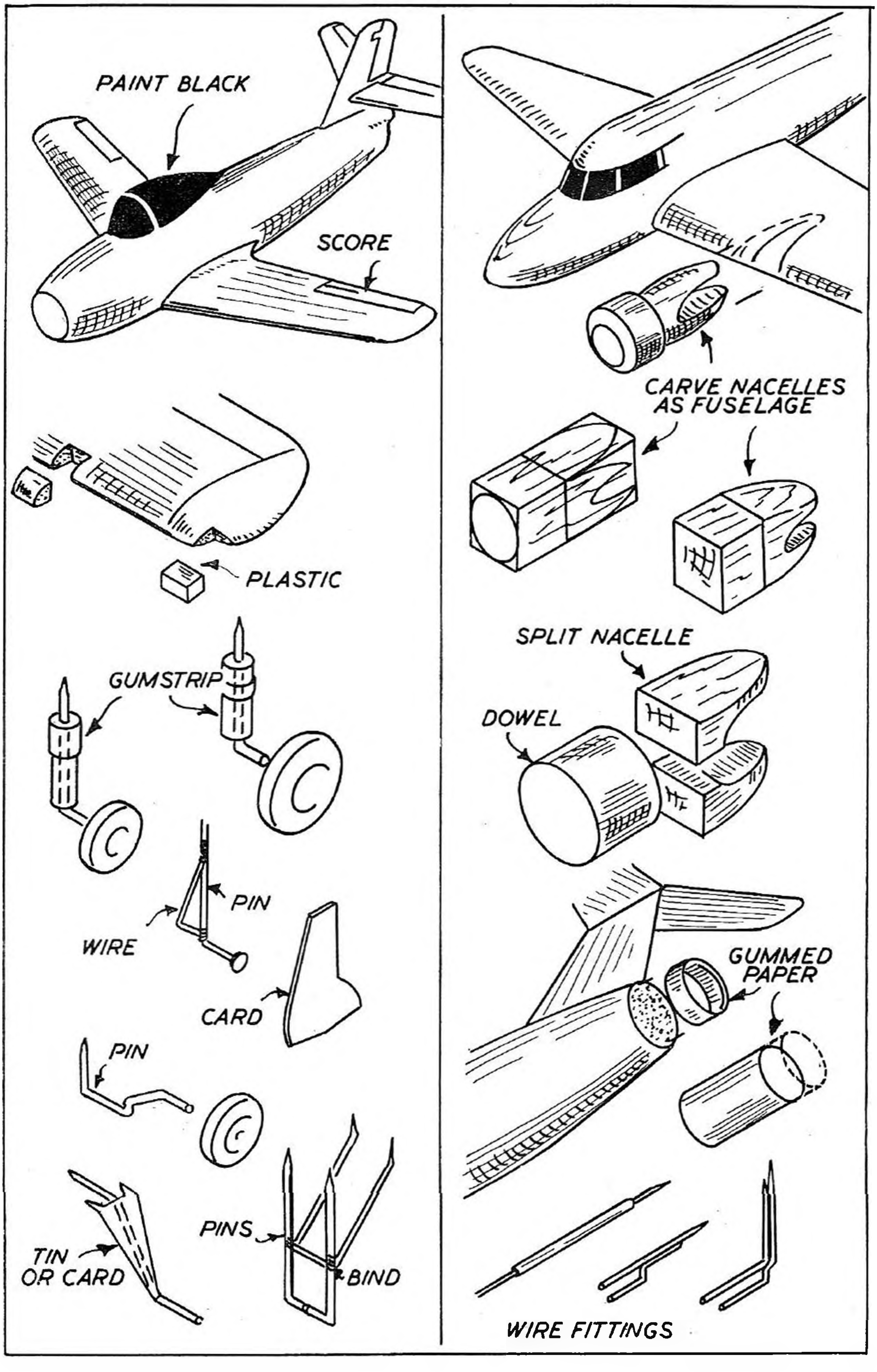
Cockpit enclosures can be painted matt black, outlined in silver. This produces a finished appearance comparable with that of a standard transparent canopy, just cemented in place—and better than a poorly trimmed plastic "hood." If you do use a plastic canopy, make sure that it is a very good fit, is clean and polished inside and out before you stick it in place, and use the minimum of thin cement to apply to save surplus cement from spoiling the finished appearance by oozing out around the joint line. As a general rule, too, when using a transparent canopy, hollow out and colour the interior of the cockpit.

As regards details, on small models the common tendency is to try to include too much in the way of small fittings, etc. The result is a caricature of the real aircraft rather than a scale model. Imagine just how much of this fine detail you would actually see when viewing the full size aircraft from such a distance that it appears the same size as your model and include just that amount and no more.

Undercarriage units are generally a nuisance. If they are to be fitted, use pins and wire and build up the correct leg thickness with gummed paper strip. This and similar details are illustrated in the sketches.

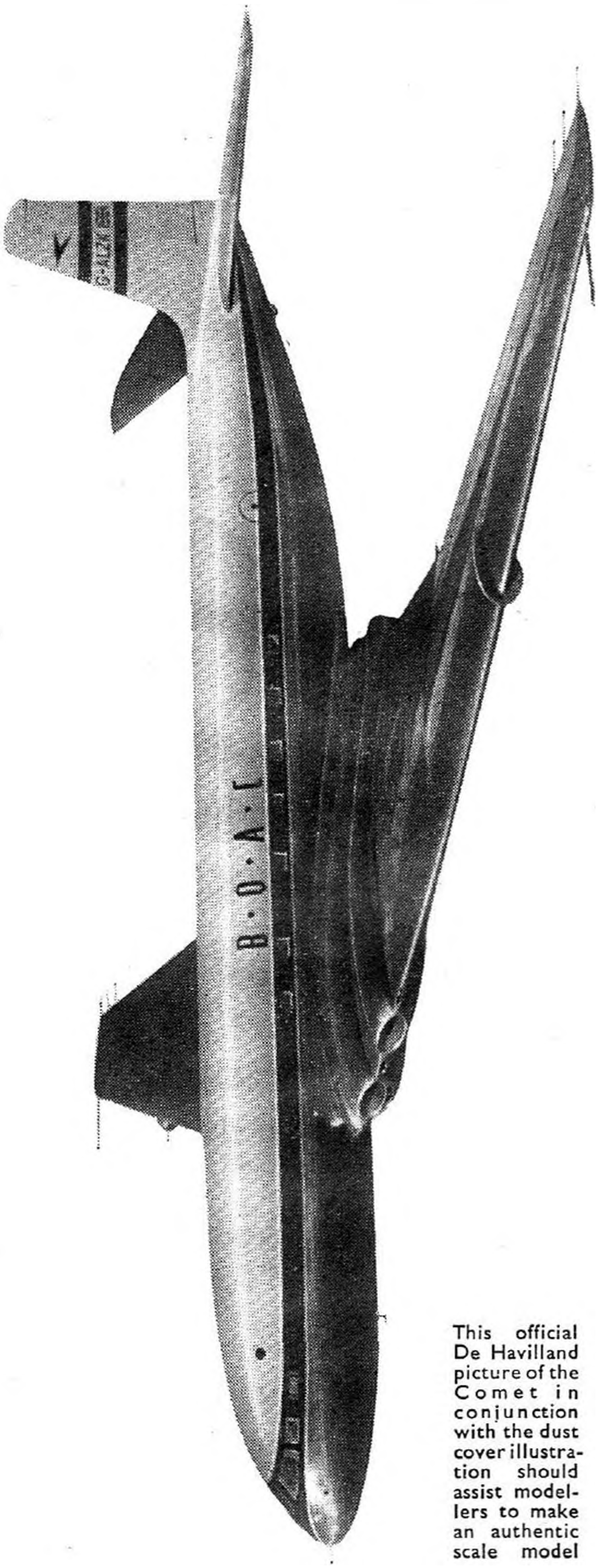
The sketches also show the method of treatment of multi-engine models. Basically, the assembly is the same, with the addition of the engine nacelles. These are, in effect, small fuselages and are prepared in the same way. They are shaped to conform to the aerofoil section and simply cement in place. In some cases it may be best to split the nacelle into a top and bottom portion, each shaped separately. The use of dowel for a radial cowling greatly simplifies this particular component.

Finishing your model is largely a matter of ingenuity. The simplest of materials will often give best results. For lettering and similar decoration, transfers, or cut-up transfer strip, is generally the best proposition, unless you are particularly skilful at hand lettering.


PAINT BLACK
SCORE
PLASTIC
GUMSTRIP
PIN
WIRE
CARD
PIN
TIN OR CARD
PINS
BIND
CARVE NACELLES AS FUSELAGE
SPLIT NACELLE
DOWEL
GUMMED PAPER
WIRE FITTINGS

SOLID SCALE DE HAVILLAND COMET

1/72 or 1/144 Scale

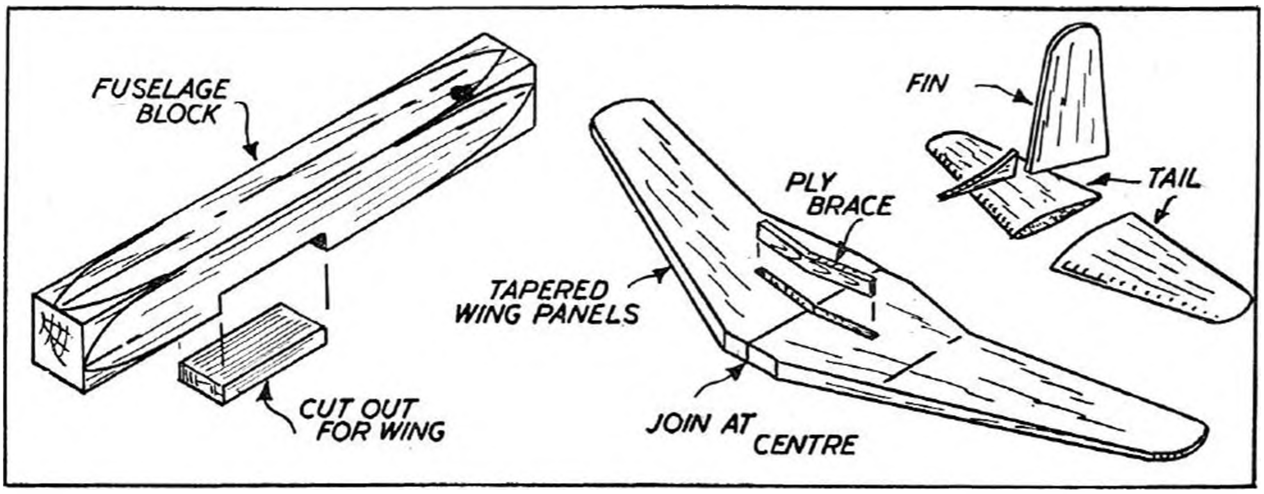


This official De Havilland picture of the Comet in conjunction with the dust cover illustration should assist modellers to make an authentic scale model

PLANS of this model as reproduced are for a 1/144th scale model, the wing span of the completed model being just over 9½ in. It will be relatively easy to use the same plans, re-drawing twice size, where necessary, to build a 1/72nd scale solid. To save a lot of trouble in re-drawing, wing, tail and fin outlines for 1/72nd scale are dimensioned on a separate illustration. The choice of which model to build is entirely up to you.

Only brief constructional details are given. Study the article on building solid scale models for further information. Start by cutting a fuselage block to size, marking out and then saw-cutting to plan and profile shape. As a guide, main wood sizes for the two models are tabulated at the end of this article. When cut to outline shape, the fuselage is carved and sanded to the correct circular section. Note that a portion of the block is cut out before carving to serve as a pick-up point for the wings.

The wings are made from two identical panels joined at the centre at the correct dihedral angle. The thickness of these panels should be tapered towards



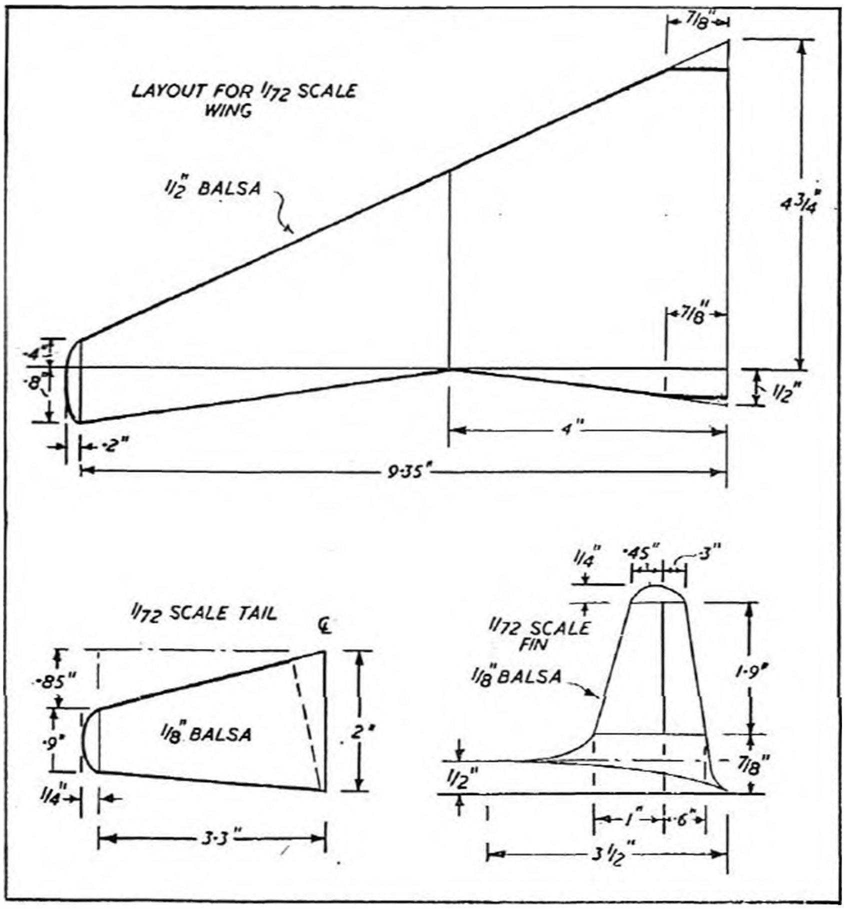
the tip before carving to aerofoil section. The centre section of the wing which fits in the fuselage cut-out is not carved. This is shaped after the wings have been assembled with the fuselage. Use a card template, as shown, to check the wing dihedral on each side before this joint is set. The addition of a stub spar of ply will considerably strengthen the wing joint.

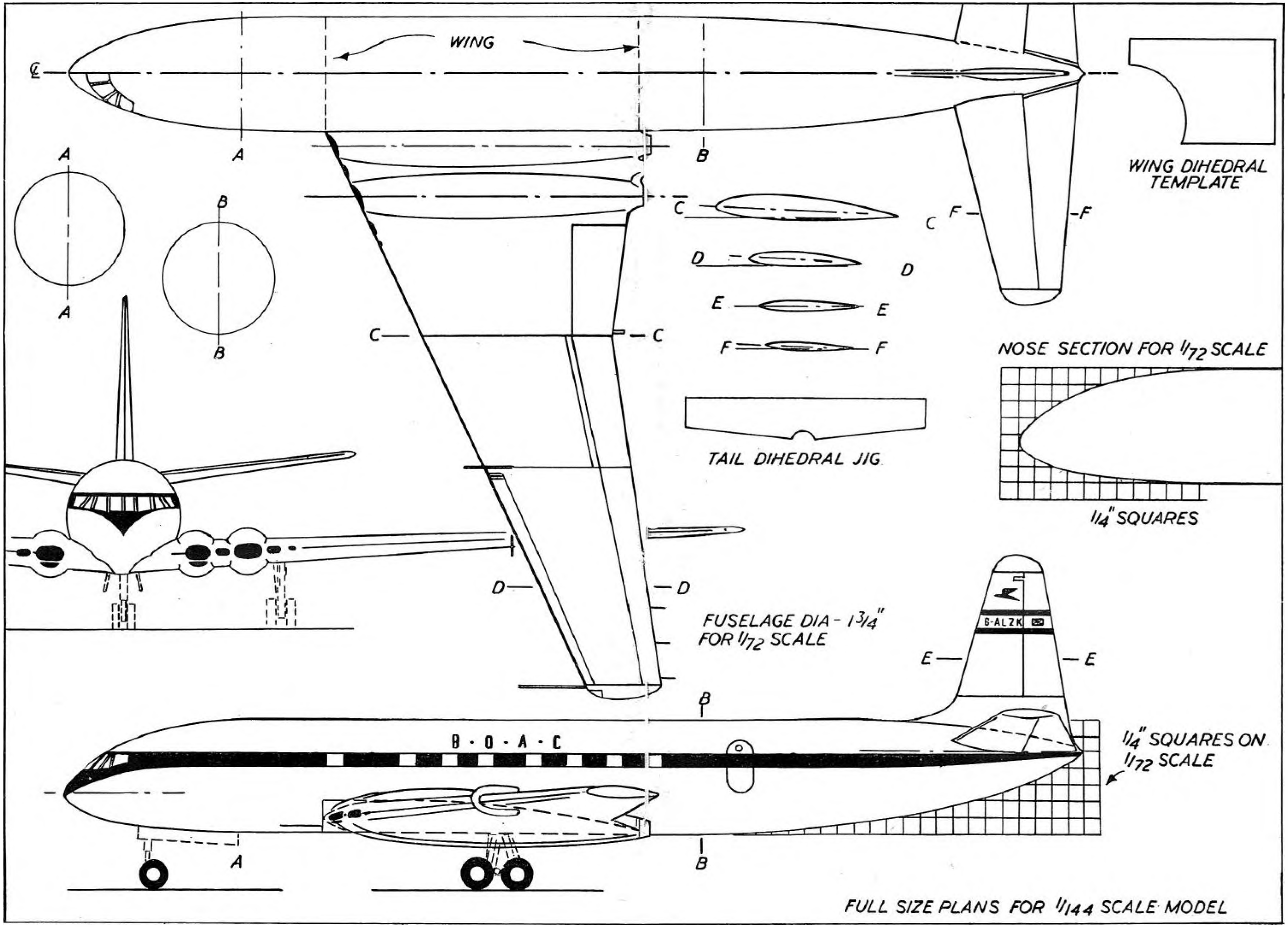
Nacelles are formed by cementing strips of balsa on top and below the carved wing in the appropriate places. When set, carve and sand to the required shape and section. The actual tailpipes can be made from dowel or rolled paper tube, cemented in place. Small fillets between the tailpipe assembly are cut from scrap sheet balsa.

Use a template again to check that the two tailplane halves are assembled on the fuselage at the correct dihedral angle. Note, also, that the tailplane has a positive angle of incidence. The fin is simply cemented directly on top of the fuselage,

Fine details can be added to the finished model, such as score lines to outline the control surfaces, flaps, etc. The boundary layer fence on the wing can be cut from card. Cement into a slit in the leading edge in the position shown.

If an undercarriage is to be fitted, the legs can be made of wire wrapped round with gummed paper. Large pins will probably be suitable for the




WING
A
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D
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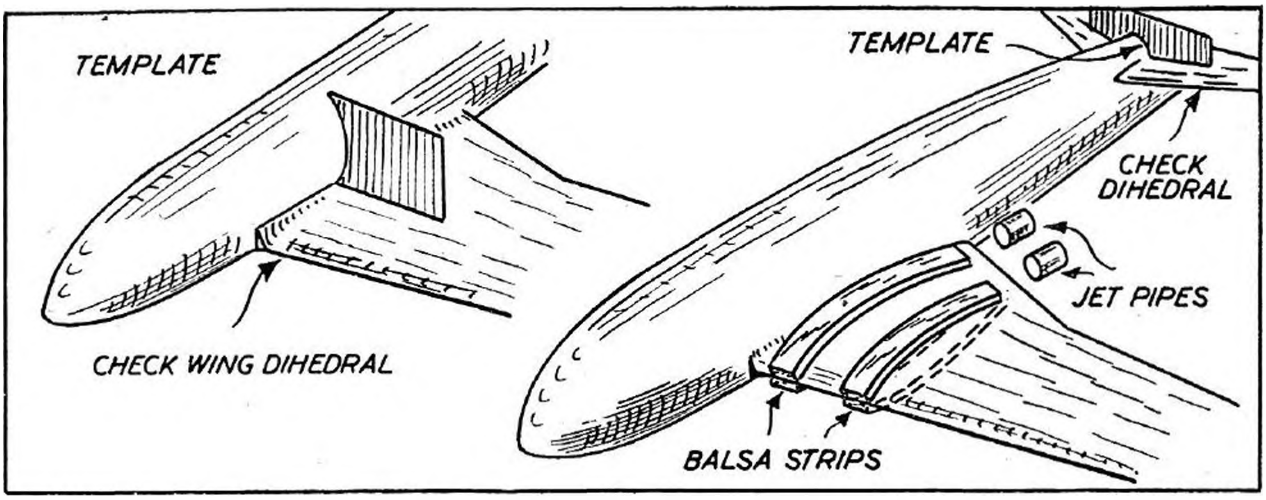
D
C
F
F
WING DIHEDRAL TEMPLATE
TAIL DIHEDRAL JIG
NOSE SECTION FOR 1/72 SCALE
1/4" SQUARES
FUSELAGE DIA - 1 3/4" FOR 1/72 SCALE
G-ALZK
E
E
B
B·O·A·C
A
B
1/4" SQUARES ON 1/72 SCALE
FULL SIZE PLANS FOR 1/144 SCALE MODEL



1/114th scale model. There are two nose-wheels and four main wheels on each side. Undercarriage doors can be cut from card and cemented in place.

Colour scheme of the completed model is quite straightforward. The whole of the top of the fuselage, including the fin, is white. The rest of the aircraft is metallic, i.e. silver doped. Dividing the two colours is a dark blue strip running along the line of the cabin windows. This can be outlined with a ruling pen and carefully filled in with a brush, or you can use blue transfer sheet, cut to appropriate size and shape. The small lettering can be done with a mapping pen.

To produce the best model, you should get hold of as many photographs of the full size aircraft as possible as this will often show shapes more clearly than a plan or drawing. The main value of a drawing is in supplying outline shapes. Get these right and your model is already half-way to being a success.

If you have to scale up the fuselage drawing for the 1/72nd scale model, duplicate the nose and tail sections by drawing a series of $\frac{1}{4}$ in. squares and copy the required outline from the plan. The portion of the fuselage between sections A and B is purely cylindrical. The diameter, in the case of a 1/72nd scale model is $1\frac{3}{4}$ in.

MATERIAL SIZES (in.)

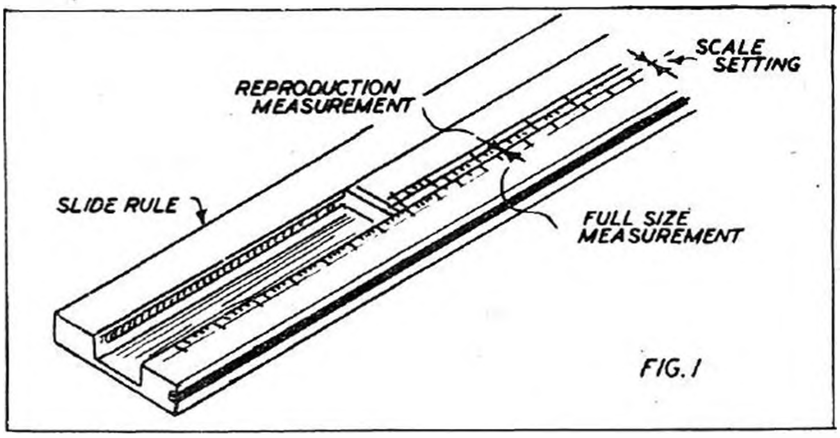
Component	No. Reqd.	1/144 Scale	1/72 Scale	Material
Fuselage ...	1	$7\frac{3}{8} \times \frac{7}{8}$ sq.	$10\frac{1}{2} \times 1\frac{3}{4}$ sq.	Balsa or Obeche
Wing Panel...	2	$\frac{1}{4}$ in. sheet	$\frac{1}{2}$ in. sheet	Balsa
Tail ...	2	$\frac{1}{16}$ in. sheet	$\frac{1}{8}$ in. sheet	Balsa
Fin	1	$\frac{1}{16}$ in. sheet	$\frac{1}{8}$ in. sheet	Balsa
Nacelle Strips	8	$\frac{3}{8} \times \frac{1}{8}$	$\frac{3}{4} \times \frac{1}{4}$	Balsa
Nosewheel	2	$\frac{7}{32}$ diameter	$\frac{7}{16}$ in. diameter	Hardwood
Main Wheels	8	$\frac{1}{4}$ in. diameter	$\frac{1}{2}$ in. diameter	Hardwood
Wing Joiner	1	$\frac{1}{16}$ ply	$\frac{1}{8}$ ply	Ply

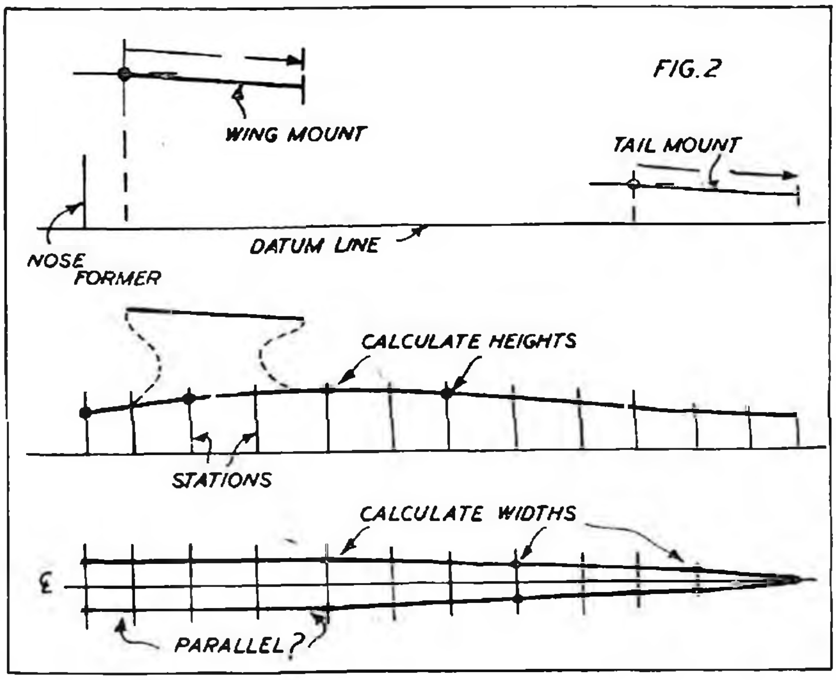
SCALING UP DRAWINGS

In model journals plans are, of necessity, usually reproduced on a reduced scale. More often than not the original full size drawing is so proportioned that it does not reduce down by some simple scale. Hence the process of re-drafting full size drawings from the magazine plan can become both tedious and lengthy. In some cases not one dimension is given on the plan reproduction and it becomes almost impossible to determine the true scale for a start ! Yet a considerable number of people do build models from magazine plans and so any hints and tips of scaling up such drawings should be most welcome.

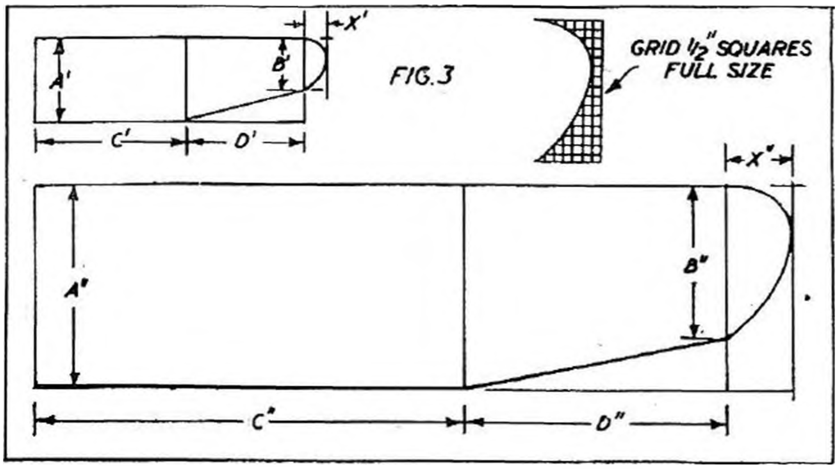
In the first case, if you are preparing working drawings from a small scale reproduction of a plan, you do not need a very elaborate drawing. The main outlines will suffice, together with any basic parts enlarged to full size. If you *must* work from an elaborate drawing, then your best bet would be to buy a full size plan, if available. The time spent in redrawing will be worth much more than the cost of such a plan.

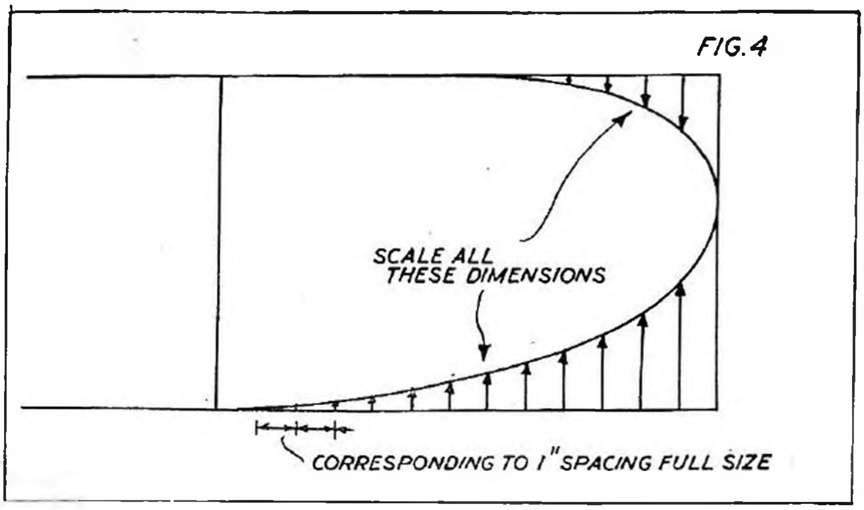
Another tip is to make your working drawings on good quality tracing paper—the kind of paper that looks more like tracing linen than paper. This will be quite tough and reasonably durable. At the same time, the surface being slightly greasy, you can work right over the drawing without further treatment and no parts will stick down to the plan.





Your approach to the drawing then depends on the type of original you have to work from. If this is to some definite scale, say one-third or one-quarter full size, then re-drafting will be comparatively easy. However, first check that the plan reproduction is exactly to the scale specified. Blockmakers usually claim a certain tolerance in reproducing drawings and it is possible that the final reproduction is just that much out. Not much, perhaps, but enough to throw the stated scale slightly out. You must then treat the drawing as one of





" unknown scale " and first find the actual scale. The scale of any drawing can readily be found provided one dimension is given on the reproduction. Make sure that this dimension is one in keeping with the scale, however, not, say, a dihedral measurement on a part of the drawing not to scale.

Suppose, for example, one particular dimension on the reproduction is given as 9 inches. The actual value of this dimension, as measured on the reproduction is 3 in. Obviously the reproduction is one-third full size and you can readily duplicate any measurement by finding its value on the reproduction and multiplying by three. On the other hand, suppose the actual dimension was some odd number, like 2.8 in. The scale is now 2.8/9, or, each reproduction dimension must be multiplied by 9/2.8 to find the actual full size value. The simple way of doing this is to use a slide rule. Set up for a normal division, as in Fig. 1, when you can instantaneously convert (reproduction dimensions) on the upper scale to corresponding full size dimensions immediately underneath on the lower scale. You do not have to be an expert with the slide rule to do this. All you need is a slide rule, and these are cheap enough. Certainly if you go in for scaling up " unknown " plan reproductions, a cheap slide rule will become one of your most valuable instruments.

Once you have determined the scale in this way, of course, you can measure off any dimension and find its full size value. You then have all the information you want at your fingertips to re-draw the plan full size. But suppose there is not one dimension to help you determine the scale ? In that case you must look for some probable dimension (not actually stated) and use that for determining the actual scale.

Some people have used wood sizes, as drawn on the plan, to determine an " unknown " scale, but that is liable to considerable error. Some draughtsmen, particularly when drawing for small size reproduction, exaggerate wood sizes for the sake of appearance. Others are far from being meticulously accurate in drawing in wood sizes. They are more concerned with outline shapes and may guesstimate wood sizes. Errors are seldom very large, but they can exist. Measure up on wood sizes as a double check, but never as the only criterion.

You may know that the span of the model is quoted as, say 54 in. But this again, may be no help. This may be the projected span from tip to tip, the actual span as laid out on the plan, or the approximate span to the nearest inch. If, however, a standard component is shown on the drawing, such as a motor, provided you can find the dimensions of the motor to check against the drawing dimensions you have a starting point.

You should, in any case, be able to get a rough idea of the scale from a number of check points, such as those mentioned. See which one fits in with a consistent rib spacing, for example. Most designers space ribs at simple intervals, like 1 in., 1½ in., 2 in., 3 in., and so on. Similarly the wing chord is often worked out to a whole number, or at least a simple fraction following.

Where sheet construction is employed, such as in a fin or fuselage side, lines dividing the sheet are almost certain to be standard sheet width (3 in.) apart. With all this, and similar, evidence you should be able to find the scale in the end, or get so close to it as will make no difference.

Start the drawing with the fuselage. Draw a datum line corresponding to that on the reproduction. If no datum line is shown on the original plan, draw one in, truly horizontal to the rest of the drawing. Major proportions can then be laid out. For the purpose of illustration we will assume that it is a power model fuselage under consideration.

Fix the position of the leading edge with reference to the datum line and the front of the fuselage—either by stepping out a simple scale with dividers, or measurement-conversion - measurement in the case of an odd scale. Determine the wing incidence (if not stated on the plan, measure with a protractor or adjustable set-square) and project the bottom line of the wing mount back. Determine the length of this mount and mark off. Now repeat the same for the tailplane seating. You have fixed what are probably the two most important parts of the fuselage.

Now measure off the respective stations along the fuselage and erect vertical lines at each. You need not plot the height of the fuselage offset at each.

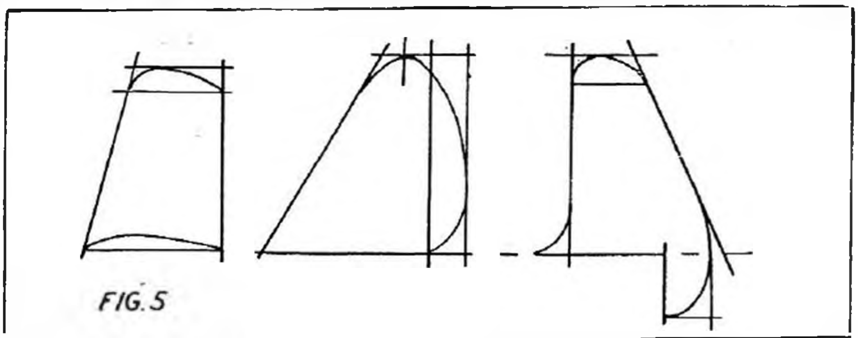


FIG. 5

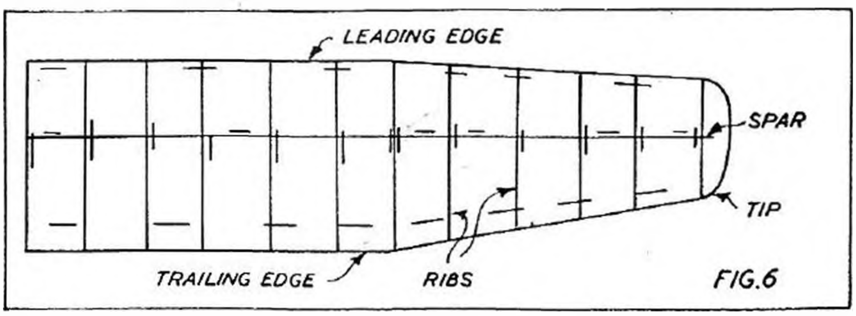


FIG. 6

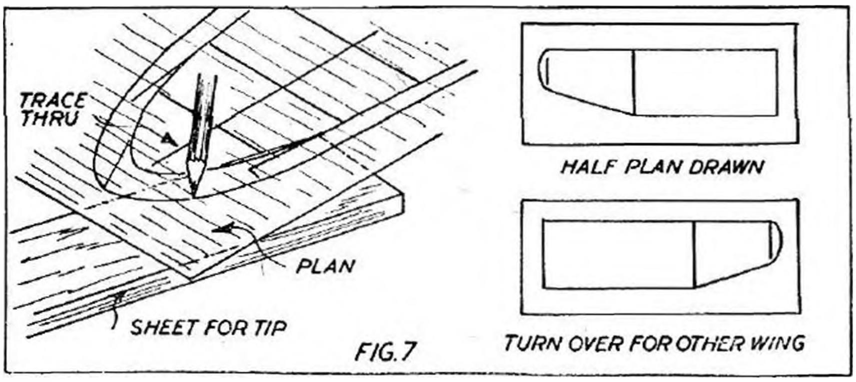


FIG. 7

Just a few along the length will be enough guide to draw in the full size outline. Use close stations over compound curves. The fuselage plan drawing follows quite logically in a similar manner, using a limited number of offsets about the centre line, scaled from the reproduction. In laying out your model, of course, you align the wood within the outline so drawn.

Wings and tailplane are best re-drawn by working to squared outlines as far as possible. Finish off the original outline in a squared tip, as in Fig. 3, and plot your scaled up outline from this. The remainder of the tip can then be sketched in within the measured boundary line, following the same curve by eye. If you want a more accurate reproduction, then lay out a grid of pencil lines over the original shape corresponding, say, to ½ in. squares on the full size drawing and re-plot the full size outline through corresponding points where the outline crosses the grid lines.

An alternative, and somewhat simpler method, is to lay out a series of ordinates as in Fig. 4, determining the true (full size) at each point, as measured off the reproduction, and duplicating on the full size drawing. Simply draw the final outline through these points. This is a very satisfactory method of reproducing curved outlines. Again, it will be noted, the outline is broadly enclosed in a simple rectangle.

Similar methods can be used for fin shapes, either "grid" or "ordinates." Or, if the fin shape is basically rectangular, re-draw in "squared" form as in Fig. 5. There is nothing at all difficult in this sort of work and it can be carried out quite quickly, especially if you are not specifically concerned with one hundred per cent. accuracy in duplicating curved tips, etc. For scale work, of course, you will have to work more closely to the original drawing and use one of the lay-off methods described above.

Probably the most difficult thing of all to re-draw full size from a scale drawing is an aerofoil section. If this section is of known type, say NACA 6409, then it should be plotted to the required size from a suitable table of ordinates. Many plans, however, include "own-design" sections which the modeller re-drawing the plans may feel he ought to copy.

Strictly from the flying point of view, there appears to be very little actual difference between the performance of sections which look similar. Even if the "unknown" section is re-drawn slightly inaccurately, therefore, it is not likely to affect the performance of the model much, if at all. Far better, if in any doubt, to use a known section which can be plotted from ordinates and has a similar overall appearance. Quite probably, if the truth were known, the "own-design" section shown on the plan is different from that actually used on the original model!

In other words, use your imagination to save time on scaling up, but, of course, do not overdo it. If you are intending to duplicate the model, then you want at least a reasonable fascimile to appear on your finished drawing.

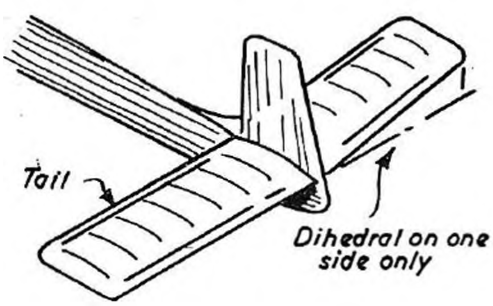
By the methods described, of course, you have produced only outline drawings to full scale. There remains the necessity of filling in necessary internal features. These, however, need take the form of nothing more elaborate than guide lines showing rib and spar positions. It is just as simple, and accurate, to align a spar or rib alongside one pencil line as between two—and two lines take more than twice as long to draw as one. Just a mark at intervals alongside the main guide line will indicate which side the wood is intended to be—Fig. 6.

Time can also be saved in other directions. Using tracing paper for your full size plan it is easy to mark out, direct, sheet for wing tips, etc., as in Fig. 7. The plan is reversed to produce the required trace line. This is less liable to error, and quicker, than making a separate tracing off the main drawing and then using *this* tracing to mark out sheet parts.

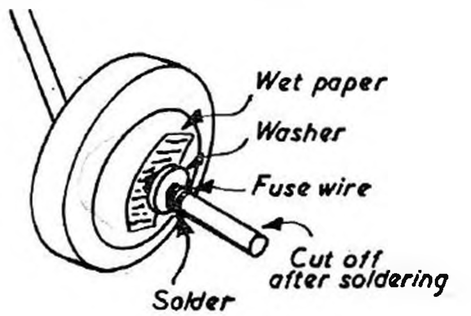
You need, also, only complete the drawing of one half of the wing. After building this half wing, make sure that the surface of the plan is clean. Lumps of cement which have fallen on it can be peeled off quite easily. Then reverse the tracing for an identical plan of the other half of the wing. The pencil lines will show through quite clearly. The only objection to this method is that you have to wait for one wing half to set before you can begin construction on the second half. But that time can be accounted for by work on another part of the model.

If you have previously shied away from the task of scaling up magazine plans then we hope this short feature has shown how simple a job this can be. With practice it should take less than half an hour to produce a set of working drawings of any magazine plan, even if the scale is completely "unknown" to start with. The conventional draughtsman may wince at some of the short cut methods used, but in model practice these are quite acceptable. After all, the main object in producing a full size drawing is to build a model directly off it, duplicating the original within the limits of practical accuracy.

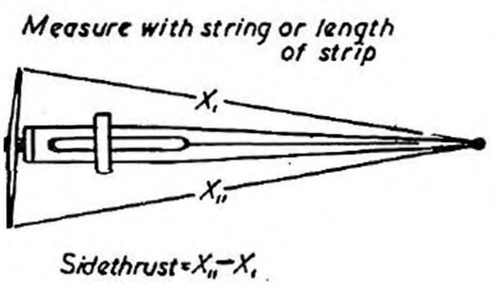
JUST TO REMIND YOU!



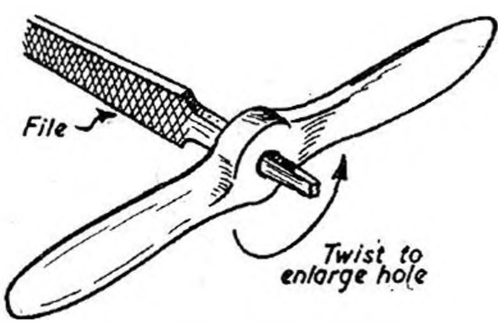
Dihedral on half tail gives safe turn



Wheel fix. Tear off paper after soldering



Check sidethrust by direct measurement



File tang makes emergency reamer

THE £ s. d. OF AERO-MODELLING

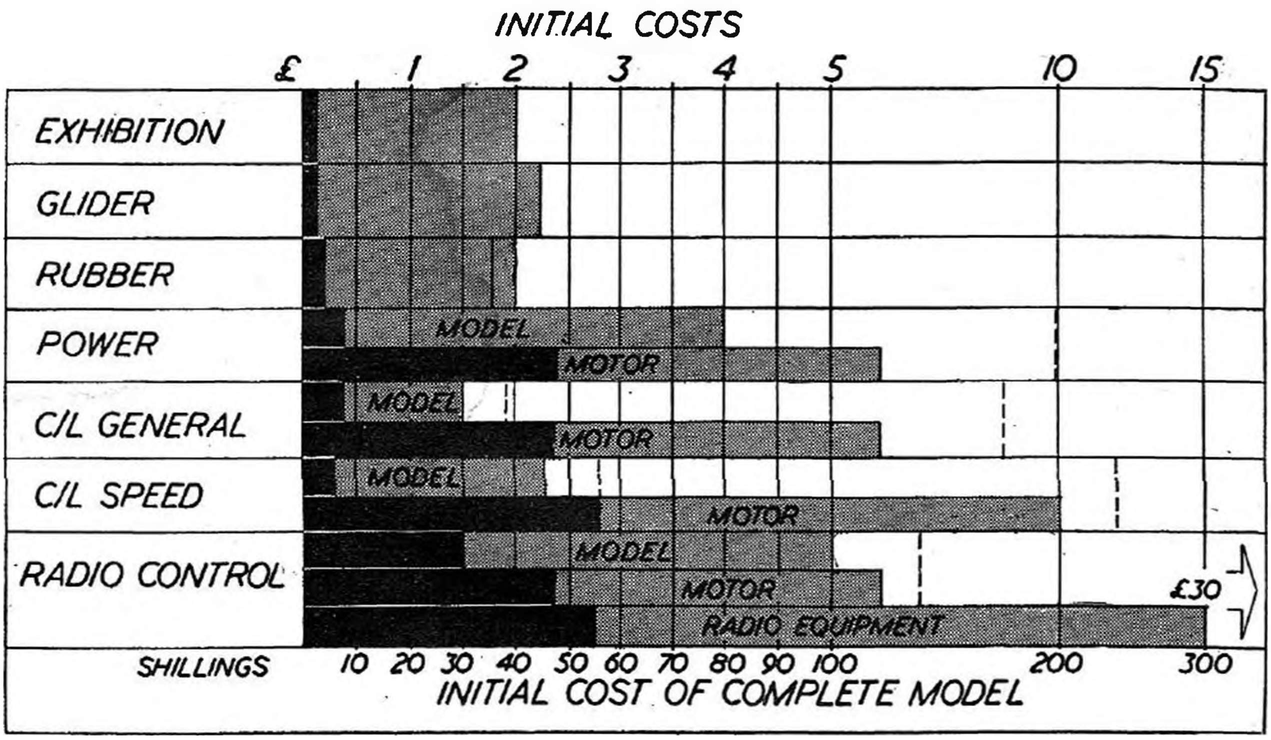
NOT so long ago aero-modelling used to be called the cheapest of hobbies, but times have changed and, in common with most other things, the price of aero-modelling goods has risen. At the same time the aero-modelling movement itself has expanded to include such developments as radio control, power model flying on an extensive scale, and so on, all in the "expensive" category. Even rubber model flying is no longer cheap, for contest requirements have demanded that more and more rubber be used in "formula" models which, together with the rise in cost of rubber strip, means that a contest motor may cost anything up to five shillings. Most leading rubber flyers seldom reckon to use a motor for more than three contest flights, and some even use a new motor for each competition flight. That puts the "operational cost" of a rubber model higher than that of any power model—even radio control!

However, that example is the exception rather than the rule. But since so few people appear to have any real idea of the respective costs of different types of models we have tried to analyse typical figures and set out the facts and figures in simple form as a guide. We have split these into "initial costs"—or the cash involved in producing the model up to the flying stage and then "operational cost," or the out-of-pocket expenses incurred in keeping the model flying.

Initial costs, of course, can vary a lot. The small model built from sheet and strip will cost far less than the large, elaborate kit model, even if both are gliders or, say, power models. So we have a wide range of variation with all types.

Broadly speaking, however, gliders and exhibition models are the cheapest of all types to build. Much of an exhibition model—"solid" or built-up scale—can come from "odds and ends." Or, of course, you can go on buying accessories and ready-made items and put the cost up considerably, depending on the size and scope of the model. The more you are prepared to make yourself, the more you can save in hard cash.

Gliders are the cheapest of all flying models to build. Half-a-crown will



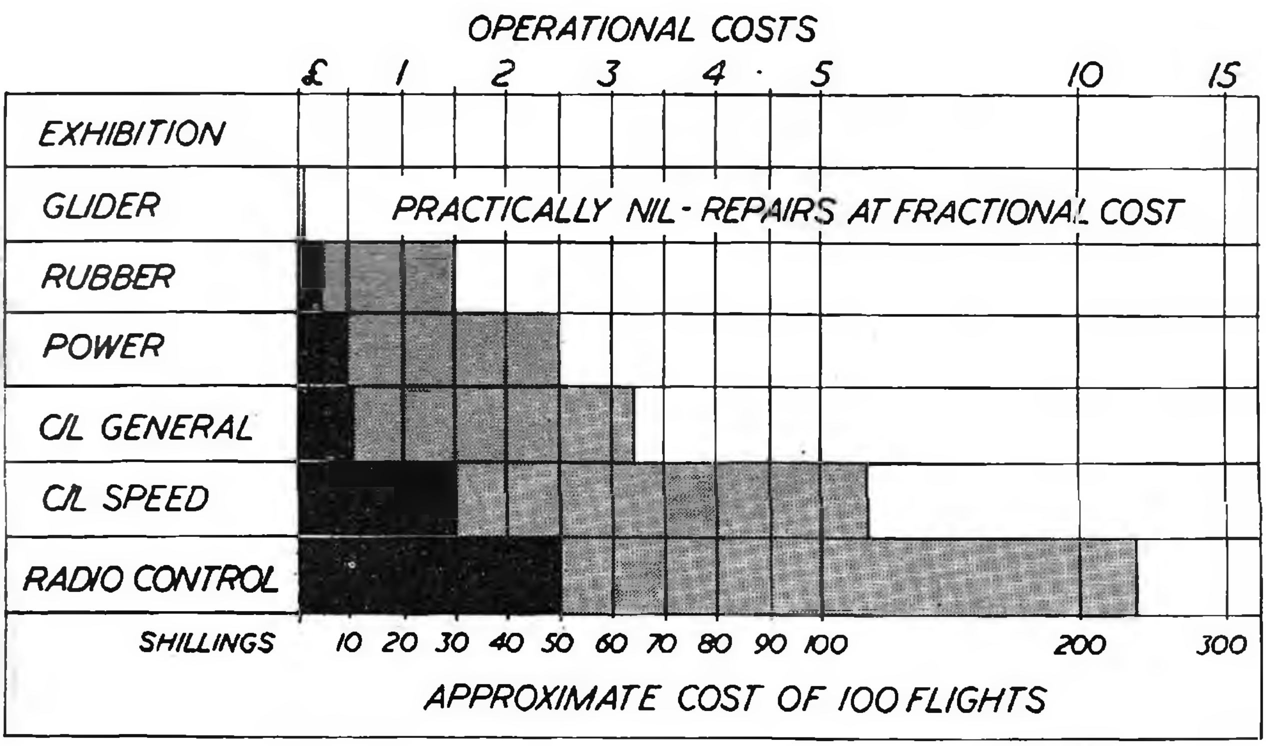
buy a kit for a small glider, or you could make a somewhat larger model from sheet and strip for about the same amount. Rubber models come next. Initial cost will be slightly higher for, even with the same airframe, you need a propeller and rubber as minimum "extras." On the other hand, "top" cost of a rubber model need never exceed thirty shillings or so since size is really limited. Rubber models larger than Wakefield size have strictly limited use. Gliders, by contrast, are sometimes built up to twelve feet span or more, when material costs mount alarmingly. You can easily spend ten shillings or more on cement alone for a "giant" model. The cost of an average A.2 glider should not exceed about twenty shillings, built from stock materials.

Power modelling can be relatively inexpensive, if you keep to the small models with small motors. Once you go up into the larger sizes, costs mount. Currently the cheapest engine costs around fifty shillings—so for the power plant alone you have to lay out the equivalent in materials for a couple of medium size gliders or Wakefields. Similarly with control line models.

Once you start specialising in power models you will generally find cost going up again. You will probably want larger, more expensive, motors. The actual cost of the model may stay relatively low, but power plant and equipment cost tends to mount. The same degree of specialisation in rubber or glider does not necessarily add to cost.

Radio control flying is, of course, the most expensive of all as regards initial cost. You will be lucky in the first place if the model itself costs less than thirty shillings and almost certainly one of the larger motors will be called for. On top of that add the radio gear which, relatively inexpensive if home made, will still cost a minimum of about three pounds. If you want the best, and most elaborate, in commercial equipment you might well find yourself spending up to thirty pounds for the radio unit alone! You will be lucky, in fact, to complete a radio model at an initial cost lower than about six pounds and ten pounds would appear a good average minimum. This does, without doubt, put radio flying in the "expensive" class.

Operational costs are rather more difficult to analyse. You can fly a



glider all the year, for example, with hardly any out-of-pocket expenses. On the other hand, you may damage it badly first time out, calling for extensive repairs. On average, however, much of the material for repairs comes from surplus or scrap stock and the additional purchase of a tube of cement should keep the model going for a hundred flights.

Rubber flying will be more expensive, for you have the same natural hazards as with gliders, plus a vulnerable propeller and a rubber motor, which must be replaced periodically. Rubber costs should not be high, if you are flying for fun. Properly treated, a rubber motor will last for months and not " tire " if it is never wound beyond about three-quarters full turns. In contest work, however, you may well use nearly two pounds of rubber in completing one hundred flights—say five contests and the rest of the flights in trimming, ten per cent of these trimming flights being on " full turns."

Power flying is going to cost you fairly dear on fuel. Using commercial fuel you may find yourself spending thirty shillings or so for a hundred flights for this alone. You can save by making up your own fuel, if you wish. But ready " bottled " fuel is so convenient. Repair bills are likely to be higher —especially propeller replacements, if you are using wooden propellers. A good average " life " for a wooden prop. is ten flights. Plastic propellers are generally far more durable. Happily, propeller costs are now very reasonable and some fifty per cent of what they were a few years ago.

Control line flying will use rather more fuel—and probably break more propellers. Use a good plastic prop. to economise whenever you can. For safety's sake, too, you will have to replace the lines periodically. It is false economy to persist in flying with old, kinked lines. You may well write off the whole model and incur another " initial cost " ! Speed control line flying will be at least twice as expensive, for you will be using more expensive fuel mixtures, breaking far more propellers and probably wasting more fuel than is actually used on actual flights.

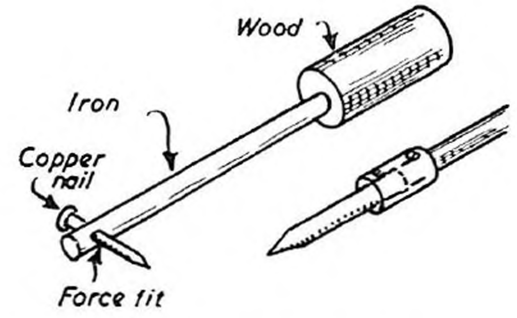
Radio control has all the normal expenses of power flying a model of similar size, with a higher fuel consumption due to longer motor runs, plus the added cost of battery replacements. Actuator batteries need frequent replacement. The radio batteries need quite a number of replacements over the course of one hundred flights, depending on the type of radio gear used. Larger batteries generally represent an economy in the long run, even if the initial cost of these is higher.

If we go over the figures again, glider flying should cost next to nothing, provided we are lucky in avoiding crashes. A sports rubber model we should be able to operate at a figure of between one halfpenny and a penny per flight at the outside, although, if we are contemplating contest work with, say, a Wakefield, we could reckon on five shillings a major contest as an average for rubber replacements, over the whole season. Reject motors, used in the early competitions, will still have their uses for trimming purposes.

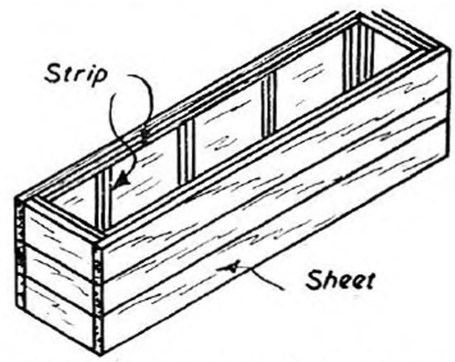
Power flying, well, we would be lucky to get by with less than about three-halfpence per flight. Probably the average will be nearer twopence, even if we do avoid all major damage. Make it twopence to threepence per flight for average control line work. Control line speed flying, with an eye on contest work, may well cost up to one shilling per flight, and even more if you break too many propellers !

Every time that radio model takes the air, too, that surely is going to cost sixpence, at least, with home-mixed fuel and a safe landing. And none of these figures take into account " wastage " in ground testing and similar necessary operations before the model is reckoned fully airworthy and capable of consistent flights. Even the rubber modeller is not immune from wastage. It is not unknown for a batch of rubber to prove useless for powering the model. It may break up when being pre-wound in the approved manner, for example.

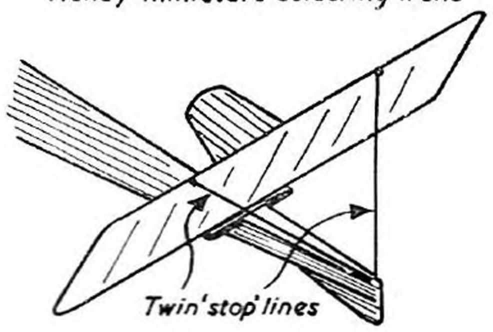
The one flight cost figure we have still to add in is that for " Jetex." Initial cost of the model is similar to that of a small glider. " Jetex " engines themselves then range in price from 13s. 4d. upwards. Fuel charges, gauze replacements and wicks, average about threepence to fivepence per flight, depending on the size of the "Jetex" unit involved. Many people, faced with the plain fact that a " Jetex " unit uses a charge per flight and ten charges cost so much, immediately think in terms of " Jetex " as being very expensive. Compared with the other figures we have worked out above, they appear to fit in quite well. All flying involves certain " operational costs " which are quite inescapable, but that need not necessarily be a deterrent. If you find that these costs are rather more than you expected, or can support, then either change to a cheaper type of model or see just where " operational economies " can be introduced.



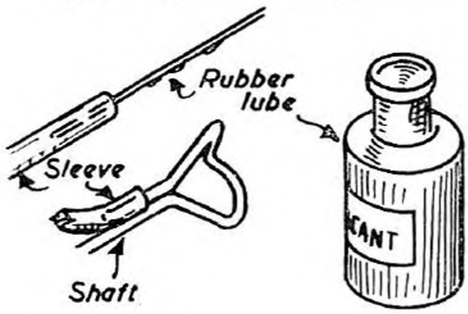
Handy miniature soldering irons



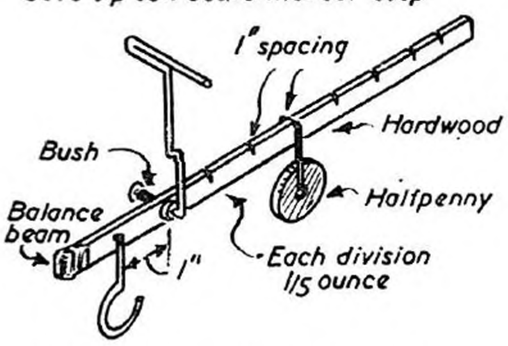
Model boxes from balsa sheet



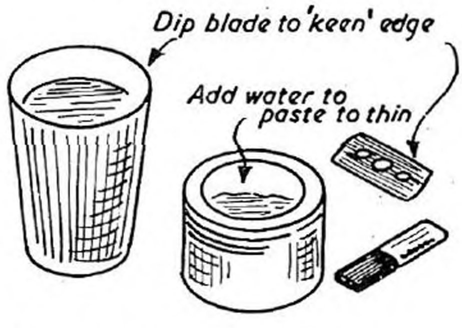
Safe tip-tail dethermaliser stop



Lubricate tubing. Goes on easier



The ha'penny beam balance



Water is aid to tissue covering

YOUR FIRST ENGINE

The purchase or receipt of your first miniature aero-motor is a thrilling moment. You have, in your hands, an example of precision engineering produced by tools costing, perhaps, many thousands of pounds. It is only by turning out these engines in their thousands that manufacturers are able to keep the prices down to reasonable limits. Shortly after the war when engines first reappeared on the British market modellers cheerfully paid up to ten pounds or more for a new engine. Now prices have dropped, on average, by more than one half.

Even after you have bought it, however, your engine can still prove expensive to you, if you do not treat it properly. You can be absolutely certain of one thing. The manufacturers know far more about that particular engine than you do, so read carefully all they have to say in the instruction sheet and make particular note of any "do's" and "don'ts."

Perhaps we had better start with the *selection* of your first engine. Unless you particularly want a certain size you would be wise to choose one of about 1 c.c. to 1.5 c.c. capacity. These engines are quite easy to handle, are not so touchy as the smaller "baby" motors, nor as powerful as a larger racing engine. Almost certainly, too, it will be of the diesel type which, as a self-contained unit, requires only fuel to operate. A "tricky" engine can be frustrating to a beginner, although it may always perform like a charm in the hands of an expert. A large, powerful engine can be dangerous. Almost certainly until you have got used to adjusting the controls you will get your fingers caught in a spinning prop. This seldom gives you more than a hard rap with a small engine. With a larger engine, however, you may get a bad cut from such an accident.

A second point of advice is to choose an engine of a well-known make. These manufacturers have their reputation at stake which they guard by a system of inspection and final checking so that no "dud" engine should get by to the retail shops. In addition, too, they can offer a complete range of spares and servicing throughout the life of that engine. To them, repairing a damaged or faulty engine is non-profitable, but they do it as a service to their customers.

If you have bought your engine second-hand and you are a true beginner, it might well pay to send it back to the manufacturers for servicing, particularly if you have any initial troubles in starting or running it. At least you will then know that any subsequent running troubles are likely to be your own fault—and something you can eliminate with practice.

Now, beginner or expert, you have to get to know any new engine by test running it on the bench or, what is sometimes called, a static rig. That is, you do not install a new engine in a model right away, but mount it on suitable bearers secured to a bench or a table or some similar stable object and give it a number of test runs. This process of "running-in" the engine serves a double purpose. Like a car engine, an aero-motor is stiff when new. It needs a certain amount of running before it will loosen up and develop full power. During this running-in period the moving parts sliding over one another polish and smooth the mating surfaces so that, in the end, the engine is operating in its most efficient manner.

Running time properly to "break-in" a new engine depends a lot on the initial fit of the various components. About half an hour's actual running time is an absolute minimum for most engines. This is not done in one long burst. The engine is generally run for short intervals at a start—no longer than one minute, gradually increasing the length of each run up to a maximum of three to four minutes. If the engine is fitted with a tank, then the duration of run from a tank-full of fuel will be about right for each run.

Perhaps when you start running-in, the engine will not continue to run out the whole of the tank without stopping. This is often another characteristic of a "stiff" engine. As the engine gets hot the parts assume an even stiffer fit, slow the engine and eventually make it stop. Running-in must continue until all these high spots are worn down. The more you test-run the engine the longer you will find it will run smoothly, without overheating and, incidentally, the greater the power it will develop. The difference in power output between an absolutely new engine and one which is properly run-in is often amazing. Sometimes power increases by as much as fifty per cent. A twenty-five per cent. increase is quite common. In terms of propeller speed, this often means an increase in r.p.m. of well over 2,000 with the same propeller from the start to the end of the running-in period.

Do not be afraid that you will wear out your engine by too much bench-running when new. Diesels in particular are very long-lived. Few are *completely* free in less than two hours actual running-in time and, after that, provided they are properly treated they seem to go on for ever. Some of the first production diesels to appear in this country after the war are still giving satisfactory service after some six years' use!

Some methods of setting up an engine for running-in are shown in Fig. 1. The engine must be bolted down to proper bearers which are rigidly mounted so that the assembly cannot vibrate. Never attempt to hold the engine in the jaws of a vice as almost certainly you will distort, and probably ruin, the crank-case. It takes very little time to do the job properly. Make sure that the hold-down screws are tight (always use nuts and bolts, never woodscrews) and that you have the necessary fuel and propeller.

If the engine is not fitted with a tank, then you will have to rig up a temporary one for bench testing. Almost any type of tank will do, provided you can locate it roughly on a line with the crankshaft of the engine. If the tank is above the fuel inlet it will continually feed fuel into the crankcase due to the action of gravity and thus flood the engine, making it difficult or impossible to start. If the tank is too low, the engine may not have enough suction to raise the fuel properly and again you will not be able to get it to run properly. Connect the tank to the engine with transparent fuel tubing so that you can actually see when the fuel line is full.

Now check over your propeller. If this is of the plastic kind, round off any sharp edges with a file or sandpaper. Die-cast propellers frequently have a " flash " or surplus material around the extreme edges which are knife-sharp.

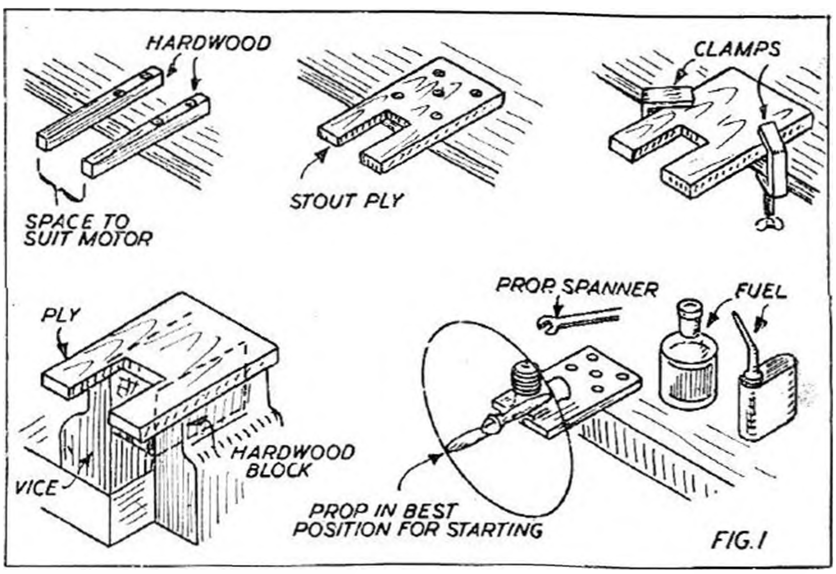
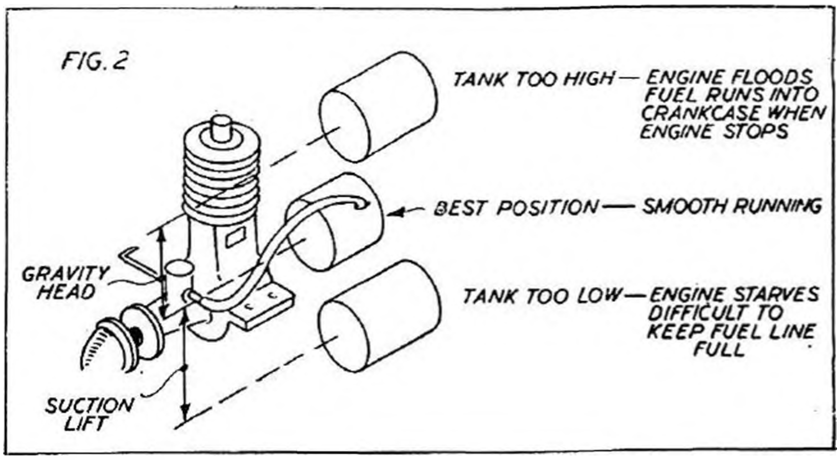
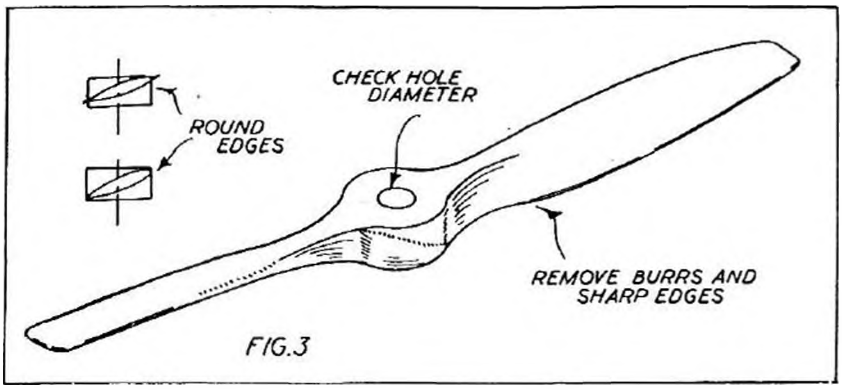


FIG. 1





This must be removed if you want to avoid cut fingers. Blunt off the tips of the propeller as well—Fig. 3.

The second important thing that bench running will do is make you familiar with the controls and behaviour of the engine. After you have made several dozen runs with it you cannot help but know how the engine behaves and you should have developed an infallible starting technique. After you have got over the excitement of the first few runs, for example, when the engine is running you can slacken off the compression and then increase it beyond the normal running position. Note the reaction of the motor in each case. Then remember these as characteristics of too little or too much compression.

Similarly, with the needle valve. Screw this down from the normal position when the engine is running and note how the engine behaves when it is starved of fuel. Open the needle valve up and see the reaction when too much fuel is fed in. Find the limits of both the needle valve and compression control beyond which the engine will not run at all. This will be invaluable practical knowledge for future operation of your engine.

But before you can do any of this you have, of course, to start the engine for the first time. Remember that, if it is a new engine of reputable make, it *will* start and run. It has been tested before it has left the factory. Most probably, too, the actual running settings will be detailed on the instruction sheet or a separate label attached to the engine.

A good many retail shops make a point of running new engines for their customers to demonstrate starting technique and check the actual settings. If this is the case, a little practice should soon enable you to duplicate the routine at home. If you have only the instruction sheet as a guide, however, you will have to work from that.

Set up the controls exactly as specified on the instructions. Most probably the compression setting will be almost right in any case, but you will almost certainly have to turn the needle valve to the recommended position. Then follow the rest of the starting procedure detailed, using the specified fuel.

As this is your first engine, do not be disappointed if you do not get instant success. A quarter of a turn out on the needle valve may make all the difference between an engine running or not. Similarly with the compression setting. But if you can only get the engine to fire in bursts, then you are halfway to mastering it.

The following details are not intended to over-ride manufacturers' starting instructions, but should be studied in conjunction with them, if initial success eludes you. They summarise a method used for starting diesels when the settings are absolutely unknown.

In the first place, open the needle valve to the specified setting (when not known, say $1\frac{1}{2}$ to 2 turns) and forget about this control for the time being. Place the finger over the intake tube of the motor and turn the propeller over enough times to *fill* the fuel line without sucking excess fuel through into the engine. Make sure that the propeller is in a convenient position for flicking over and then prime the engine with three or four drops of fuel applied through the exhaust directly into the top of the cylinder. Flick the propeller over gently and screw down the compression adjustment until definite resistance is felt. Never force the propeller over against such resistance. It means that the contra-piston is very near the top of the actual top of the piston and most of the space between the two is filled with fuel. *Forcing* the piston past this position may bend the connecting rod.

Now slacken off the compression setting about half a turn. Flip the propeller over *smartly*. Continue for about a dozen times, if no results are obtained. If nothing has happened by then, prime the engine again and repeat.

The engine should sound " wet " by then and will almost certainly fire. If it runs very rough—or the propeller starts to vibrate backwards and forwards, slacken off the compression still more. Adjust the compression until the engine picks up from rough firing into a short burst of power and then stops. Re-prime and start again, only this time as the engine settles into its short burst, increase the compression. You should, by this action, be able to find a compression setting where the engine continues to run.

If your initial needle valve setting is out, continued running will not be possible. With the compression in the running position, the engine will either starve out, or be over-fed with fuel. In the former case, it will stop abruptly. In the latter, with too much fuel, excess fuel will be thrown out of the exhaust ports and sustained steady running will not be possible until the needle valve is closed down slightly.

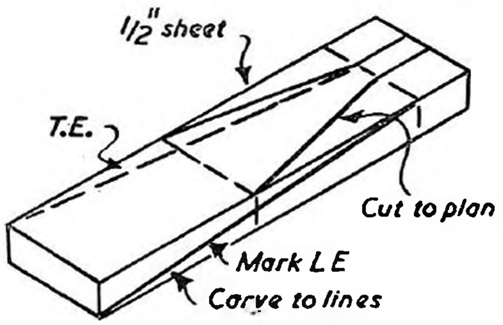
Once you have got the engine to run you can experiment with starting technique. Some motors respond best to " choking " (i.e. finger over intake and propeller flicked over several times) with compression slackened off and then smartly flicking. They then run in short bursts of power, which can be turned into steady running by increasing the compression once more. Other engines respond best to priming directly through the exhaust ports with " choking " restricted to filling the fuel line. Still others are best primed through the intake tube.

Practise, and you will soon find that starting becomes a matter of habit. You automatically do the right thing. The most common fault is to flood the engine completely, so that it is full of fuel and has no chance at all of running until that fuel is worked out. You can see the excess fuel in the engine by looking through the exhaust port. An engine suffering from lack of fuel, however, looks quite dry inside. For the purpose of starting control, too, you will generally find the compression adjustment far more useful than the needle valve. There is nothing particularly difficult about starting the modern miniature engine. It is just a knack which is readily acquired with patience.

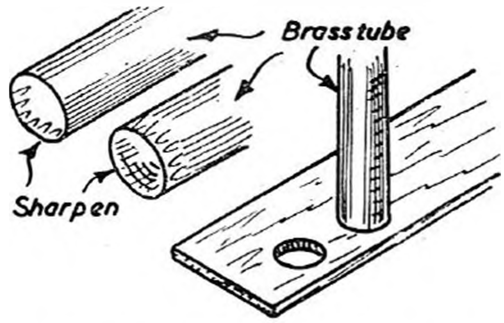
Glow motors are similar, but somewhat simpler. Here you have only one control—the needle valve. The general rule is to make sure that there is excess fuel in the top of the cylinder before flicking over with the glow plug connected—but not so much fuel that the motor is completely flooded and the plug filament extinguished. The larger the motor the more readily you can flood it by priming direct through the exhaust. It will start to run very roughly, but soon settle down.

Usual practice is to open the needle valve from the normal running position about half a turn (more if the needle valve has a fine thread adjustment), generously prime or choke and start by flicking the propeller over smartly. Allow the excess fuel to burn off or be thrown out as the motor starts to run roughly, then slowly close the needle valve down to the proper setting. Leave slightly on the rich side, if anything and then disconnect the glow plug. If glow plug and engine are correctly matched, and the fuel is satisfactory, the engine should continue to run steadily.

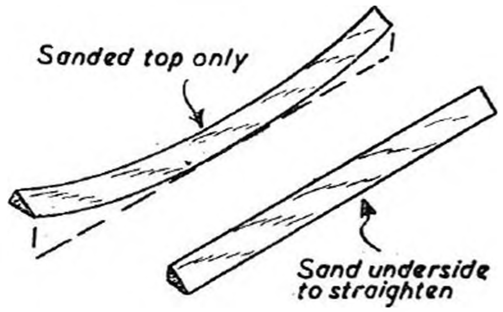
The final word of advice is that one minute's practice is usually worth one hour's reading. So get that new motor mounted on a test rig right away !



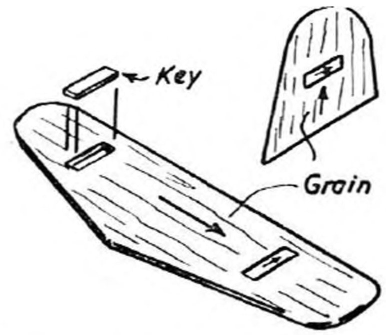
Prop. blades are easy from sheet



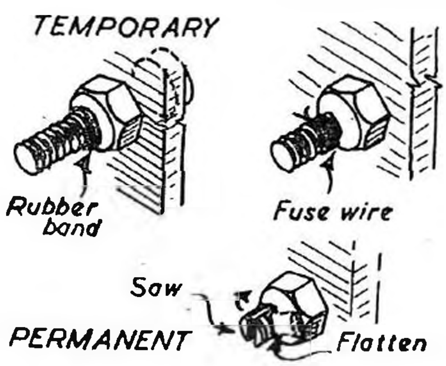
Brass tube makes handy punches



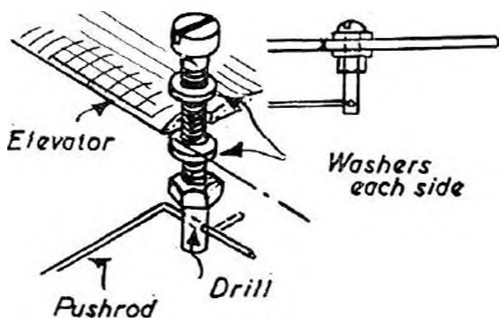
Sand both sides when shaping spars



Sheet tails strengthened with keys



All nuts should be locked



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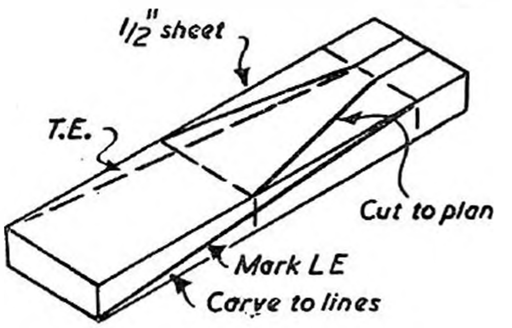

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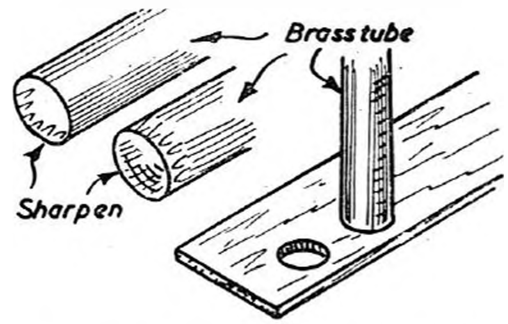

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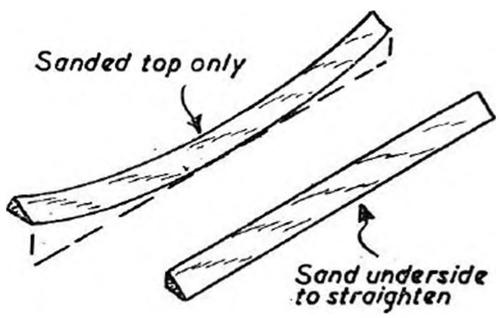

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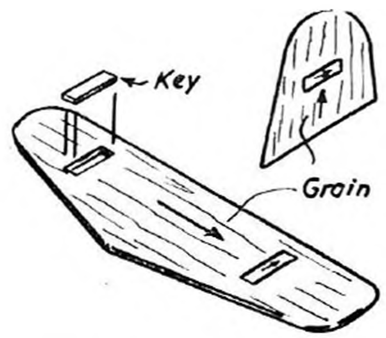
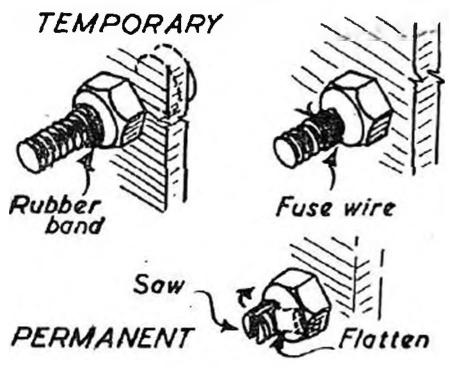


Sheet tails strengthened with keys



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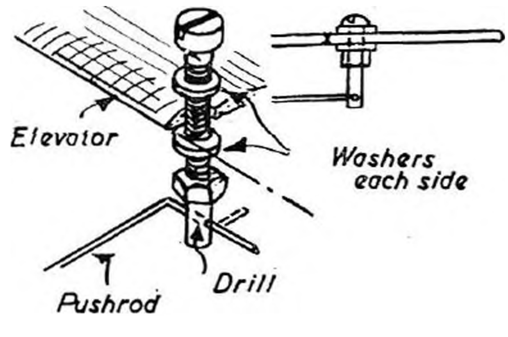


6 B.A. bolt makes simple horn

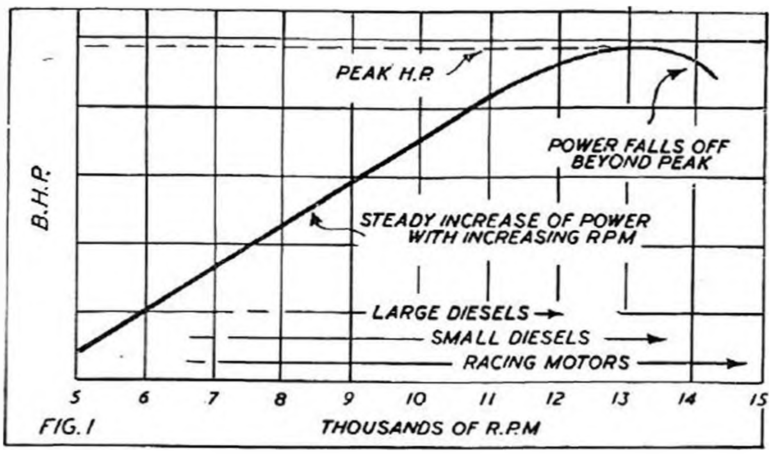
PROPELLER SELECTION

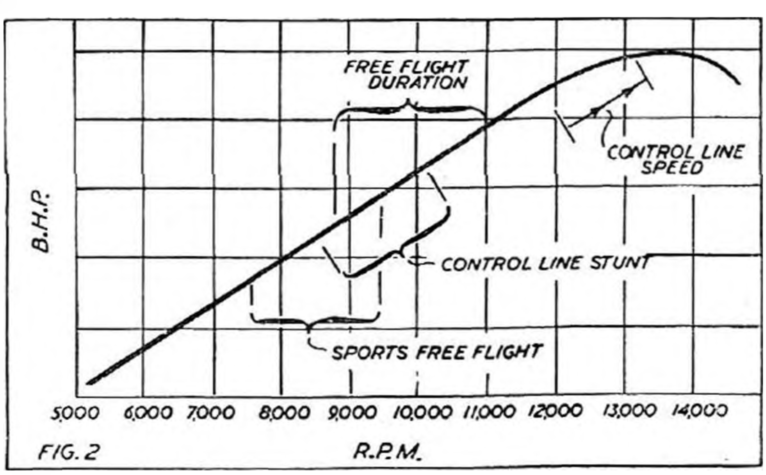
How to select the best propeller for a particular power model. That really is something of a problem. Fortunately present-day modellers are better off than some years ago, when motors were more of an unknown quantity and offered in far greater variety. By 1949, for example, something like one hundred different makes and sizes of motors had been produced, ranging from 0.2 up to 15 c.c. capacity. Each one really demanded a different propeller for best results and propeller prices were high and sizes not available in so wide a variety as today.

Now we have far less engines to choose from, which is a good thing in a way. In most cases, too, the manufacturers specify optimum propeller sizes for their engines and so eliminate much guesswork in this direction. However, no two engines of the same make are likely to be *exactly* identical in performance and this is particularly true of the smaller sizes, under 1 c.c. Here you can get considerable variation in power output from different " stock " engines, sometimes as much as fifty per cent. It follows what is a " best " propeller size for one is not necessarily the best for the other.

This is something to which there is no general answer. You would have to make an individual power output test on each engine to find the best " matching " propeller for a particular job and then cross check against flight performance—a lengthy and somewhat tedious job.

The propeller, ultimately, is a very important part of a contest model. If it puts too great a load on the engine it slows it up so that the resulting power output is but a fraction of that possible from that engine. On the other hand, it is possible to use a propeller which is too small, making the engine overspeed, again with a loss of maximum power. This will be fairly obvious if you study the power output curve of any typical engine.





A typical " power curve " is shown in Fig. 1. The power output (brake horse power) of the engine goes on increasing with speed (r.p.m.) up to a peak. A further increase in r.p.m. results in a drop in power. The shape of this peak varies with different engines. On some it is sharply defined, on others it is flat. The latter type gives more leeway when working at the top end of the speed range.

As far as model aircraft are concerned, the engine is used for one of five main purposes :—

(i) Free flight " sports " flying ;
(ii) Free flight duration ;
(iii) Control line stunt ;
(iv) Control line speed ;
(v) Control line team racing.

Now for sports flying, we are not particularly concerned with maximum power. Far more important in this case to use a propeller which lets the engine operate at a speed corresponding, roughly, to two-thirds of the speed associated with maximum brake horse power, as in Fig. 2. The engine usually runs more steadily and is less likely to be upset by a change in attitude than at some higher or lower speed. In other words, although we are not letting the engine develop its full power, we are getting consistent running with non-critical controls. The " recommended " size of propeller, as detailed by the manufacturers, generally holds the engine to this speed when new, but lets it operate slightly faster when fully run in. In other words, this " recommended " size is generally a good compromise between " Sports " and " duration " requirements for free flight models.

For duration flying, of course, we want to approach maximum power if possible, which means high speed running. Around peak r.p.m. some engines are " touchy," whilst others are not. A lot depends on the type of fuel used. It is possible to achieve high r.p.m. with " standard " fuels, but often running is a bit rough or erratic at peak r.p.m. For really high speed operation, a racing type of fuel is usually best.

As a general rule, though, it is best to keep below peak r.p.m. still, even for duration flying. The engine will, in any case, speed up in the air as the machine achieves forward speed and the load on the propeller decreases. Starting with the engine at peak r.p.m. (" peak " in the sense that the r.p.m. corresponds to peak power), peak power output may be passed in the air. This is more likely to happen to a control line speed model rather than a free flight model, however.

The main difference between free flight duration and control line speed operation is that the former requires a more generous propeller *diameter*—hence, low pitch.

To take a typical example as to how a " recommended " propeller size can be used as a guide for " best " performance, suppose the propeller recommended is 9 in.×4 in. pitch. For pure duration work, best results are usually achieved with a low pitch and a 9 in.×3 in. propeller would probably give better results than the 9 in.×4 in. once the engine has been properly run in. For sports flying, we could afford to slow the engine up slightly, either by increasing the pitch or the diameter. Considering the speed at which propellers turn, relative to the flight speeds of free flight models, pitch is already quite high enough. Perhaps this is control line influence, where the tendency is to use higher pitches. To slow the engine on a free flight model, therefore, we would recommend an increase in diameter, leaving the pitch the same.

Our two propellers now become 10 in.×4 in. for sports flying and 9 in.× 3 in. (or even 8 in.×3 in. for greater speed) for duration work. In other words, if you are after the very best performance—consistent, non-critical running for sports flying and best climb for duration work—slow the engine slightly for sports flying by increasing the diameter and speed it up for duration work by decreasing the pitch (and diameter as well, if necessary).

The one objection to this is that the new sizes of propellers are probably outside the range covered by plastic types. For sports flying a plastic propeller is to be preferred since it is far less liable to breakage. Where sheer performance is the main aim, however, a good quality, thin wood propeller generally has a slight edge over its plastic counterpart.

For control line flying, we have got quite different conditions. Models fly much faster for one thing and, theoretically require a larger pitch and smaller diameter propeller. Stunt flying requirements are similar to free flight sports, with a slightly higher pitch preferred. But as we have seen, "recommended" propeller sizes generally err on the side of quoting a high pitch and so are probably well suited to the job.

We see, for example, that an engine capable of a static r.p.m. figure of 13,000 with a 6 in. pitch propeller is capable of producing a speed of just 70 m.p.h. in the air. We choose static r.p.m. as the criterion as this is something we can actually measure, whereas r.p.m. in the air or actual flight r.p.m. cannot be determined. We have to allow for this in arriving at the basic formula for the table figures, basing this on known experience.

To get something better than 70 m.p.h., we have either to push the engine speed up with the same pitch (14,000 r.p.m. gives 75 m.p.h.), or get the same engine r.p.m. with a higher pitch (8 in. pitch at 13,000 is about 82 m.p.h.). This we can do by decreasing the diameter of the propeller in each case.

There are one or two simple " rules " here which are followed by many racing engines of 2.5 to 5 c.c. capacity. If the *sum* of the diameter and pitch are kept the same, a one inch decrease in propeller diameter is generally worth about 1,000 r.p.m. For example, if a 9 in. $\times$ 6 in. propeller produces 8,000 engine r.p.m., a 8 in. $\times$ 7 in. propeller (same " sum ") should give about 9,000 r.p.m., and so on. Generally speaking, too, an inch decrease in diameter is worth between 1,500 and 2,000 increase in r.p.m. for the same pitch.

These are only rough rules and cannot be relied upon for anything but an overall guide. They do, however, give an indication of what changes to make in searching for maximum speed.

It would seem logical, now, to go on increasing the pitch of the propeller and decreasing the diameter to get maximum speed. This is, in fact, the best approach. But there are two limits. We have got to have enough diameter (and thus blade area) left to produce the necessary thrust to overcome the drag of the model at that speed and also we do not want the engine r.p.m. to exceed the figure corresponding to peak power as again we will lose thrust. We should get maximum thrust at peak power or, in other words, be able to

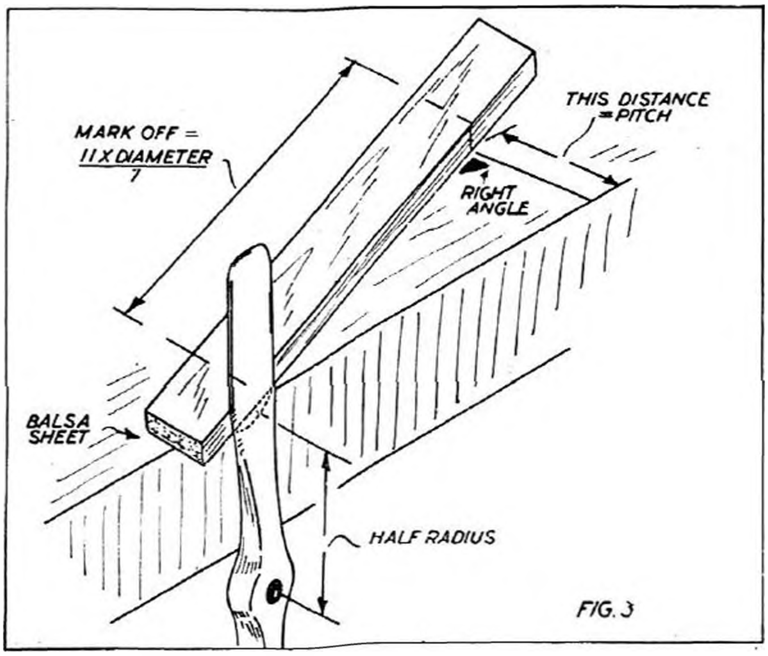


FIG. 3

use the smallest diameter propeller at peak power, consistent with the required thrust.

The final answer will be found in no text book or article. It is something that has to be worked out on the flying field, trying different propellers with greater and greater pitches, trimming the diameters accordingly until the best results are obtained. You can, however, keep a useful check on what you are doing by logging the propeller characteristics against measured static r.p.m., using the tables as a cross reference.

Since these tables are worked on actual geometric pitches, calculated at half the blade radius, it would be useful to check the pitch measurement of the propellers you are using. On manufactured articles, the actual geometric pitch may differ considerably from the stated pitch. For one thing the manufacturers may have determined the pitch in a different way.

How to measure the pitch of a propeller is shown in Fig. 3. Mark a point on the blade equal to half radius (e.g. $2\frac{1}{2}$ in. from the hub on a 10 in. diameter propeller) and hold the propeller flat against the edge of the table with this mark level with the edge. Mark off a distance equal to... $\frac{D}{2}$ (11/7× diameter) on a length of balsa sheet or strip and lay this straight-edge flush against the back of the blade, one mark corresponding to the centre of the blade. If the distance " X " is now measured at right angles to the straight-edge to the table edge, this will be the geometric pitch of the propeller.

Practical limits set a maximum pitch size for control line work. For speed models the highest pitch commonly employed is about 10 inches, although 12 and 14 in. pitches have been used. The higher the pitch, usually, the slower the initial acceleration and the greater the hazard of take-off. A maximum pitch for team racers is generally lower, remembering, also, that engine sizes are smaller. A typical figure is 7 in. pitch. Only the 10 c.c. size of racing engine can hope to cope with a 10 in. pitch propeller and produce an r.p.m. figure high enough to approach peak power.

APPROXIMATE SPEED DATA — CORRECTED TO NEAREST M.P.H.
(COMMERCIAL WOOD PROPELLERS)

	Static R.P.M. of Engine (× 1,000)											
Propeller Pitch (in.)	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
4 ...	17	20	25	30	34	38	40	44	48	50	53	57
5 ...	20	25	30	36	41	45	50	54	59	63	67	72
6 ...	24	30	37	42	48	53	59	64	70	75	80	86
7 ...	30	35	42	48	55	61	69	74	81	87	92	100
8 ...	35	40	48	55	62	70	78	85	93	100	108	116
9 ...	40	46	55	63	71	80	88	96	105	112	120	128
10 ...	48	52	63	72	80	90	98	107	116	125	132	141
11 ...	52	58	68	78	88	99	108	118	128	137	146	156
12 ...	55	64	74	85	96	108	118	130	140	150	160	171
14 ...	65	75	87	100	111	124	137	150	162	175	188	200
16 ...	75	86	100	115	130	143	158	172	187	200	—	—

SCOPE FOR EXPERIMENT

AEROMODELLING never really gets into a rut. There is no finality in model aeroplane design. Just as everyone begins to say that Wakefields, for example, have reached peak performance, along comes someone with slightly different ideas and provides scope for further research and development. A few years ago it was the return gear system. Nobody has yet decided whether the extra trouble is worth it, compared with single skein motors. Geared models are still in the minority, but in the hands of experts have put up some outstanding achievements.

In the main, duration model design seldom undergoes any radical change from year to year. Yet it is developing all the time. More often than not the changes are not immediately apparent—new methods of construction, for example, which give lighter, stronger airframes. There are the exceptions. The long fuselage Wakefield, for instance, which appeared with the change in the cross sectional area rule. Then there was the "Toothpick" style of glider which won the 1951 world championship event. Both these design layouts, unorthodox as they were, were brought to the attention of all contest minded flyers—if only for the fact that they had won major contests.

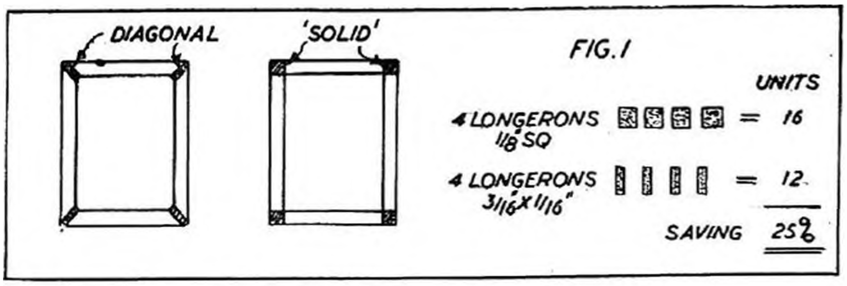
Even in the power model field designers are not content with the normal pylon layout. There have been some very successful shoulder wing duration designs, most of them of Continental origin whilst, more recently, we have seen a low wing duration model putting up a creditable performance in a contest. Others seeking better flight times have tried the high thrust line layout.

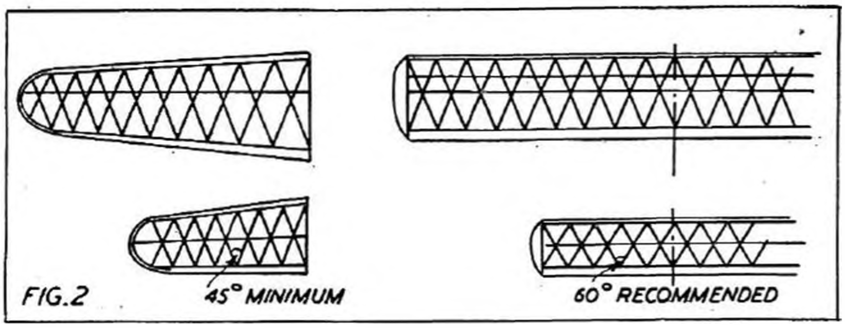
In other words, although the performance of contest models of the "orthodox" style has advanced, and is now amazingly high, none of the designers admit of finality in their designs. Most are fully prepared to try out new ideas to better the performance. Hence we still get those attractive "different" models.

Duration design usually sets the standard for the sports type of model as well, where sheer performance is a secondary consideration. Duration models have to be built to more critical standards. They have to be more stable, proportionately, for invariably they carry higher power. They require careful trimming, and the finer points of trimming emerge as a consequence. They also have to be rugged, and at the same time light. Strong but lightweight structures are evolved. Most of these desirable features find themselves incorporated in sports model design in one way or another eventually.

There is a world of difference between producing an unorthodox model which performs with the best of normal designs and a model which is "different" but has a comparatively poor performance. Both may attract equal attention when they appear on the flying field for the first time, but it is the *successful* unorthodox model which will be remembered. And to be successful in an unorthodox field usually means that considerable time has been spent in trial and error experiment to make things work out.

There have been some quite remarkable developments in structural design of recent years, too. First there was the diagonal longeron method of fuselage construction, applied particularly to slabsided fuselages of Wakefield models. This offered a considerable saving in weight over the orthodox "box" construction with square section longerons and at the same time was, if anything, stronger. Where it is necessary to build a strong fuselage down to minimum weight, diagonal longeron construction is now almost an automatic choice.





Its one disadvantage is that it makes the fuselage more difficult to construct. Some form of jig usually has to be employed. You can no longer build two sides in the approved manner and join them with spacers.

Here, undoubtedly, there is scope for further experiment. A method which gives all the advantages of diagonal longeron construction without its relative complication—or a simple, direct method of making a fuselage with diagonal longerons. Maybe you might even be able to save some more weight.

This constructional development is really confined to rubber models, and Wakefields in particular. There is seldom the same need to build a light, slabsided fuselage for other types of model. But one further form of unorthodox construction, developed initially for Wakefields, lends itself to every type of free flight model. This is geodetic construction.

In geodetic construction the ribs (in a wing or tail) or the spacers (in a fuselage) cross one another at some fairly generous angle (usually between 45 and 60 degrees)—Fig. 2. The result is, virtually, a series of "redundant frames." Surprisingly enough these can be built down to weights directly comparable with orthodox construction and the great advantage is that the resulting structure is absolutely rigid. In other words, it is warp-proof.

Geodetic tailplanes are becoming more and more common of rubber, glider, and power models. Geodetic wings are still in the minority and few people have troubled to build geodetic fuselages as yet. The advantages are there for the asking, but, of course, the structure is more complicated and takes extra time to build. Again there may be a simpler solution, offering the same basic advantages of rigidity. If there is, it will be most welcome, for the one thing most modellers would like is a truly warp-proof wing and tailplane on *any* model. Forms of Warren girder construction have been tried with success, also cotton bracing, but none of these, so far, are quite as rigid as "geodetic."

There is even scope for experiment with structural *materials*. We have gone on using balsa wood for so long that we now accept it as the only material for the majority of the airframe. Why not built-up metal spars on large models, for example, or the greater use of some of the modern plastic materials ? So far the use of such materials is almost entirely confined to detail parts and fittings. It might even be possible to discover a " tearproof " covering material, as light and rigid as doped tissue.

The experimental field most likely to appeal, however, is not in structures but in aerodynamic design. This is something still relatively unexplored, for the majority of modellers prefer to stick to the orthodox as then they can be assured of results. They follow, in other words, proven practice. The true experimenter sets out to establish new " practice " to follow.

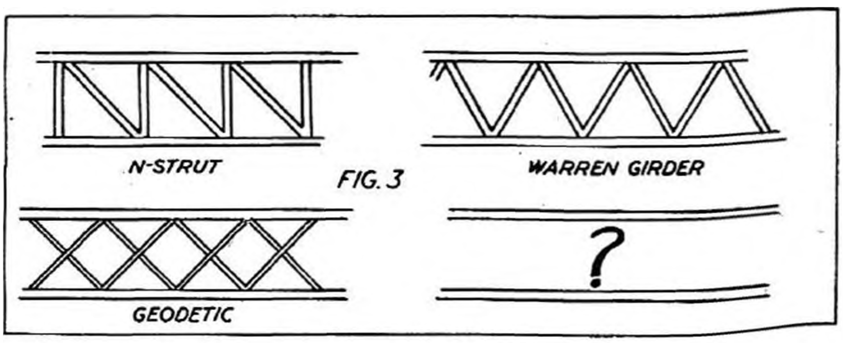
Let us take the power duration model as a suitable example. The pylon layout reigns supreme, but still, after all these years of development, trimming is often a tricky business. The margin of stability is so low under full power on many designs that the slightest mal-adjustment may result in a spiral dive. There is a lot to be learnt, still, about the stability of high powered duration models. Quite possibly some other design layout would be much safer to handle than the pylon model. But to appeal its performance would have to be at least comparable.

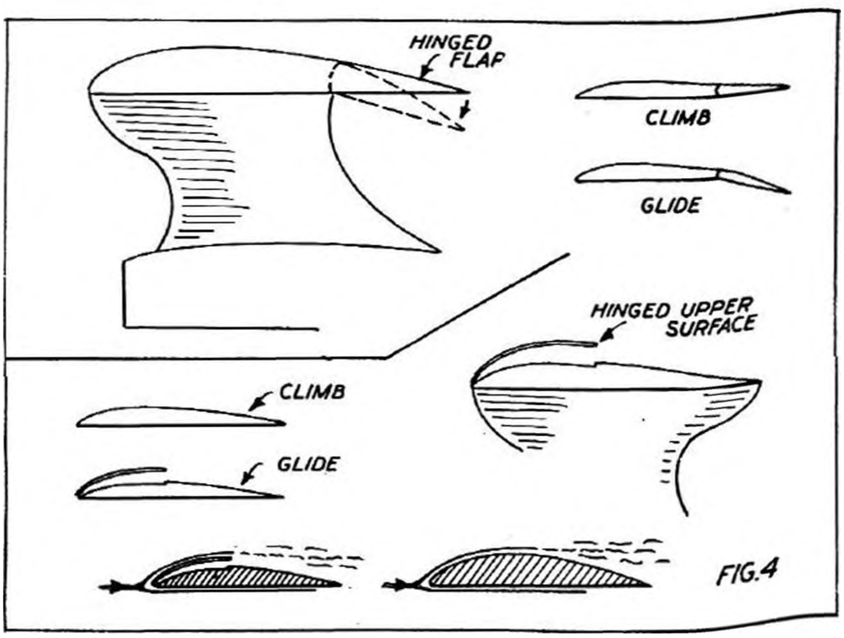
For maximum rate of climb, a power duration model needs a thin wing section, which offers little drag. On the glide, however, conditions are somewhat different. Flying speed is much slower and for minimum sinking speed a section of at least moderate camber and thickness is desirable. A power duration model with a thin, flat wing climbs fast, but also glides fast and sinks rapidly. Using a thicker section, the glide may be excellent, but the climb is slowed up.

Figure 3 sketches two possible solutions to this problem. In the first the wing is fitted with a hinged flap, accounting for some quarter to one-third of the span. For the climb the setting of this flap relative to the main wing is zero. You have your desirable thin section. When the power cuts, however, the flap is lowered to turn the aerofoil into a highly cambered section. There would, at the same time, be a considerable trim change, but this might even be used to advantage in controlling the power flight. The flap angle could not be overdone, however, otherwise the resulting drag would be too high and the extra lift nullified, as far as glide performance was concerned.

The second suggestion is more unorthodox. A normal thin section is used by the upper surface from the leading edge back to about 50 per cent of the chord is hinged. At the end of the power flight this portion is raised to transform the nose section of the aerofoil, at least, into a high-lift section.

The resulting " step " in the upper surface of the high lift section would probably have no effect at all. Almost certainly the air would have separated from the upper surface by this point, in any case so that the airflow would be similar to that over a normal high-lift section of the





same as the stepped thickness. The necessary linkage system to produce the required movement would have to be positive and foolproof, but would not be beyond the capabilities of the average aeromodeller with a flair for detail design. In fact, this is just the sort of problem many model builders delight in solving.

There does not appear to be the same possibility of success with unorthodox aerodynamic shapes. Most of the shapes that will fly have been investigated at one time or another, with varying degrees of success, but none have been persisted with. That is to say, they have not been given the same degree of development as, say, the conventional parasol layout as applied to rubber and power models. Given further development some new ideas on " duration " layout might well emerge. But that would take time and it would need a firm conviction in the eyes of the experimenter concerned that his particular layout was " right " and justified the failures that would be inevitable in the early stages.

Unorthodoxy can pay out. Remember the swept-forward wing power duration designs featured in an earlier AEROMODELLER ANNUAL ? Properly trimmed, these are probably the fastest climbing power designs that have yet been produced. The idea of using a swept-forward wing planform was not new. One of the best American designs which appeared soon after the first " baby " motor came on the market (the spark ignition " Atom "), has a wing which was swept forward. Similarly, with lots of other " new " ideas. Return gears were used on a Wakefield as far back as 1934—possibly earlier. At about the same time the first successful feathering propeller appeared. At the time these were some of the developments never brought to fruition—until at some later date they were revived and improved upon so that in the end they became standard practice.

Just think how, through the history of aero-modelling, the things we now accept as standard practice must have first appeared as the result of a happy thought, or perhaps a lucky experiment, on the part of some model flyer. The propeller that freewheeled instead of stopped at the end of the power run on a rubber model. Later the folding propeller to save even more drag. The parasol wing layout, which has so far provided the best means of controlling a high powered model engine—incidentally, a direct application of indoor model practice. Stretch-winding rubber to get more turns ; pre-tensioning or cording to take up the slack in over-length motors. All factors contributing directly to performance.

Performance is by no means at a standstill. The criterion is a five-minute flight without thermal assistance. There are quite a few Wakefields capable of $4\frac{1}{2}$ minutes in still air, but none has so far proved itself a consistent five-minute flyer. On a 20-second power run, too, no power model design can yet consistently exceed the maximum (five minutes) without some thermal assistance. Glider duration off a 328 ft. towline is also under the ideal aim, unless the model flies into lift.

The duration flyer is also faced with one big unknown—the air. If air goes up, as in thermals, somewhere or other it is coming down. Downdraughts are the only thing to account for relatively indifferent performances on the part of many high performance models at times. In fact, many fliers are now becoming more " downdraught conscious " than " thermal conscious." Rather than setting out deliberately to find thermals, they aim to fly when there are no downdraughts about ! In many cases this may add up to the same thing, but not always so.

If you are a duration enthusiast with an eye on competition work, then this is something to think about. What is the best type of model to fly in " downdraught " conditions ? As a general rule the rate of sink in areas of downdraught is comparatively mild, but sufficient to turn a normal four to four and a half minute flight into one nearer the three minute mark. Would a very long power run be best on a rubber model, so that it cruises around for an assured four minutes at low altitude ? Or a model which climbs really high and aims to get above the layer of sinking air ? Is the mass of air sinking faster lower down near the ground that it is higher up, or *vice versa* ? There is certainly scope for experiment here. Perhaps even gadgets to test the vertical speed of the air at any one time !

Duration, too, has brought other problems. Long flights generally mean considerable distances travelled before the model comes down again. There is scarcely a flying field available large enough to accommodate a first-class duration model on a windy day. As a result, the model may land in growing crops or inaccessible places. And few fliers can have escaped hearing about the repercussions following indiscriminate recovery of models from a farmer's field of corn !

Probably the most important requirement of all at the moment—and for all types of models, come to that, not just duration machines—is a positive means of controlling the model in flight so that it can be kept within bounds. Radio control in its present form is not the answer. Radio is too heavy, expensive and complicated to be used on the average rubber model and glider and a radio model, just like any other machine, drifts downwind just as fast, once it is allowed to turn out of wind.

The answer—and there must be one somewhere—is at present quite unknown. It appears it will have to be something that nobody has yet thought of—not a modification of some existing device. If you have any ideas on the subject, right now is the time to get working on them.

Regarding control of models, there is still plenty of scope for experiment in forms of automatic control, especially as far as flying scale models are concerned. The "pendulum" control is in popular use for this type of model, but is certainly far from foolproof. Its critics claim that any form of automatic control operated by gravity (the basis of pendulum action) is so modified by "g" forces in involuntary manoeuvres that the response to the controlling mechanism cannot be anything but erratic. Against this is the fact that almost true outline scale models, with scale dihedral, have flown successfully with pendulum control whereas they are almost invariably unstable without some form of automatic control.

Just one word of advice, however, in working out something new. What may seem just the answer on paper—perhaps even sketched out and the prototype built—may not work out in practice, simply because you have overlooked one vital factor. The answer must lie in successful practical application. Too many ideas have been doomed to failure at the "design stage" by some elementary miscalculation. And no model, gadget, or anything else is seldom right from the first, even if everything is basically sound. But do not let that deter you. There is still plenty of scope for experiment in aeromodelling.

DUCTED FANS

Phil Smith and his beautifully built prototype Lavochkin 17. Allbon Dart, 37in. span, 11 ounces. Scale fin, Enlarged tailplane. Best flight 7min. on 3/4 min. motor run. Model was flown at 1952 N.H. Gala. (*Bill Dean photo*)

DUCTED fan propulsion is something which quite a number of aeromodellers have tried, or experimented with, but few have achieved any real success. The idea is, essentially, to turn an ordinary miniature aero-motor into a " jet engine " which can be completely buried in the fuselage. To do this, the normal propeller is replaced by a small diameter multi-blade fan and the whole enclosed in a tube, extending from nose to tail of the fuselage.

A simplified arrangement is shown in Fig. 1. The fan unit is mounted some way down the tube or duct. It accelerates the air passing through the tube so that the exhaust velocity, or the velocity of the air leaving the tail end of the tube, is greater than the velocity of the air entering at the front end. This difference in velocity produces a thrust force which propels the model forward.

In practice, the method is far from being as simple as that. Replace the propeller on a standard engine by a fan, enclose it in a tube and the most probable result is little or no thrust. Certainly the engine, as a thrust-producing unit, is operating at a far lower efficiency than it would do when fitted with a normal propeller.

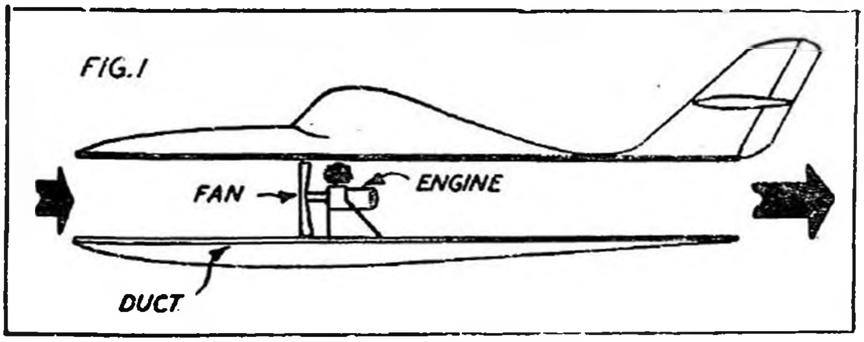
However, there have been successful applications of the ducted fan principle in the aero-modelling world and one of the latest—and, incidentally, the first commercial model of its type—is the scale Lavochkin designed and developed by Phil Smith (designer for *Model Aircraft* (*Bournemouth*), *Ltd.*). Prior to this there was the scale *Vampire* flown round-the-pole at the last AEROMODELLER EXHIBITION at Dorland Hall. Success has also been claimed for a number of American models of this type.

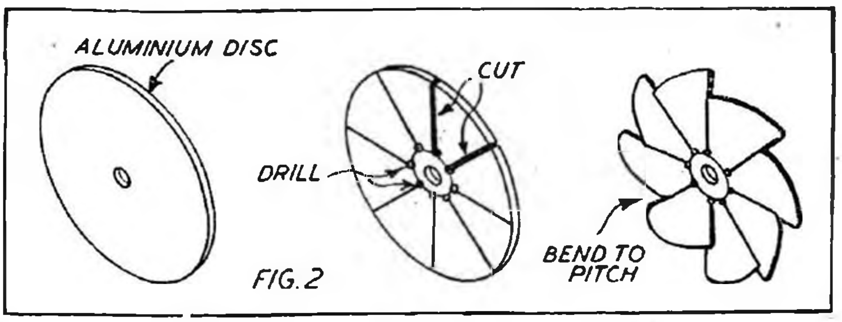
Ducted fan propulsion lends itself admirably to theoretical investigation. It is one of those basic problems of air momentum through and behind a revolving propeller or fan. On paper you should, quite readily, produce a design specification with a desired working efficiency and thrust. But whilst this may be a helpful background, positive *results* with ducted fan propulsion at this relatively early stage of its development are only likely to come from practical tests. As far as practical data is concerned, we have very little to go on. The only published articles on the subject have been one by Phil Smith and one by an American, Thomas Purcell. On many points these agree quite well ; on others they appear to differ.

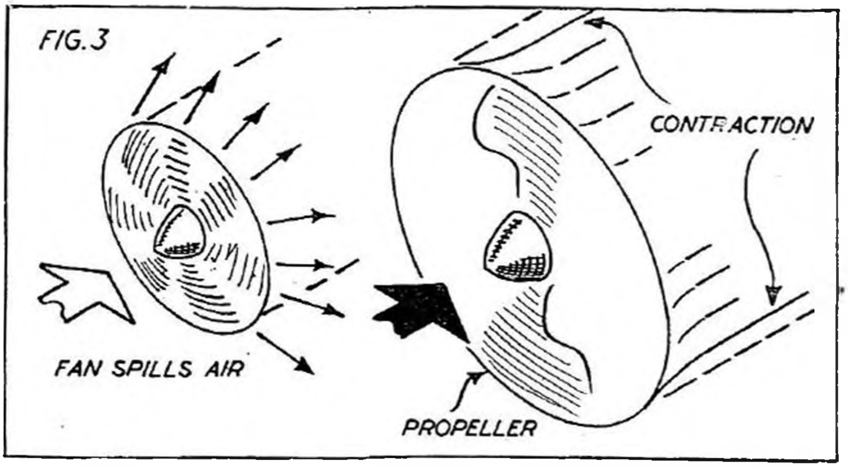
Both these writers have produced successful models propelled by the ducted fan system. They agree on the type of fan which must be employed—a multi-bladed type of small diameter operating in the region of 15-16,000 r.p.m. These fans can be cut, quite simply, from a disc of metal (aluminium of 16 s.w.g. appearing the favourite material), after the style shown in Fig. 2. The individual blades are then bent to the appropriate pitch angle. The pitch angle required for maximum thrust is generally quite high—about 30 degrees—but adjustment is simple by bending.

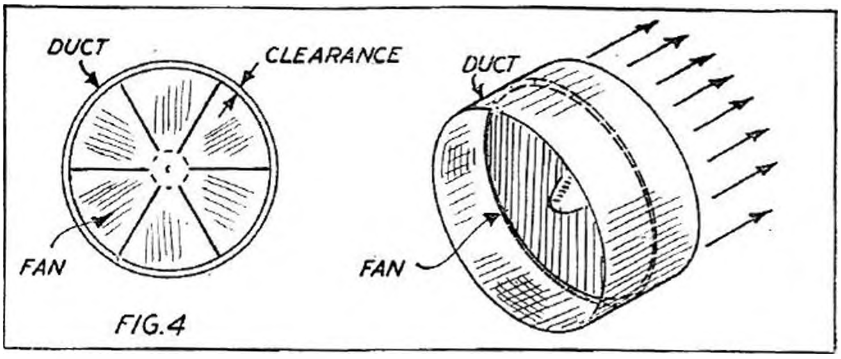
For a half c.c. engine, a 3 in. diameter impeller or fan is about right. Twisted to pitch most of the small motors in this class will have no difficulty in turning it over at the required high r.p.m. This is, however, quite a fantastic speed for a miniature engine to maintain. Unless the system is perfectly balanced vibration will be excessive—sufficient, even, to shear the hold-down bolts in some cases so that the whole engine breaks adrift. The solution does not lie entirely in correct balance for the fan. The engine itself may be unbalanced which will produce this vibration even with a balanced fan.

Most engines have certain speeds at which they do tend to vibrate badly. At some lower or higher speed they smooth out again. A possible cure, therefore, lies in seeking some high r.p.m. figure around the desired maximum where vibration is a minimum—either by varying the pitch of the fan blades, or varying the diameter. There is also the point to consider that all engines lose power at extremely high r.p.m. They may be going fast but nearly all the power is accounted for by overcoming internal friction. At some lower speed the engine "peaks" as regards power output. To get the maximum power from that engine it must be operated at that particular r.p.m. The "peak" may be broad, when variation in r.p.m. either side may not matter much, or quite sharp, so that there is an appreciable falling off in power with, say, an additional 1,000 r.p.m. Most of the small engines "peak" at





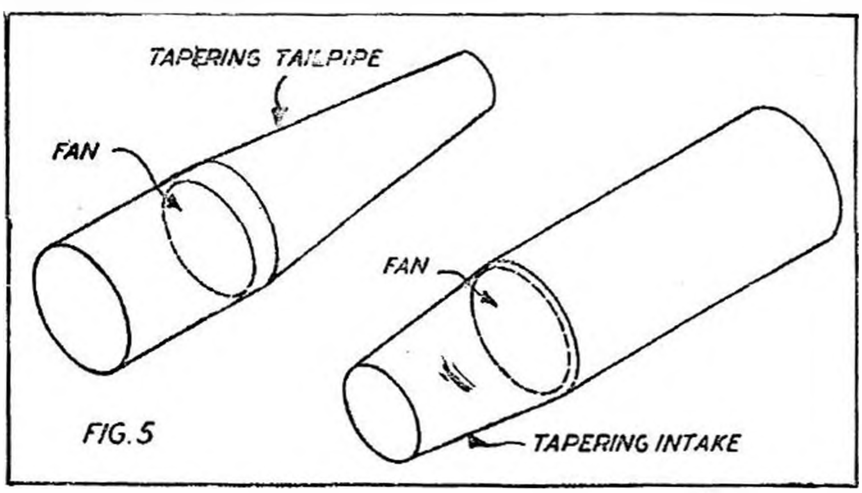




quite high revs. (around 12-14,000), so this may not be too serious. The main thing is to appreciate that even though the fan may be revolving at a very high r.p.m., you may not be using the full power of the engine. When the fan has a definite pitch angle, however, it is doubtful that you could exceed the peak power r.p.m. and still drive the fan. An r.p.m. figure of 16,000 with a fan with 30 degrees pitch angle seems rather on the optimistic side. One of the best of the half c.c. engines only recorded 16,000 r.p.m. with a $1\frac{1}{2}$ in. diameter pulley used as a flywheel. To achieve high r.p.m., it is absolutely essential that the engine be first thoroughly run in.

The question of vibration at operating r.p.m. is an important one for tip losses are high on the impeller. That is to say, there is a considerable outward as well as backward airflow from a small diameter, wide-blade fan rotating at high speed—Fig. 3. This is contrary to accepted " propeller " theory where the slipstream tends to contract behind the propeller disc. The only way to minimise these losses with an impeller is to use the minimum possible clearance between the walls of the enclosing tube and the tips of the blades. This has the desired effect of straightening out the airflow—Fig. 4.

Minimum clearance means, in practice, something like 1/16 in. or less. If the unit is vibrating badly with such a small clearance the fan blades might well strike the walls of the tube with disastrous results. At least, the tube would be punctured and destroy the duct effect.



This criterion—minimum clearance—has fixed the mid-diameter of the tube. The actual end-to-end of longitudinal shape is also critical. Experiments with conical tubes have not proved a success. Using a tail cone, for example, so that the exit area is greatly reduced, the exhaust velocity is not improved, but rather the impeller blades are stalled and thrust falls off considerably. Similarly with the entry area. Using a small entry area expanding up to a maximum mid-diameter again produces poor power results—Fig. 5.

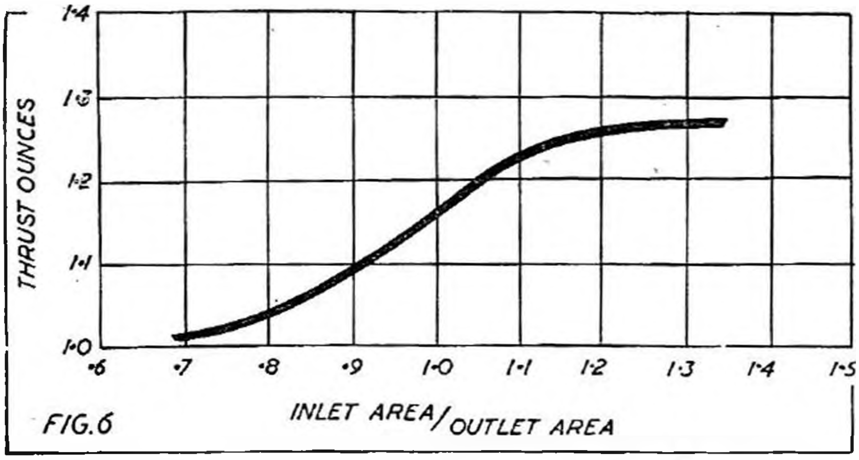


FIG. 6

Some figures have been produced in America showing the relative effect of entry and exit areas on static thrust in a ducted fan system. These, at least, would confirm that a relatively large exit area is to be preferred—Fig. 6. Further tests, illustrated in Fig. 7, show the effect of varying the relationship between exit area and fan area. Both these drawings are from data published by Thomas Purcell.

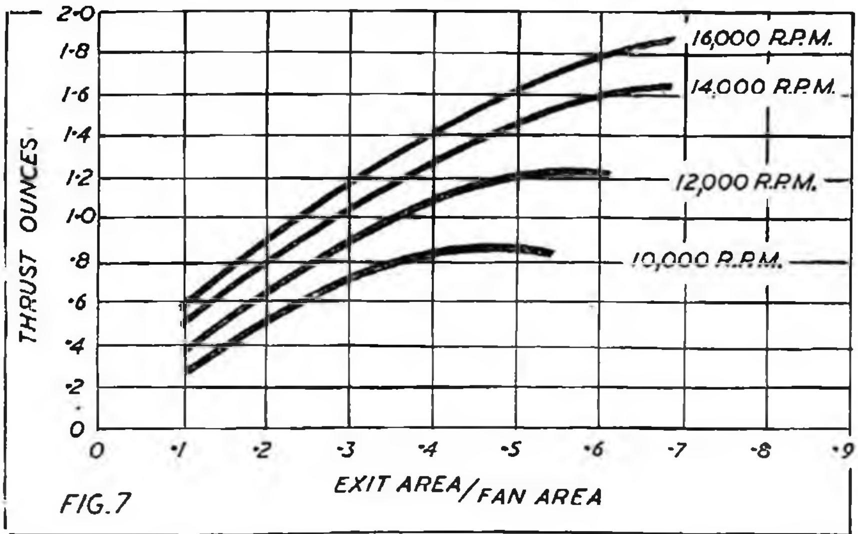


FIG. 7

Comparing these results with details given by Phil Smith of his own experiments, the American figures would indicate that the exit area must be at least one half of the fan area and the inlet area the same, or preferably slightly greater. Phil Smith, on the other hand, recommends an entry area of twice the fan area and thence a parallel section, *i.e.*, exit area equals fan area—Fig. 7. However, at the same time, Phil Smith points out that his suggested layout is not practical for inclusion in scale outline fuselages and has employed conical sections similar to the American layout. The two extremes obviously present useful limits for further experiment.

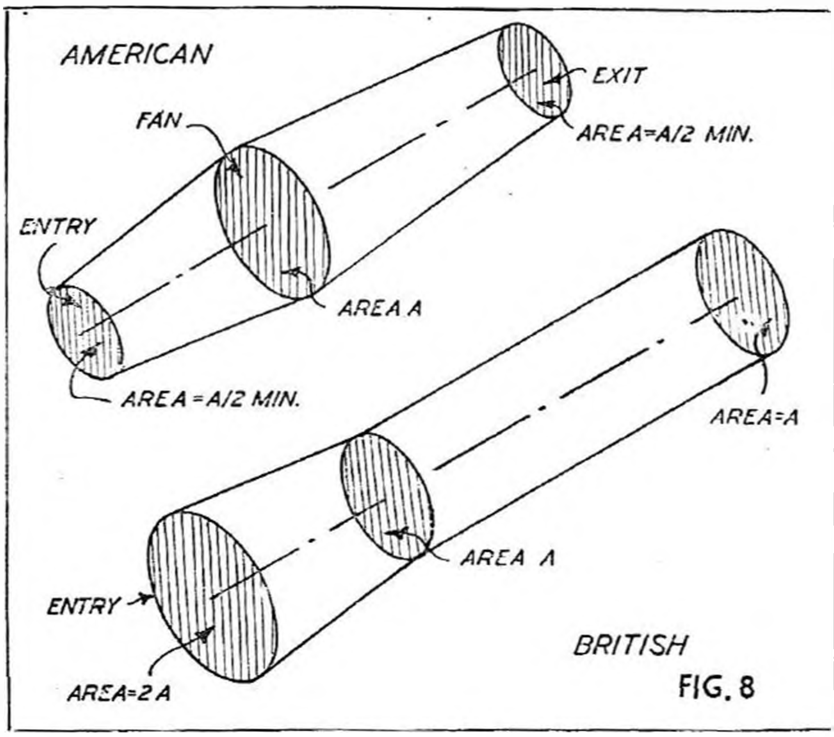
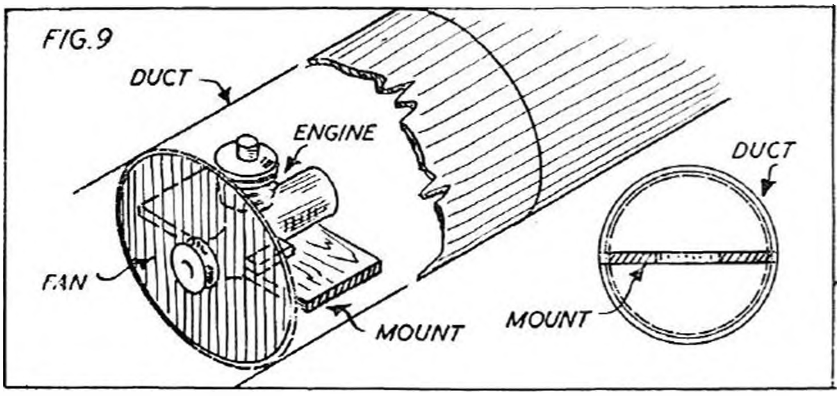
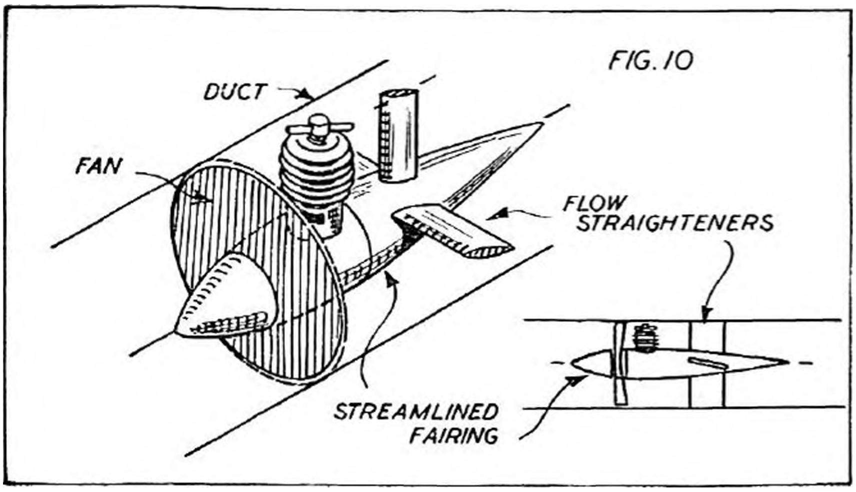
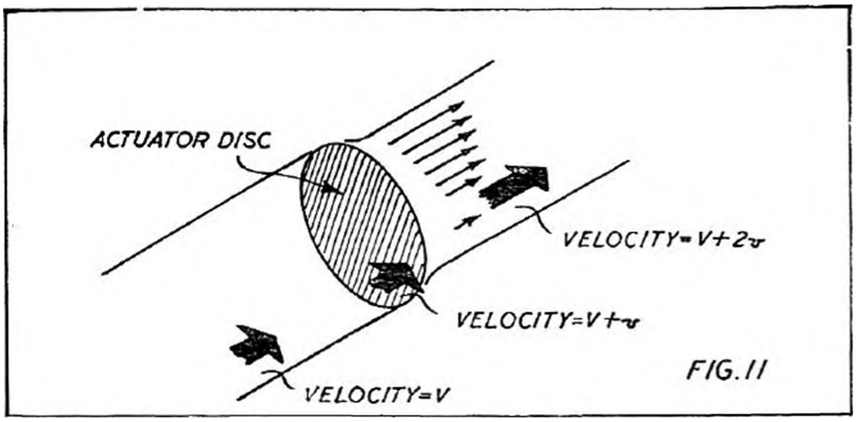


FIG. 8







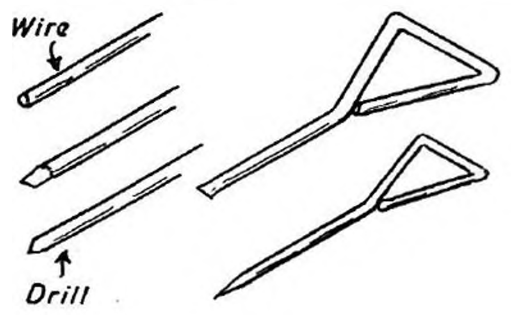
Regarding the installation of the fan or impeller unit in the duct, the simple solution is to mount the engine on rigid bearers secured across the duct, with a pulley attachment for starting—Fig. 8. This, however, would appear to lend itself to considerable improvement.

In the first place, undoubtedly some advantage would result from straightening the airflow by means of vanes, of opposite pitch to the fan, rigidly mounted across the duct immediately behind the fan—Fig. 9. Since the airflow conditions, too, apparently are critical it would seem highly advisable to streamline at least the hub portion of the fan and engine assembly as a further aid to "clean" airflow.

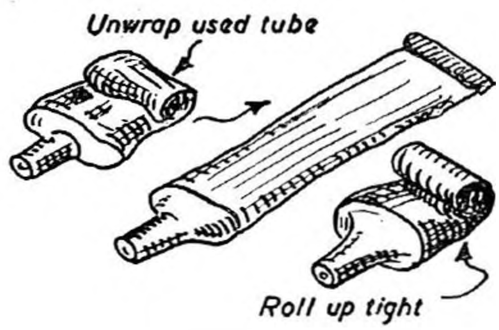
This also raises another interesting point. According to theory, with any propeller or fan system, one half of the increased velocity of the slipstream is added at the propeller disc and the other half immediately behind it—Fig. 10. This would appear to indicate that it would be best to mount the engine in front of the fan—using a fan of opposite pitch to produce a " backward " slipstream—and so save a certain amount of drag. The only available data on previous ducted fan models, however, clearly indicates that in all cases the fan has been in front of the engine in normal " tractor propeller " style. The " pusher " arrangement should not complicate installation of starting.

The only real answer to the many further questions which could be raised concerning ducted fan propulsion, is in practical experiment. This article has attempted to outline the chief factors in design, as far as these are known, and thus provide a starting point. How a ducted fan system would compare with orthodox " propeller " propulsion for any particular model, is a question which could not be answered with great accuracy. In the first place it would obviously depend on the efficiency of the ducted fan system and even small errors in workmanship, particularly as regards duct clearance at the fan position, could seriously affect results. It is almost certain, however, that the overall efficiency, as compared with a normal propeller, will be considerably lower.

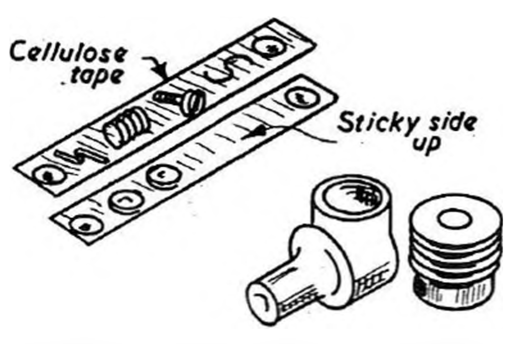
In other words, the ducted fan system, at least in its present form, must be rejected where performance is the main aim. Its chief attraction is to produce flying scale models of jet-propelled aircraft, using a standard miniature aero-motor. The outlines of a normal full size jet aircraft fuselage do not, unfortunately, fit in well with the design requirements of the duct outline. Figure 7 suggests the minimum limits for entry and exit duct sizes. After that you must compromise by modifying the scale outline, if necessary. Whatever its failing in this respect, ducted fan propulsion does open up a whole new field of possible development.



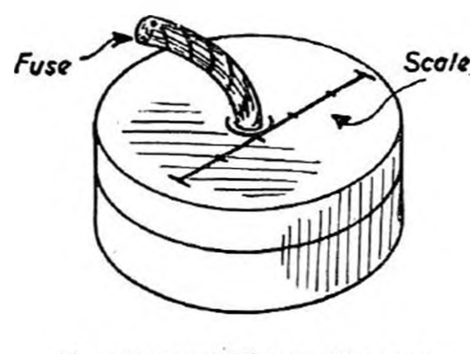
Small tools from steel wire



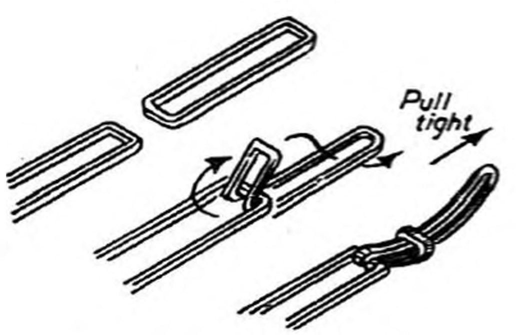
Use the last drop of cement!



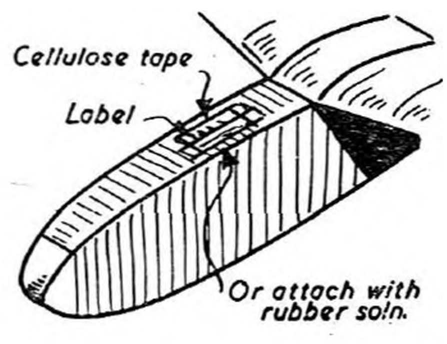
Don't lose small parts on dissembling



Use tin for D/T fuse dispenser



Joining bands for extra length



Temporary label, easily removed

AEROMODELLING DICTIONARY

English	*French*	*German*	*Swedish*	*Italian*
MATERIALS, TOOLS, etc.				
aluminium	aluminium	Aluminium	aluminium	alluminio
ballast	lest	Ballast	ballast	zavorra
balsa : hard, medium, soft, strip, sheet, block	balsa : din, midin, tendre, baguette, planche, bloc	Balsaholz : hart, mittelhart, weich, leisten, bretter, klotz	balsa : hård, mellan, mjuk, list, flak, block	balsa : duro, medioduro, tenero, listello, tavoletta,blocco
bamboo	bambou	Bambus	bambu	bambu
banana oil	banana oil	—	—	olio di banana
brass	laiton	Messing	mässing	ottone
building board	chantier de montage	Werkbank	byggbräda	piano porta pezzo
cardboard, Bristol board	carton, Bristol	Pappe	papp	cartone, cartone di bristol
celluloid	celluloid	Celluloid	celluloid	celluloide
cement	colle	Klebstoff	lim	colla cellulosico
compasses	compas	Zirkel	kompass	compasso
dethermaliser	dethermaliseur	Zeitschalter	utlösare	anti termica
d/t fuse	Meche pour "	Zeitzundschnur	stubintråd	miccia
dope : clear, tightening, coloured	enduit : incolore, de tension, colore	Spannlack : farblos, farbig, — .	lack : färglös, spänn, färgad	flatting : vernici alla nitro-cellulosa, gommalacca, colorata
dress-fasteners, snap fasteners	boutons-pressions	Druckknopf	tryckknappar	spille di sicurezza, agrafi
drill	foret	Bohrer	borr	punta di trapano
elastic bands	bracelet de caoutchouc	Gummibande	gummiband	vincolo elastico
fibre	fibre	Fibre	fiber	fibra
file	lime	Feile	fil	lima
fretsaw	scie a decouper	Laubsage	lövsåg	sega
fuel	carburant	Brennstoff	bränsle	combustibile vermice antisolvente
fuel proofer	à l'epreuve du carburant	Brennstoffschutz anstrich	bränslefast	dispositovo per controllare il combustibile
fuse wire	fusible	Binderdraht	ståltråd	filo fundibile
grain filler	bouche-pores	Flussiges Holz	spackel	stucco
hacksaw	scie a metaux	Eisensage	bågfil	sega di metalli
hardwood : engine bearers, dowels	bois dur : batimoteur, goupilles	Hartholz : Motorentrager, Rundholz	hårdträ : motor bockar, pinnar	legno duro : supporto del motore, spina
Jap Silk	soie japonaise	Japanseide	japan papper	sela giapponese
lead shot	grenaille de plomb	Blei	bly hagel	palla di piombo
mould	moule	Form	form	forma
nuts, bolts, and washers	ecrous, boulons et rondelles	Muttern, Boltzen, Zwischenscheiben	muttrar, bult & brickor	viti, bulloni, rondelle

English	*French*	*German*	*Swedish*	*Italian*
MATERIALS, TOOLS, etc.—*cont.*				
nylon	Nylon	Nylon	nylon	nylon
parachute	parachute	Fallschirm	fallskärm	paracadute
pennant	banderole	Wimpel	vimpel	bandierina
piano wire	corde a piano	Klavierdraht	pianotråd	corde di piano
pins	epingles	Sticknadeln	knappnalar	spilli
plastic	plastique	Plastik, Kunststoff	plastic	plastico
plastic wood	bois plastique	flussiges Holz	plastiskt trä	legno plastico
plasticine	pate a modeler	Plastelin	plasticine	plastelina
plywood, 3 ply	contreplague (3 plis)	Sperrholz, 3 fach gesperrt	plywood 3 lag	compensato
razor blade	lame de rasoir	Rasierklinge	rakblad	larma di rasoio
rubber	caoutchouc	Gummi	gummi	gomma
sanding sealer	bourche-pores	—	spackel	vermice per stuccare
sandpaper : rough, smooth	papier de verre : gros, fin	—	sandpapper : groft, fint	carta di vetro : ruvida, fine
set square	a angle droit, ou d'equerre	Winkel	vinkelrät	squadra
solder	soudure	Lotzinn	lödtenn	soldatura
sponge, Sorbo	éponge	Schwammgummi	svampgummi	spugna
spring	ressort	Feder	fjäder	mollia
tank, fuel	reservoir a carburant	Brennstofftank	bränsletank	serbatoio
tape, linen	ruban, de lin	Leinenhand	band, linne	nastro di telo
template	gabarit	Schablone	schablon	garbo, sagoma
thread, cotton	fil, coton	Baumwollgarn	tråd, bomull	filo cottone
thrust race, washer	rondelle	Properllermit nehmerscheibe	tryck lager, bricka	cuscinetto, rondello
tinplate	fer blanc	Zinkblech	förtent bleck	lamiera bianca
tissue : lightweight,	papier : fin	Spannpapier, Japanpapier, leicht	silkespapper : tunt	tessuto leggero
heavyweight, rag	lourd, papier de chiffon	Japanpapier, schwer	silkespapper : tjockt	tessuto pesante
tissue paste	colle a papier	Kleister	pappersklister	colla per la stoffa
tow line	cable de treuil	Startseil	bogserlina	cavo di rimorchio
tracing paper	papier a calquer	Pergamentpapier	smörpapper	carta di recalco
transfer	decalcomanie	Abziehbild	överföringsbilder	ricalciare
tubing	tube	Rohrchen	rör	condotto, tubo
vice	etau	Schraubstock	skruvstycke	morsa
wheels, air, sponge	roue gonflables, mousses	Rader, Luft, Schwammgummi	hjul : luft, svampgummi	ruote, pneumatiche, di materia elastica
winch	treuil	Winde	vinch	virricello
winder	remontoir	Leiher	vinda	trapano a mano

English	*French*	*German*	*Swedish*	*Italian*
FUSELAGE				
airscrew—propeller	helice, propulseur	Luftschraube, propeller	propeller	elica
bulkhead	cloison	Spanten	spant	paratia
cabin	cabine	Kabine	kabin	cabina
canopy	bulbe	Kabinendach	huv	tettutccio
centre of gravity (C.G.)	centre de gravite (c.g.)	Schwerpunkt	tyngdpunkt	centro di gravita
coarse (pitch)	grand (pas)	grosse Steigung	stor/stigning/	abitatcolo
cockpit	cockpit	Fuhrersitz	cockpit	capotto
cowling	capotage de refroidissement	Verkleidung	huv	
crutch	echelle	Streben	förstärkning	costrucione a listelli di forza laterale
datum line	ligne de reference	Ziellinie	mittlinje	linea di riferimento
diameter	diametre	Durchmesser	diameter	diametro
dowel	goupille	Rundholz	pinne	spina
downthrust	angle piqueur	negativer Zug	nedåttryck	inclinazione negativa
fine (pitch)	petit (ou faible) (pas)	kleine Steigung	låg/stigning/	passo piccolo
folder (prop.)	(helice) repliable	Klapp Propeller	hopfällbar /prop/	elica a pale ribaltibile
former	forme ; *Couple*	Spant	formare	ordinata
free wheel	roue libre	Freilauf	frihjul	scatto libero
gusset	gouseset	verstarkungs-Ecke	hörnstöd	fazzoletto, lamiera di rinforzo
hull	coque	Rumpf	skrov	scafo
keel	quille	Kiel	köl	carena
longeron	longeron	Gurt	longeron	longherone
maximum cross-section	section maitre-couple	grosste Durchmesser	maximalt tvärsnitt	sezione trans-versale massima, sezione maestra
nose block	bloc avant	Nasenklotz	nosblock	naso
paper tube	tube en papier	Papierrohrchen	pappersrör	tubo di carta
pitch	pas	Steigung	stigning	passo
platform	plateforme ou support	Platform	plattform	—
pod-and-boom	fuselage poutre	—	pod and boom	—
sidethrust	angle vireur (de lance de traction)	seitliche Zug	sidotryck	incidenza laterale
single blade	monopale	Einblatt (propeller)	enkelt blad	monopala
spacers	entretoises	Stege	distansbricka	ordinate
sponson	nageoire stabilisatrice	—	sponson	pinna
stringer	lisse	formegebende Leisten, Stringer	sträng	tiranti
tailskid	bequille	Sporn	sporre	pattino
tailwheel	roue de queue	Spornrad	sporrhjul	ruotino di coda
uprights	vertical	senkrechte Stege	upprätt	ordinate

English	*French*	*German*	*Swedish*	*Italian*
WING				
aerofoil	profil (aero dynamique d l'a)	Profil	vingprofil	piano aerodinamico
aspect ratio, high, low	grand allongement, faible allon—gement	—	rektangelvärde, högt, lågt	allungamento
aileron	aileron	Querruder	skevningsroder	alettone
angle	andle	Winkel	vinkel	angolo
anhedral	—	—	anhedral	diedre laterale
area	surface	Flacheninhalt	yta	superficie
attack	attaque	Angriff	attack	attacco
camber	course	Profiloberseite	välvning	curvatura dell'ala
capstrip	chapeau de nervure	—	capstrip	—
centre section	section centrale	Mittelstuck	mitt sektion	parte centrale dell'ala
chord	corde	Flachentiefe	korda	corda
dihedral	diedre	V-Form	V-form	diedro
effective	effectif, reel, vrai	effectiv	effektiv	effettiva
elevon	elevon	—	elevon	alettone
fillet	filet de racord, petit carenage	Fullecke	kant, list, skiva	filetti
flap	volet (d'hyper-sustentation)	Klappe	flapp	flap
incidence	incidence	Anstellwinkel	anfallsvinkel	incidenza
knock-off	demontage sous un choc	abfallbar	knock-off	distaccabile anti vico
lamination	contre-collage	lamiliertes Holz	lamellartad	laminazione
leading edge (L.E.)	bord d'attaque	Nasenleiste	framkant	bordo d'attacco
lift	portance	Auftrieb	lyft	sputa
loading	charge	Flachenbelastung	belastning	carico
mainspar	longeron principal	Hauptholm	vingbalk	longerhone principale
negative	negatif	negativ	negativ	negativa
platform	plateform, support	platform	plattform	—
polyhedral	diedre compose	hochgezogene Ohren	polyhedral	polidiedro
positive	positif	positiv	positiv	positivo
pylon	cabane	pylon, parasol baldachin	pylon	pilone
rib	nervure	Rippen	ribba	centina
riblet	bec de nervure	kleine Rippen	spröt	naso di centina
root	emplanture, racine	erste Rippe	bas	radice
section	section	Abteilung	sektion	sezione
slot	fente	Schlitz	spår	fissura
spar, auxiliary	longeron auxilaire, faux-longeron	Hilfsholm	balkstötta	longerone
span	envergure	Spannweite	spännvidd	apertura alare

English	*French*	*German*	*Swedish*	*Italian*
WING—*cont.*				
trailing edge (T.E.)	bord de fuite	Endleiste	bakkant	bordo d'uscita
undercamber	—	Profilunterseite	välvd /på undersidan/	profilo concavo
undersurface	intrados	tragende Flache	underyta	intradossa, sucerofice inferiore
warp	torsion, gauchipement	verziehen	slå sig	svegolamento
wash in	gauchipement positif	positiver Anstellwinkel	inåt	—
wash out	gauchipement negatif	negativer Anstellwinkel d. Flachenenden	utåt	—
TAIL UNIT	**EMPENAGE**	**LEITWERKE**	**STJÄRTPARTI**	**IMPANNAGGIO**
elevator	gouverne de profondeur	Hohenleitwerk	höjdroder	timone orizontalli
elevator horn	guignol de profondeur	Anlenkhebel	höjdroderhorn	squadretta di comando
fin, underfin	derive, sous derive	Seitenleitwerk	fena	derive verticali
fuse	meche	Zundschnur	stubin	fusibile
hinge	charniere, articulation	Scharnier	gångjärn	snodo cterniera
lifting	porteur	tragend	lyft	portanza
outline	contour exterieur	Aufriss	ytterkant	disegno
pendulum-control	controle pendulaire	Pendulruder	pendel-kontroll	controlo a pendolo
pop-up tail d/t	dehermaliseur a empennage releve	—	pop-up tail	impennaggio rialzato
rudder	gouverne de direction	—	roder	timone
symmetrical	symetrique	symetrisch	symetrisk	simmetrico
tailplane	empennages	Leitwerk	stabilisator	piano horizontale
trim-tab	volet de reglage	Trimmklappe	trimroder	—
UNDERCARRIAGE		**FAHRGESTELL**	**LANDNINSSÄLL**	**CARRELLO**
axle	axe	Achse	axel	asse
fairing	portee	Verkleidung	luftsläpp	calzoni, scarpe
fixing	fixation	—	fastsättning	fissare
main leg	jambe principale	Hauptgestell	huvudstötta	gamba principale
mono-wheel, peg-leg	monoroue, jambe simple	Eibein-fahrgestell	enhjul	man ruota
nosewheel	roue avant	Bugrad	noshjul	ruota anteriote
oleo	oleo, a huile	—	oleo	olio
piano wire	corde a piano, fildacier	Klavierdraht	piano tråd	filo d'acciaio, corde di piano
spreader	pistolet	Verstrebung	spridare	—
track	voie	Spurbreite	spår, bana	scartamento
tricycle	tricycle	Dreirad-fahrgestell	3 hjul	carrello triciclo
tubes	tubes	Rohrchen	rör	tubo
washer	rondelle	Zwischenscheibe	brickor	rondella

English	*French*	*German*	*Swedish*	*Italian*
RADIO CONTROL	**RADIO COMMANDE**	**FERNSTEUE-RUNG**	**RADIO KONTROLL**	**RADIO-COMANDA**
actuator	servomoteur	Emplangerrelais	actuator	servomotore, scappamento
aerial	antenne	Antenne	antenn	antenna
batteries	batteries on piles	Batterien	batterier	batteria
connection	connection	Anschluss	anslutning	accoppiamento
contact	contact	Kontackt	kontakt	contatto
crank	manivelle	Steuerstange	vev	biella
escapement	echappement	Ausloser, Arbeitsrelais	utlösare	servomotore
grid	grille	Gitter	galler	griglia
high tension (H.T.)	Haute tension (H.T.)	Anodenstrom	högspänning	batteria anodica
low tension (L.T.)	Basse tension (B.T.)	Heizung	lågspänning	batteria accenscione
milliammeter	milli-amferemetre	Milli-ampremeter	milliampere mätare	milli-amperometro
plug	fiche male	Stecke	stickkontakt	spina
receiver	recepteur	Empfanger	mottagare	apparato ricevitore
saddle	chariot	Sattel	sadel	bietta a forma di U
socket	fiche femelle	Buchse	dosa	bussola di riduzione
transmitter	emetteur	Sender	sändare	apparato trasmittente
valve, hard, soft	lampe	Rohre, — —	rör, hård, mjuk	valvola
variable resistance, potentiometer	resistance variable, potentiometre	regulbare Widerstand, potentiometer	variabelt motstånd	potenziometro
wiring	enroulement	Verdrahtung	ledningsdragning	schema elettrico
GENERAL INFORMATION		**VERSCHIEDENES**	**ALLMÄNNA UPPLYSNINGAR**	
adjustment	ajustement	Einstellung	justering	adjustamento
balance	equilibre	Gleichgewicht	balans, jämnvikt	equilibrio
ballast	lest	Ballast, Gewicht	ballast	zavorra
bellcrank	palonnier	Steuerplatte	kontrollplatta	triangolo di comando
brace	bande, bracelet	Verstarkung	stötta, staga	trappano
bunt	fond	—	buk	looping inversi
canard	canard	Ente	canard, anka	anatra
carve	tailler	ausschneiden	skära	scavare
chamfer	chanfrein	abschleifen	avfasning	sagomento
chuck glider	planeur lance main	Handstartsegler	glidflygplan	alliante da lancio
component	elements	Zubehorteil	del	elemento
Control Line	Vol Circulaire controle	Fesselflug	linstyrd	telecomandato, modello controllato in volo circolare

English	*French*	*German*	*Swedish*	*Italian*
GENERAL INFORMATION —*con'.*				
control plate, bellcrank	palonnier, reuvoi de commande	Steuerplatte	kontrollplatta	triangolo di comando
control system	systeme de pilotage	Steuersystem	kontrollsystem	sistema comando
corkscrew	tire-bouchon, vrille	Korkenzieher	korkskruv	leva turaccido
covering	recouvrement, entoilage	Bespannung	täcka, kläda	ricopertura
crash	ecrasement au sol	Ansturz	krash	incidente
cut-out	dispositif d'arret	Ausschalter	slå av, stänga av	interupptori
cut out	couper	ausschneiden	—	—
diesel (C.I.)	(moteur) a auto allumage	Dieselmotor	diesel	motore ad auto-accensione
duration	duree	Dauerflug	duration g-flygplan	durata
engine, motor	moteur	Motor	motor	motore
floatplane	hydravion a flotteurs	Wasserflugzeug	sjöflygplan	idromodello
flying boat	hydravion a coque	Flugboot	flygbåt	idroplano
Flying Scale	Maquette volante	Naturgetreues Flugmodell	flygande skalamodeller	inscala
flying wing	aile volante	Nurflugel	flygande vinge	ala volante, senza coda
Free Flight	Vol Libre	Freiflug	friflyg	volo libero
glider	planeur	Segelflugzeug	glidflygplan	veleggiatore, aliante
gliding angle	angle de plane	Gleitwinkel	glidvinkel	angolo di planata
gloplug	glow plug/ Bougie luisante	Gluhkerze	glödstift	incadescenza
grain	fibres	Faser	ådra	
hand launch	lance main	Handstart	handstart	lancio a mano
high wing	aile haute	Hochdecke	högvingad	ala alta
indoor	(modele) d'interieur	Saalflug	inomhus	—
jet	(moteur) a reaction,	Duse	jet	propulsion a getta
jig	formule libre	Leichtgewicht	jig	attrezzatura
lightweight	boucle	Looping	lättvikt	leggere
loop	forme de montage	Helling	loop	looping
low wing	aile basse	Tiefdecke	lågvingad	ala bassa
mid wing	aile mediane	Mitteldecke	midvingad	ala media
petrol/ignition	(moteur) a allumage electrique	Benzinotor mit elekt. Zundung (Ottomotor)	bensin/tändning	motore a scoppio
power	puissance	Kraft	motor	potenza
pre cement	pre collage	Vorleimen	förimma	colla
R.O.G., R.O.W., R.T.P.	depart de l'eau	Bodenstart	R.O.G. starta från marken	decollare

English	*French*	*German*	*Swedish*	*Italian*
GENERAL INFORMATION —*cont.*				
sailplane	vol circulaire (non controle) planeur	Segelflugzeug	segelflygplan	aliante, veleggiatore
semi scale	semi maquette	Naturahnlich	delvis skala	semi scala
shrink	tendre	spannt	krympa	restringere
Speed	vitesse	Geschwindigkeit	Speed, hastighet	velocita
spark plug	bougie d'allumage	Zundkerze	tändstift	candela di accensione
spin	vrille	trudeln	spin	vite
spiral	spirale	Spirale	spiral	spirale
Sport	sport	Sport	Sport	sport
stability	stabilite	stabilitat	stabilitet	stabile
stall	perte de vitesse, decrochage	pumpen	ståla, stegra sig	perdita di velocita
steam	vapeur	Dampf	ånga	vapore
Stunt	acrobatie	—	Stunt	acrobazie
Team Race	course poursuit par equipe	Mannschafts-rennen	Team Race	team race
template	gabarits	Schablone	schablon	garbo, sagoma
trace	tracer	pausen	följa	delineare
trimming	reglage	trimmen	trimma	deflettore
unorthodox	special, non orthodoxe	aussergewohn-lich	unorthodox	non usuale
ENGINES	**MOTEURS**	**MOTOREN**	**MOTORER**	**MOTORE**
bore	alesage	Bohrung	cylinderdiameter	alesaggio
stroke	course	Hub	slaglängd	corsa
capacity	cylindree	Inhalt	kapasitet, cylindervolym	capacita
crankcase	carter	Kurbelgehause	vevhus	carter
crankshaft	vilbrequin	Kurbelwelle	vevstake	albero
cylinder head	culasse	Zylinderkopf	cylindertopp	testa
connecting rod	bielle	Pleuel	vevstake	biella
induction	admission	Duse	insugning	induzione
compression ratio	taux de compression	Kompressionsver-haltnisse	kompressions förhållande	rapporto di compressione
timer	minuterie	Zeitschalter	timer, tidsintällare	interruppton regolabile
starting	demarrage	anlaufen lassen	starta	farepardere
leakage	jeu	undicht	läcka	perdita
mounting ; beam, radial	fixation : laterale, radiale	Flanschbefesti-gung, Stirn-befestigung	montering, bock, radial	montare : attaccio radiale, attaccio laterale
cut out	robinet d'arret	Ausschalter	spjäll	interupptori
torque	couple	Drehmoment	vridnings-moment	reazione di torsione, coppia
FUEL	**CARBURANT**	**BRENSTOFF**	**BRÄNSLE**	**COMBUSIBILE**
ether	ether	Aether	eter	etere
castor oil	huile de ricin	Rizinusol	ricin olja	olio di ricino
paraffin	petrole	Petroleum	motorfotogen	paraffina
petrol	essence	Benzin	bensin	benzina

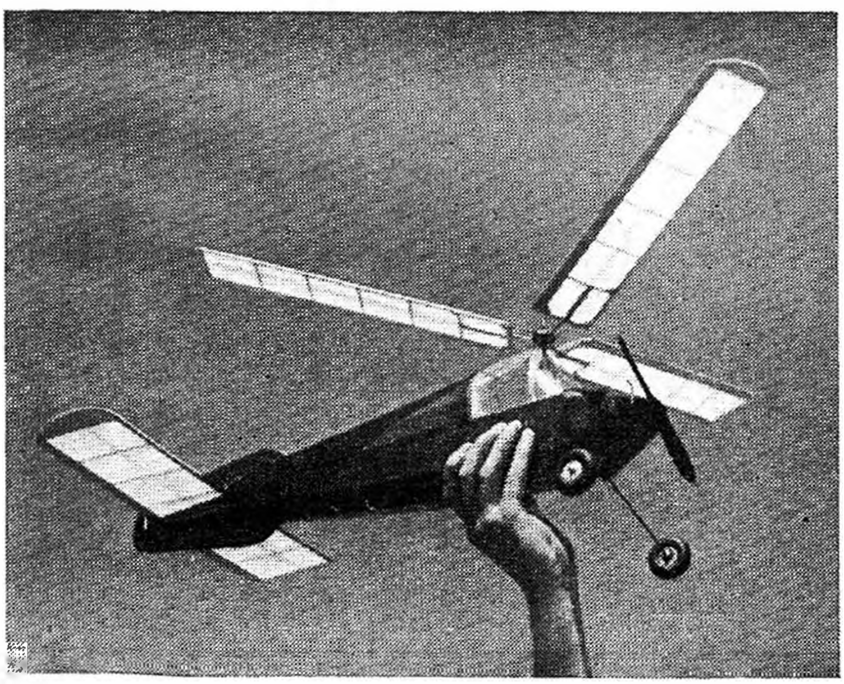
TRY AN AUTOGIRO

UNLESS our records are incomplete, the first powered single rotor model Autogiro to be published anywhere in the world, was the Ro-dart by Dennis Neale in the December, 1951, AEROMODELLER. That this design aroused so much interest in Britain is significant that modellers are looking, as they are ever wont to do, for something new and unconventional to occupy their leisure hours. The age of control-line which started in 1947 here, and reached a peak in 1949-50, is now waning and no longer holds the interest normally coupled with something difficult to build and fly.

We suggest, from practical experience, that if you are looking for something different, exciting and eminently satisfying in its performance, then you should certainly put your hand to an Autogiro.

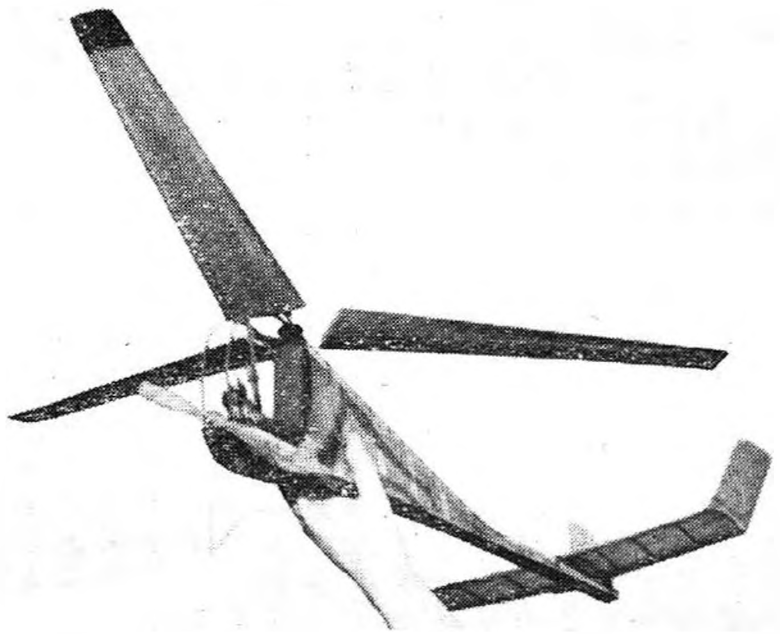
Not wishing directly to copy the Ro-dart, we branched out with the model, subsequently called "Jumping Jiminy" on account of its amazing performance, which is shown accompanying this article and, although we completely lacked even the remotest theoretical knowledge of Autogiro design, our first attempt did, if we may blow our own trumpet, exceed the altitude and rate of climb of the Ro-dart by a creditable margin. Since then, this Allbon Dart powered experiment has maintained regular high performance and this in spite of several facts which have come to light to disclose that many of its design features were far from ideal. In other words, Autogiro design for the .5 c.c. diesel is so flexible that, although the "designer" may tackle the project without previous experience he can, if working within wide limits, be assured of every success.

As far as we were concerned, the performance of our first model was perfectly satisfactory and we were quite prepared to carry on with only structural modifications. However, in the course of correspondence, we located two specialists in the powered model Autogiro and from them and their long experience, we have learned enough to improve flying considerably. These two experts are D. W. Cooper, B.Sc., and R. Coles, M.A., of Newcastle-upon-Tyne and their experiments have centred upon the Frog 150 Diesel. Whereas with our Dart powered model we can, at the most, claim a flight of ¾ mile, they have substantiated claims of flights up to 4 miles, reaching an altitude



Alan Baker's 28-inch diameter design for the Dart made many consistent demonstration flights at the 1952 Northern Heights Gala. Total weight is 7 oz. and maximum height would appear to be in the region of 200 feet. A clubmate of Dennis Neale, Baker has pioneered powered Autogiros since the early days of the prototype Ro-Dart.

(Bill Dean Photo)



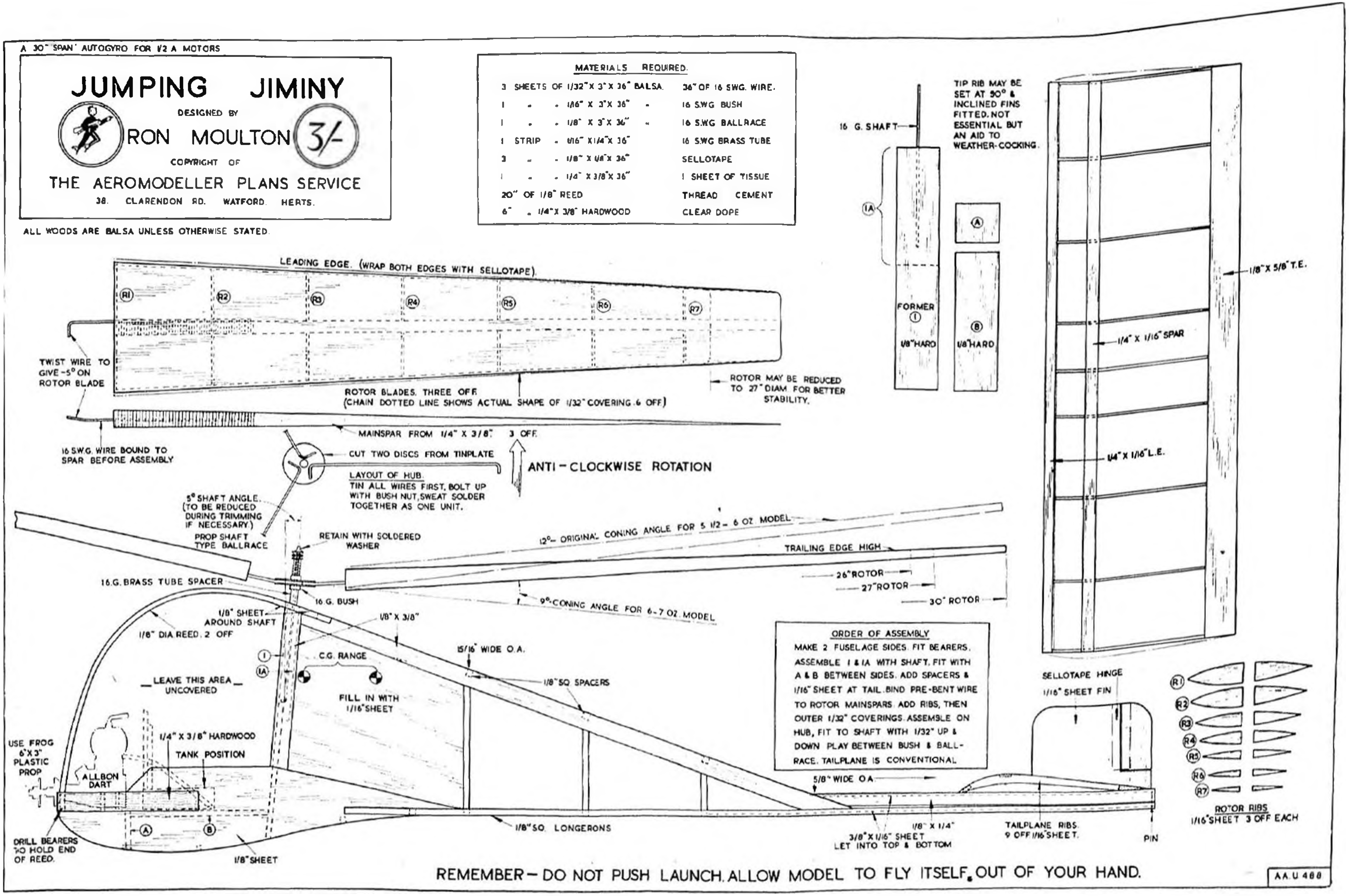
In its original form, with long span rotors, skid type wire undercarriage and inclined tip fins on the tailplane, Jumping Jiminy is seen here. Latest version, produced in plan form overleaf, is slightly different, with modifications born of practical experience. Uncovered cabin portion ensures rearward centre of lateral area

of 500 feet, checked by the local Aero Club's Auster light plane. Impressive though they may be, these flights do indicate the one weak point in known findings and that is the difficulty in obtaining any form of directional control.

If directional control is lacking, other points have come to light to ensure stability and minimise breakage of the vulnerable rotor blades. One great advance in this direction is the hub developed by the Newcastle exponents and which permits each blade to knock off independently, or the actual blade angle to be trimmed for ultimate satisfaction. Spare blades may be carried in the model box for experiment with rotor disc areas or sections and if anything, the whole assembly is no heavier than the all metal soldered fitting described for the Ro-dart and also used on Jiminy.

Tailplane construction can be entirely conventional, as may also the fin, whilst rotor blades open themselves to many varied forms. With a blade area of approximately 80/90 square inches for .5 c.c., a normal built-up structure with tissue covering is practical, although for only a slight concession to weight, it is possible to make the blades from 1/32nd sheet balsa, using a full depth spar and very wide rib spacing. This is particularly useful for blades of streamline section, but in view of the better performance with the Clark Y section blade, it might be more practical to combine normal structure with 1/32nd top sheet covering to maintain an accurate section for the narrow chord. So much for the general construction; now what about the theoretical points which have evolved from practical flying experience ?

A common error in judging an Autogiro's reasons for flying, is that blade area is the criterion and each blade must be regarded as an individual provider of lift. This is erroneous in that lift is provided by the *total* disc area, and if you allow your imagination to run riot, you should consider the disc as a " flying saucer " with the forward part tilted upwards. The airflow against this provides an upward lift, whilst the action of the blade sweeping forwards and into this " tilted" section is assisting matters more than somewhat by virtue of its particular aerofoil section. Obviously, the faster the blades can go round the more " solid " is the disc and the greater the lift generated. Since blade area has a greater effect on rotational speed than on its individual component of lift, the tendency is to high aspect ratio blades for faster rotor speed. Experience now gives us a working figure for this blade area and such a figure is quoted as a


A 30" SPAN AUTOGYRO FOR 1/2 A MOTORS
JUMPING JIMINY
DESIGNED BY
RON MOULTON
3/-
COPYRIGHT OF
THE AEROMODELLER PLANS SERVICE
38. CLARENDON RD. WATFORD. HERTS.
ALL WOODS ARE BALSA UNLESS OTHERWISE STATED
MATERIALS REQUIRED.
3 SHEETS OF 1/32" X 3" X 36" BALSA.
1 " " 1/16" X 3" X 36" "
1 " " 1/8" X 3" X 36" "
1 STRIP " 1/16" X 1/4" X 36"
3 " " 1/8" X 1/8" X 36"
1 " " 1/4" X 3/8" X 36"
20" OF 1/8" REED
6" " 1/4" X 3/8" HARDWOOD
36" OF 16 SWG. WIRE.
16 S.W.G BUSH
16 S.W.G BALLRACE
16 S.W.G BRASS TUBE
SELLOTAPE
1 SHEET OF TISSUE
THREAD CEMENT
CLEAR DOPE
16 G. SHAFT
TIP RIB MAY BE SET AT 90° & INCLINED FINS FITTED. NOT ESSENTIAL BUT AN AID TO WEATHER-COCKING.
1A
A
FORMER 1
1/8" HARD
B
1/8" HARD
1/8" X 5/8" T.E.
1/4" X 1/16" SPAR
1/4" X 1/16" L.E.
LEADING EDGE. (WRAP BOTH EDGES WITH SELLOTAPE).
R1 R2 R3 R4 R5 R6 R7
TWIST WIRE TO GIVE -5° ON ROTOR BLADE
ROTOR BLADES. THREE OFF.
(CHAIN DOTTED LINE SHOWS ACTUAL SHAPE OF 1/32" COVERING. 6 OFF)
ROTOR MAY BE REDUCED TO 27" DIAM. FOR BETTER STABILITY.
MAINSPAR FROM 1/4" X 3/8". 3 OFF.
16 S.W.G. WIRE BOUND TO SPAR BEFORE ASSEMBLY
CUT TWO DISCS FROM TINPLATE
LAYOUT OF HUB.
TIN ALL WIRES FIRST, BOLT UP WITH BUSH NUT, SWEAT SOLDER TOGETHER AS ONE UNIT.
ANTI-CLOCKWISE ROTATION
5° SHAFT ANGLE. (TO BE REDUCED DURING TRIMMING IF NECESSARY.)
PROP SHAFT TYPE BALLRACE
RETAIN WITH SOLDERED WASHER
12° - ORIGINAL CONING ANGLE FOR 5 1/2 - 6 OZ MODEL
TRAILING EDGE HIGH
26" ROTOR
27" ROTOR
30" ROTOR
9° CONING ANGLE FOR 6-7 OZ. MODEL
16.G. BRASS TUBE SPACER
16 G. BUSH
1/8" SHEET AROUND SHAFT
1/8" DIA REED. 2 OFF
1/8" X 3/8"
15/16" WIDE O.A.
C.G. RANGE
1/8" SQ. SPACERS
FILL IN WITH 1/16" SHEET
LEAVE THIS AREA UNCOVERED
1/4" X 3/8" HARDWOOD
TANK POSITION
USE FROG 6"X3" PLASTIC PROP
ALLBON DART
DRILL BEARERS TO HOLD END OF REED.
1/8" SHEET
1/8" SQ. LONGERONS
ORDER OF ASSEMBLY
MAKE 2 FUSELAGE SIDES. FIT BEARERS. ASSEMBLE 1 & 1A WITH SHAFT. FIT WITH A & B BETWEEN SIDES. ADD SPACERS & 1/16" SHEET AT TAIL. BIND PRE-BENT WIRE TO ROTOR MAINSPARS. ADD RIBS, THEN OUTER 1/32" COVERINGS. ASSEMBLE ON HUB, FIT TO SHAFT WITH 1/32" UP & DOWN PLAY BETWEEN BUSH & BALL-RACE. TAILPLANE IS CONVENTIONAL.
5/8" WIDE O.A.
1/8" X 1/4"
3/8" X 1/16" SHEET LET INTO TOP & BOTTOM
SELLOTAPE HINGE
1/16" SHEET FIN
TAILPLANE RIBS. 9 OFF 1/16" SHEET.
PIN
ROTOR RIBS 1/16" SHEET 3 OFF EACH
REMEMBER - DO NOT PUSH LAUNCH. ALLOW MODEL TO FLY ITSELF OUT OF YOUR HAND.
A.A.U 488

" Solidity Factor," or in other words, the ratio of the actual rotor blade area to the total swept area of the rotor disc. This is the area for all blades and since, for balance and maximum efficiency three blades are used, the actual solidity is divided by three for individual blade area. For example, a suitable rotor diameter for a 1 c.c. engine, would be about 32 inches, which gives a total swept area of 805 square inches and by practical experience, the solidity factor in this case should be about 12½ per cent. Then the total blade area should be about 100 square inches, which means that the individual blades will be 33/35 square inches each. With the blade span fixed by the decided rotor diameter of 32 inches, less allowance for root attachment, the aspect ratio of the blades is thus regulated by the chord necessary to provide this area, which should be approximately 2⅜ inches giving an aspect ratio of 5.6 for a 14½-inch blade. Using the Newcastle hub, solidity should be less, using approximately same rotor chord.

As the rotor diameter is increased so the solidity factor should decrease proportionately, whilst for smaller diameters the solidity increases.

So much for blade areas; now what about their angles and the means by which they will work. We have already seen that the inclined forward portion of the disc is responsible for some part of the lift and the angle of this forward portion may be considered similar in effect to the incidence used on the wing of a conventional model. Although we managed to convince ourselves that an angle more in keeping with the *dihedral* of a fixed wing is essential here, we reduced the coning angle (or dihedral) from 12 degrees to 9 degrees and also the backward angle of the rotor shaft to 3 degrees. Thus at the most, the upward and forward inclination of the blade pointing forwards will be 12 degrees; and the blade pointing aft will be horizontal. This set-up has been confirmed in practice as the best arrangement for general stability, providing the disc loading is in the region of 2/3 ozs. per square foot—only with a considerably lighter loading was Jiminy successful with the large coning angle of 12 degrees. So now we have another factor for the 1 c.c. Autogiro specification, and that is that it should be approximately 12½/15 ozs. total weight for best performance.

As mentioned earlier, the advancing blade provides lift by virtue of its aerofoil section and it is arranged so that it sweeps spanwise into the forward half of the disc at an angle near enough to neutral. With a backward inclination of the rotor shaft at up to 5 degrees this indicates a fixed negative angle on each blade at minus 5 degrees for first tests. If it is necessary to speed up the rotor then this blade angle may be reduced, as also the rotor shaft angle which should always be kept as small as possible. Best blade section is undoubtedly one of the Clark Y or "arc of circle" variety, although a symmetrical section was used to very good effect and did enable a deeper spar to be used.

With rotors moving in a clockwise direction when viewed from above, there is a tendency to roll to starboard, a very handy fact which helps to counteract torque, whilst an opposite rotor direction means a constant will on the part of the model to roll off to port. One method used by a famous Japanese aircraft designer, Kazuo Kasaki, with his *rubber* driven Autogiro is to make the tailplane with one half upside down to the other and in that way having the tail in constant battle to roll the fuselage in an opposite direction to that desired by the rotors. Whichever way the rotors are fitted, one is assured of success, for our experiments have been anti-clockwise, as with Ro-dart, whilst in Newcastle clockwise rotation is favoured.

Before departing from the rotor we should mention that for motive power a normal tractor airscrew is used on the engine, but there is a distinct advantage to be gained if a larger diameter than normal is used in a combination with low pitch to maintain r.p.m. Use of downthrust has twofold points in favour, for not only does it direct slipstream on to the rear half of the disc, but it also has its more usual helpful effects should the 'giro find itself standing on its tail and grasping for air.

Like their full size counterparts, model Autogiros require a tail unit for general stability, though fin area is by no means critical and is certainly not effective for directional control. Inclined tip fins may be arranged to keep the machine headed into wind for the power run though this is not altogether effective. It does, however, carry on a small air of realism in reproducing the appearance of the Cierva tail units which were characteristic with their inclined tips. Further realism may be extended to either the open cockpit type of fuselage also common to the Cierva marque or, with a combination of helicopter appearance, one may adopt an open frame cabin around the nose in the manner of the Bell or Hiller helicopters.

Reverting to the tail end, there comes the consideration of tail area, section and tail moment arm. Again practical experience gives us the lead, for, working quite independently, both Mr. Cooper in Newcastle and ourselves in the London area, have found that 7 per cent. of the disc area is ideal. For the 1 c.c. specification this would indicate a 57 square inch tailplane. On section there is a slight difference of opinion in that Clark Y or flat plate tail are used in the north and we are more content, in view of the high angle of attack which the tailplane is often forced to combat, to use a high lift aerofoil of the RAF 19 or Marquardt S-2 variety.

Moment arm should not be short and the leading edge of the tailplane should not be allowed to enter the rotor disc area. In fact, it is better to increase the moment arm to approximately 1.25 times the radius of the rotor disc as a security measure against a peculiar manoeuvre, sometimes described as an Autogiro "stall," but which is more in keeping with a stall turn than the conventional straight forward switchback motion.

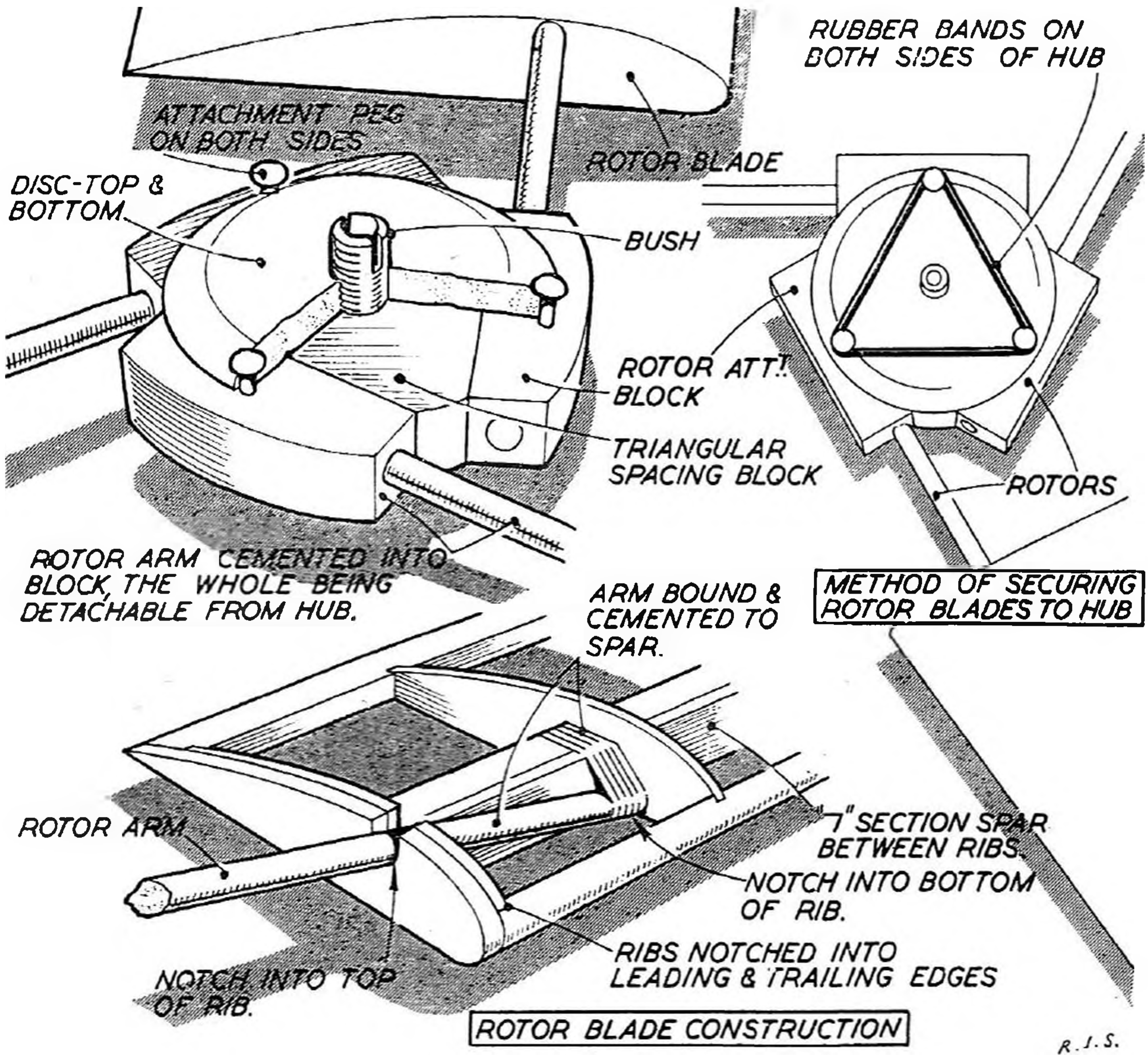
One point now remains for us to close this introduction to a non-theoretical approach to Autogiro design and that is the CLA and CG positions. A glance at the Jiminy outline will show you that the CLA is considerably aft of the rotor shaft and we would advise intending designers to make certain of this simple fact. For good stability the centre of gravity should be just behind the rotor shaft, but this will not be found to be altogether critical, though the CG should never be allowed to stray in front of the rotor pivot point.

Dennis Neale, who has by no means been standing still after his successful pioneering "Ro-Dart" design, offers his latest findings on these last mentioned points of design.

"An autogiro does not turn in the normal way, by banking, since there are no banking forces (even with dihedral), when the model yaws. If the model banks, it is either due to a very low CG or to the rotors having unbalanced incidences, *i.e.*, one side lifting more than the other. The autogiro turn is merely a pure rotation about the rotor head (or very near it) caused in the first instance by rudder effect and the model follows its thrust line. This combination of rotation and forward movement produces the flat, rather 'skidding' turn of the autogiro, and dihedral (coning angle), unless excessive, does very little, if anything, to help cure this skid. The only way of stopping this skid is to adjust the rotors to bank the model, which generally screws the job in anyway, so it's safer to skid! Hence, providing the CLA is behind the rotor head, its actual position is immaterial. Dihedral is, however, necessary to correct any serious sideslip that may occur. I have found that if the area of the tailplane is greater than half the blade area of the rotors, and its moment arm is greater than three-quarters the blade length from LE of tailplane to rotor head, the model is perfectly stable."

"Test fly for the first time with the motor at half speed and release only when the rotors develop sufficient lift to raise the model out of the hand. Tendency to roll is due to unbalanced rotor incidence. A spin to the left with anti-clock rotors means too much incidence on the right hand side of the rotor disc. Adjust the incidence until a gentle turn is achieved, then use opposite rudder. Cure stalls with a combination of downthrust and tailplane incidence rather than moving the CG or rotor angle."

Below, the "Newcastle" Hub for quickly detachable blades



With a good diesel, a spot of oil on the ball race *above* the rotor hub, plenty of fuel and enthusiasm, you will find a day's flying with a model Autogiro can be one of if not the most exhilarating branch of our absorbing hobby.

We are indebted to Messrs. D. W. Cooper, B.Sc., and R. Coles, M.A., for their co-operation in assisting us with information on their own experiments and for their goodwill in providing the following fifteen guiding points for the budding Autogiro designer.

1. Lift is dependent on swept area (disc area).
2. Blade area has little effect on lift, but a great effect on rotational speed (Rotor revs.). Small blade area gives high revs.
3. Solidity should be kept as low as possible, but depends on blade chord.
   .125 (.15) up to 24 in. diameter.*
   .100 (.125) up to 24 in. to 30 in. diameter.*
   .080 (.10) up to 30 in. to 36 in.*
4. Backward tilt of rotor shaft is similar to incidence of an ordinary wing. Should be kept as small as possible, 3 degrees to 5 degrees.
5. Blade section can be any good general purpose wing section. Symmetrical sections are not the best : authors find Clark Y good from both theoretical and practical viewpoints.
6. If torque rolls machine to port, rotor should run clockwise when viewed from above.
7. Torque can be controlled to some extent by using a tailplane built in two halves with one half working at a greater incidence than the other. Usually large incidence on port side, small or zero on starboard side.
8. Coning angle (dihedral) of rotor blades should be kept small. Not more than 5 degrees should be necessary. Increase of coning angle produces same effect as increasing backward tilt of rotor shaft (*i.e.*, incidence of disc).
9. Best position of C.G. is *very slightly* behind rotor shaft. Position not critical for power flight, but greatly affects "glide."
10. Authors use downthrust to direct slipstream on *rear* of rotor disc, so that rotor runs at high speed *without assistance from wind.* This is a very necessary factor for ROG flying.
11. Use airscrew about 25 per cent. larger in diameter than that normally recommended for free flight by engine manufacturers. Keep pitch low at 4 in. to 5 in. Use good blade area.
12. Successful flying depends on matching engine torque to *forward speed* of aircraft and rotor characteristics. It is *fatal* to attempt high forward speed unless the rotor runs at extraordinarily high r.p.m. The authors' maximum rotor speed obtained on 32 in. dia. was 350 r.p.m. With Frog 150 maximum forward speed was about 12-15 m.p.h. in still air.
13. Tailplane area similar to ordinary pylon type model. About 1/14th of *disc* area can be used. Aspect ratio 4 to 5. Section Clark Y. Flat plate has been used successfully.
14. Fin area can be small (even non-existent).
15. For successful ROG flight, the ground angle should be such that rotor incidence is at least 10 degrees.

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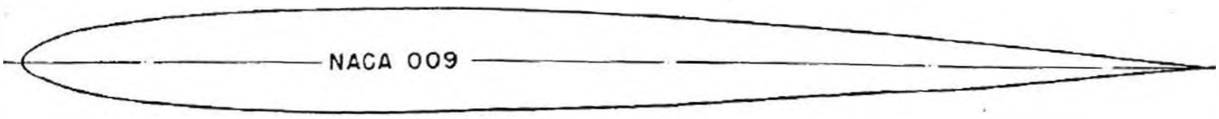
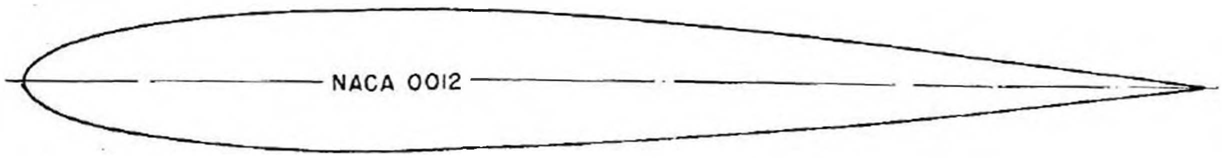
* In (3) bracketed figures are for short rotor arm attachments

AEROFOIL SECTIONS



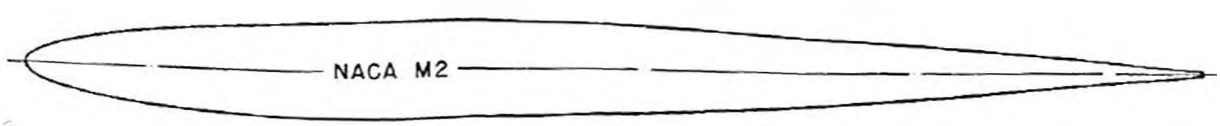
Station	0	1.25	2.5	5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	0.00	1.42	1.96	2.67	3.15	3.51	4.01	4.30	4.50	4.35	3.97	3.42	2.75	1.97	1.09	0.6	0.00
Lower	0.00	-1.42	-1.96	-2.67	-3.15	-3.51	-4.01	-4.30	-4.50	-4.35	-3.97	-3.42	-2.75	-1.97	-1.09	-0.6	0.00



Station	0	1.25	2.5	5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	0.00	1.89	2.62	3.56	4.20	4.68	5.34	5.74	6.00	5.80	5.29	4.56	3.66	2.62	1.45	0.81	00
Lower	0.00	-1.89	-2.62	-3.56	-4.20	-4.68	-5.34	-5.74	-6.00	-5.80	-5.29	-4.56	-3.66	-2.62	-1.45	-0.81	00

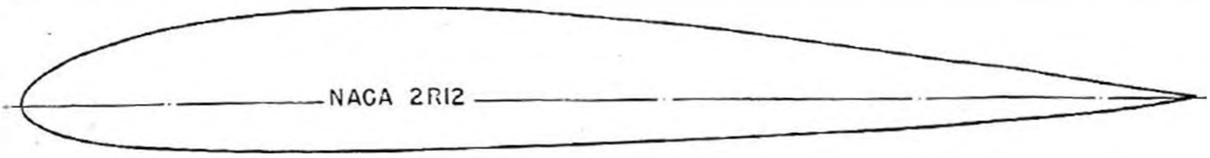
Station	0	1.25	2.5	5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	0	1.85	2.5	3.45	4.1	4.7	5.4	5.85	6.35	6.35	5.85	5.15	4.2	3	1.5	0.65	0
Lower	0	-1.85	-2.5	-3.45	-4.1	-4.7	-5.4	-5.85	-6.35	-6.35	-5.85	-5.15	-4.2	-3	-1.5	-0.65	0

Station	0	1.25	2.5	5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	0	1.5	2.3	3.1	3.6	4.0	4.4	4.6	4.75	4.5	4.0	3.4	2.65	1.9	1.05	0.6	0.1
Lower	0	-1.5	-2.3	-3.1	-3.6	-4.0	-4 4	-4.6	-4.75	-4.5	-4.0	-3.4	-2.65	-1.9	-1.05	-0.6	-0.1

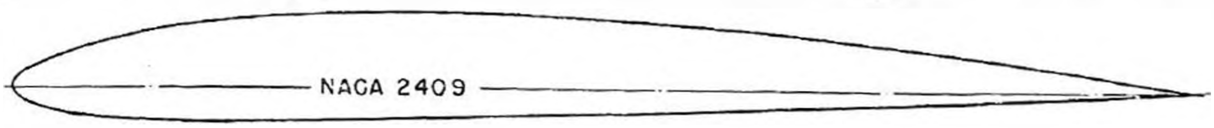


Station	0	1.25	2.5	5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	0.00	1.30	1.74	2.33	2.74	3.05	3.49	3.78	4.03	4.00	3.74	3.30	2.71	1.99	1.15	0.60	0.20
Lower	0.00	-1.30	-1.74	-2.33	-2.74	-3.05	-3.39	-3.78	-4.03	-4.00	-3.74	-3.30	-2.71	-1.99	-1.15	-0.60	-0.20

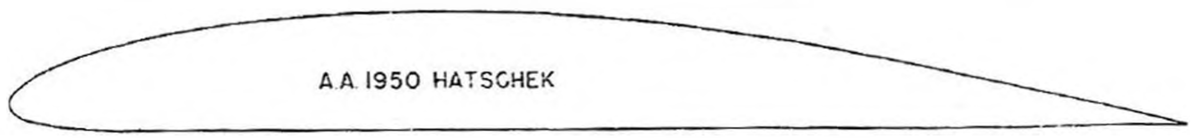
Station	0	1.25	2.5	5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	0.00	2.67	3.61	4.91	5.80	6.43	7.19	7.50	7.55	7.14	6.41	5.47	4.36	3.08	1.68		0.13
Lower	0.00	-1.23	-1.71	-2.26	-2.61	-2.92	-3.50	-3.97	-4.46	-4.48	-4.17	-3.67	-3.00	-2.16	-1.23	-0.70	-0.13



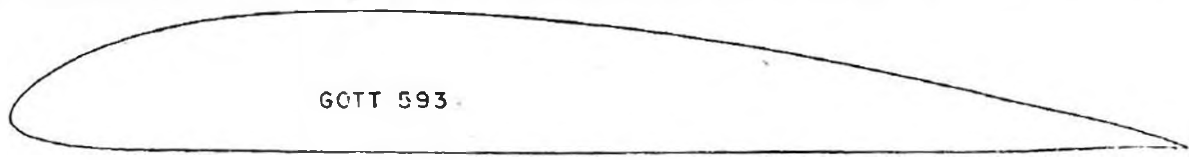
Station	0	1.25	2.5	5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	0.00	2.24	3.10	4.29	5.16	5.84	6.82	7.47	7.98	7.76	7.03	5.94	4.61	3.16	1.63		0.13
Lower	0.00	-1.57	-2.17	-2.86	-3.28	-3.57	-3.83	-4.02	-4.02	-3.84	-3.55	-3.18	-2.72	-2.10	-1.26		0.13



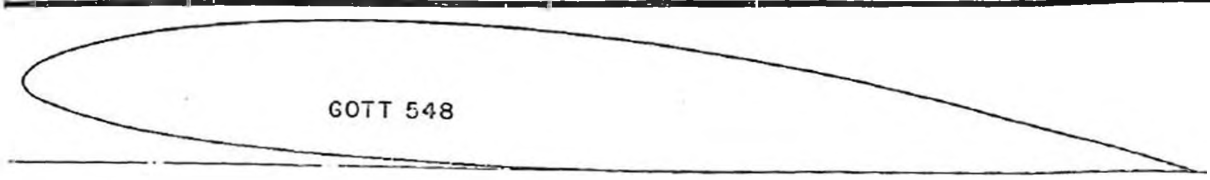
Station	0	1.25	2.5	5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	0.00	1.62	2.27	3.20	3.87	4.43	5.25	5.81	6.38	6.35	5.92	5.22	4.27	3.10	1.72	0.94	0.00
Lower	0.00	-1.23	-1.66	-2.15	-2.44	-2.60	-2.77	-2.79	-2.62	-2.35	-2.02	-1.63	-1.24	-0.85	-0.47	-0.28	0.00



Station	0	0	1.25	2.5	5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	2.4	4.0	4.8	6.0	6.7	7.3	8.3	9.0	9.5	9.8	10	9.5	8.3	6.7	4.8	2.6	1.3	0
Lower	2.4	1.1	0.7	0.3	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0

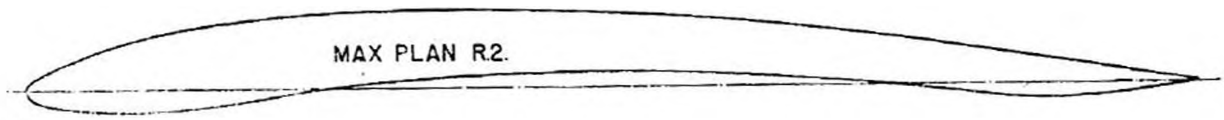


Station	0	1.25	2.5	5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	3	5.5	6.5	7.85	8.9	9.6	10.95	11.5	12	11.7	10.85	9.45	7.65	5.5	3	1.65	0
Upper	3	1.8	1.35	0.85	0.55	0.4	0.25	0.15	0.1	0	0	0	0	0	0	0	0

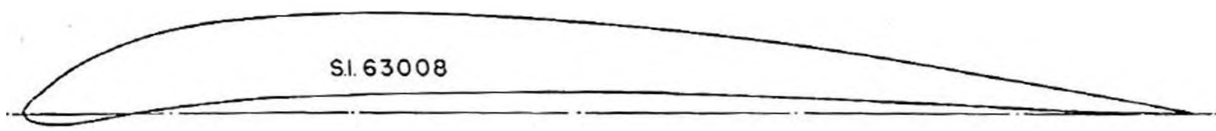


Station	0	1.25	2.5	5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	6.55	8.25	8.23	9.75	10.40	10.95	11.65	12.10	12.5	12.15	11.25	9.9	8	5.95	3.15	1.8	0.15
Lower	6.55	5.25	4.95	3.9	3.25	2.75	1.95	1.4	0.65	0.25	0.05	0	0	0.1	0.1	0.1	0.15

Station	0	5	15	25	30	40	50	60	70	80	90	95	100
Upper	0.0	3.0	5.0	7.5	8.5	9.0	8.5	7.5	5.8	4.0	2.0	1.0	0.0
Lower	0.0	-1.7	-1.3	0.6	2.6	3.4	3.6	3.0	1.8	0	-1	-0.75	0.0

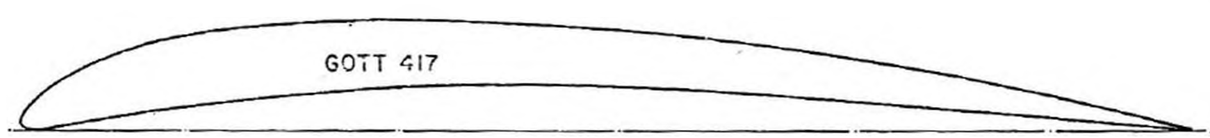


Station	0	5	15	25	30	40	50	60	70	80	90	95	100
Upper	0.00	2.77	4.35	5.05	6.55	6.8	6.35	5.65	4.45	3.3	1.8	0.96	0.0
Lower	0.00	-1.93	-1.95	+0.85	00.65	1.2	1.35	1.15	0.45	-0.7	-1.2	-0.8	0.0

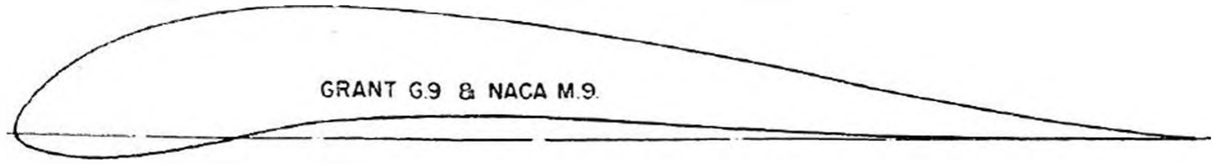


Station	0	2.5	5	15	25	30	40	50	60	70	80	90	100
Upper	0	2.30	4.50	6.7	8.30	8.7	8.4	7.8	6.6	5.3	3.6	1.9	0
Lower	0	-1.0	-0.9	0.0	1.2	1.6	1.8	1.8	1.5	1.2	0.6	0.1	0

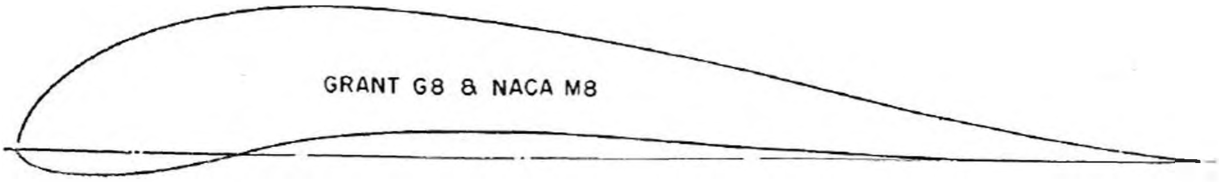
Station	0	2.5	5	15	25	30	40	50	60	70	80	90	100
Upper	0.8	3	4.4	6.4	8.4	8.8	8.5	7.8	6.9	5.6	4.1	2.1	0.7
Lower	0		0.9	1.6	2.4	2.9	3.2	3.1	2.6	2.1	1.4	0.8	0



Station	0	1.25	2.5	5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	0.65	2.50	3.75	5.05	6.25	7.05	8.15	8.84	9.30	9.15	755	a.55	6.25	4.50	2.40	1.20	00
Lower	0.65	0.05	0.25	0.70	1.10	1.50	2.20	2.55	3.65	3.90	3.63	3.20	2.50	1.70	0.80	0.40	00

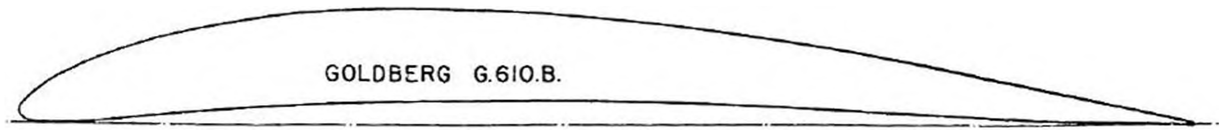


Station	0	1.25	2.5	5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	0	3.12	4.50	6.39	7.79	8.85	10.11	10.79	11.11	11.10	10.29	8.78	6.95	4.84	2.94	1.22	0.00
Lower	0	−1.05	−1.39	−1.65	−1.66	−1.55	−0.72	+0.33	1.12	1.72	1.98	1.58	0.89	0.44	0.11	0.06	0.00



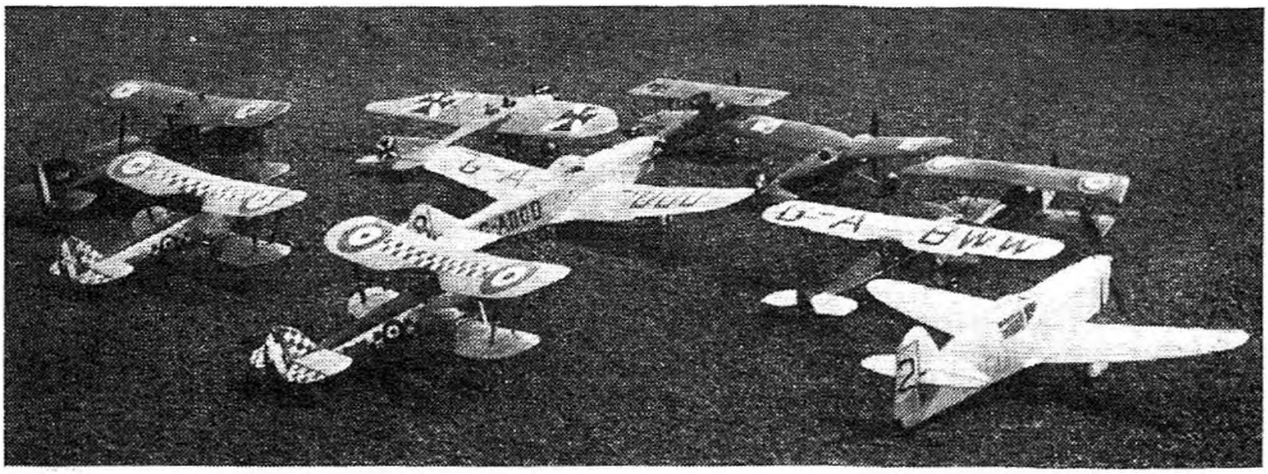
Station	0	1.25	2.5	5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	0	3.50	5.06	7.18	8.75	9.95	11.35	12.12	12.50	12.41	11.57	9.89	7.82	5.44	3.31	1.38	0.00
Lower	0	−1.19	−1.56	−1.93	−1.94	−1.75	−0.81	+0.38	1.35	1.94	2.22	1.78	1 00	0.80	0.13	0,06	0.00

Station	0	1.25	2.5	5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	0	2.80	4.05	5.74	7	7.96	9.10	9.70	10.00	9.93	9.25	7.90	6.25	4.35	2.65	1.10	0.00
Lower	0	−0.95	−1.25	−1.49	−1.50	−1.40	−0.65	+0.30	1.08	1.55	1.76	1.42	0.80	0.40	0.10	0.05	0.00



Station	0	1.25	2.5	5	10	15	20	25	30	40	50	60	70	80	90	95	100	00
Upper	1	2.7	3.7	4.0	6.0	6.7	8.0	9.0	9.5	9.8	9.8	9.1	7.7	6.3	4.3	2.3	1.2	00
Lower	1	0	0	0.1	0.3	0.7	1.1	1.5	1.7	1.9	2.0	1.9	1.6	1.2	0.7	0.1	00	00

Station	0	1.25	2.5	5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	1.65	4.26	5.35	6.82	8.02	8.92	10.30	11.04	11.60	11.28	10.34	8.86	6.72	4.60	2.15	0.96	0.00
Lower	1.65	0.29	0.00	0.14	0.46	0.78	1.20	1.55	2.16	2.48	2.48	2.00	1.48	1.01	0.58	0.26	0.00



SCALE POWER MODELS

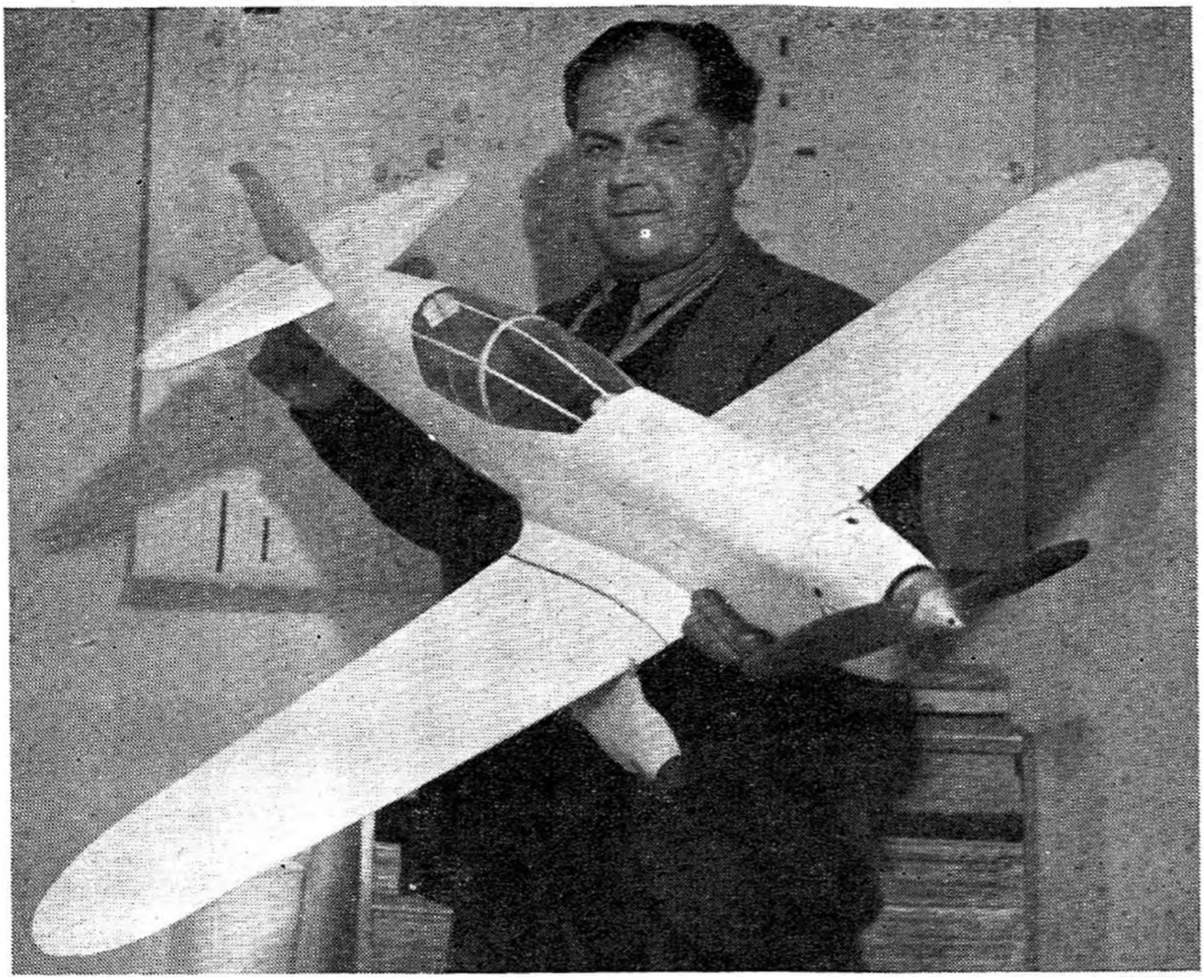
If at any of the many branches in this hobby of aeromodelling the British modeller may be said to excel, it would certainly be in the category of Flying Scale power models. There may be special reasons for this, better facilities for obtaining scale plans in this country being perhaps the most important ; but the fact remains that there is currently in this 1952 season a boom in free lance design of scale jobs and the general object would appear to be to try and select a model that has not been tackled before. A glance at the heading photograph, which shows a few of the many models in the South London (Scale) M.F.C., will reveal the diversity of types selected by one enthusiastic group.

So, in writing an article advising the selection of certain aircraft as subjects for scale, we must avoid mention of types which have already been published. In view of the large selection available through the AEROMODELLER PLANS SERVICE, which does already incorporate a great many " first choices," the field would appear at first sight to be limited.

This, we hasten to assure you, is not the case and we hope to bring to your attention a few untried subjects (though we stand to be corrected) which have not as yet been published as flying scale designs or come to our notice in the modelling world.

Perhaps you are not a scale modeller and have a scepticism of possible performance of any full size aircraft, scaled down to model size. There is an all too common viewpoint that the proportions of the full size craft are not readily useful for model purposes. This is now proven to be a false impression although we must admit that there are some full size aircraft of hopeless configuration, for example, the tandem wing pusher Miles M 35 " Libellula." Now, having quoted that aircraft as being unsuitable, we shall probably be inundated with photographs and drawings of successful flying scale versions of it, such are the vagaries of the scale modeller ! No, it would be difficult to find aircraft which are not at all suitable for model flight and, rather, the problem is to find the design which is more suitable than most.

Two items have greatly contributed to the increase in popularity of scale models, the first being the system of pendulum controls and the second, the widespread introduction of small capacity diesel or glowplug motors which are extremely easy to install. The majority of free flight scale models today are equipped with either a pendulum operated rudder or elevators which can



Britain s most ardent scale power fan, P. E. Norman, is a specialist in free-flight aerobatic models of amazing strength. His 46-inch span Percival Mew Gull has only 320 sq. in. wing area for its E.D. 3.46 diesel, and flies at 50 m.p.h. . . . plus ! (Bill Dean photo)

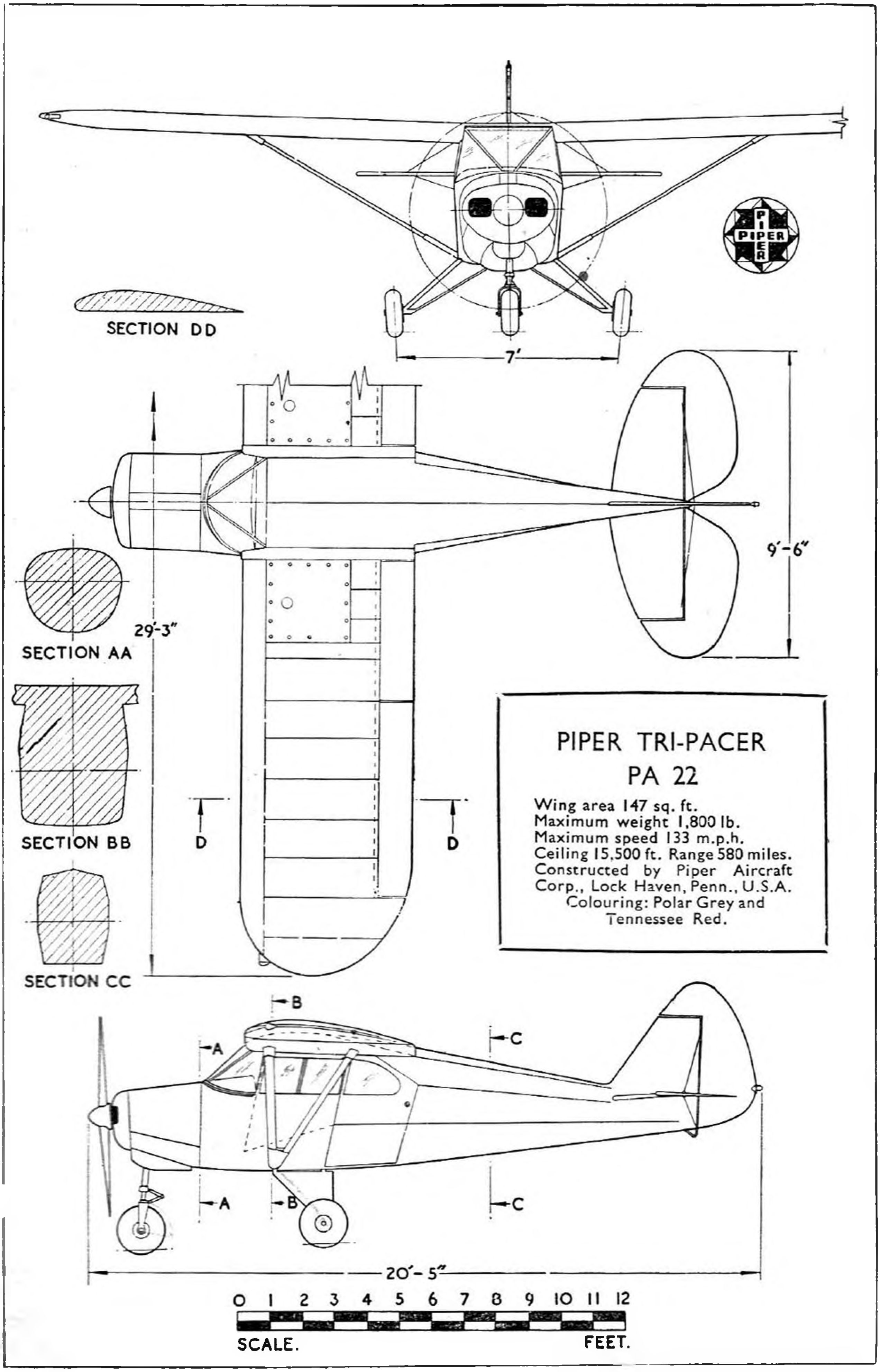
compensate to a large degree for the inherent instability. Readers who have seen P. E. Norman's Percival Mew Gull, with its diminutive tailplane and highly loaded wings, will readily recognise the benefits of pendulum control as they reflect on the excellent flight characteristics of this impressive model. We should, then, give first consideration to pendulum operated control surfaces and can now dismiss the once considered drawback of lack of dihedral.

The simple radial or beam installation of the modern engine means that the construction of the model can closely follow that of the full size aircraft. Gone are the days when ignition equipment had to be dispersed about the fuselage to the general disfiguration of the internal construction.

Now why should we build a scale model ?

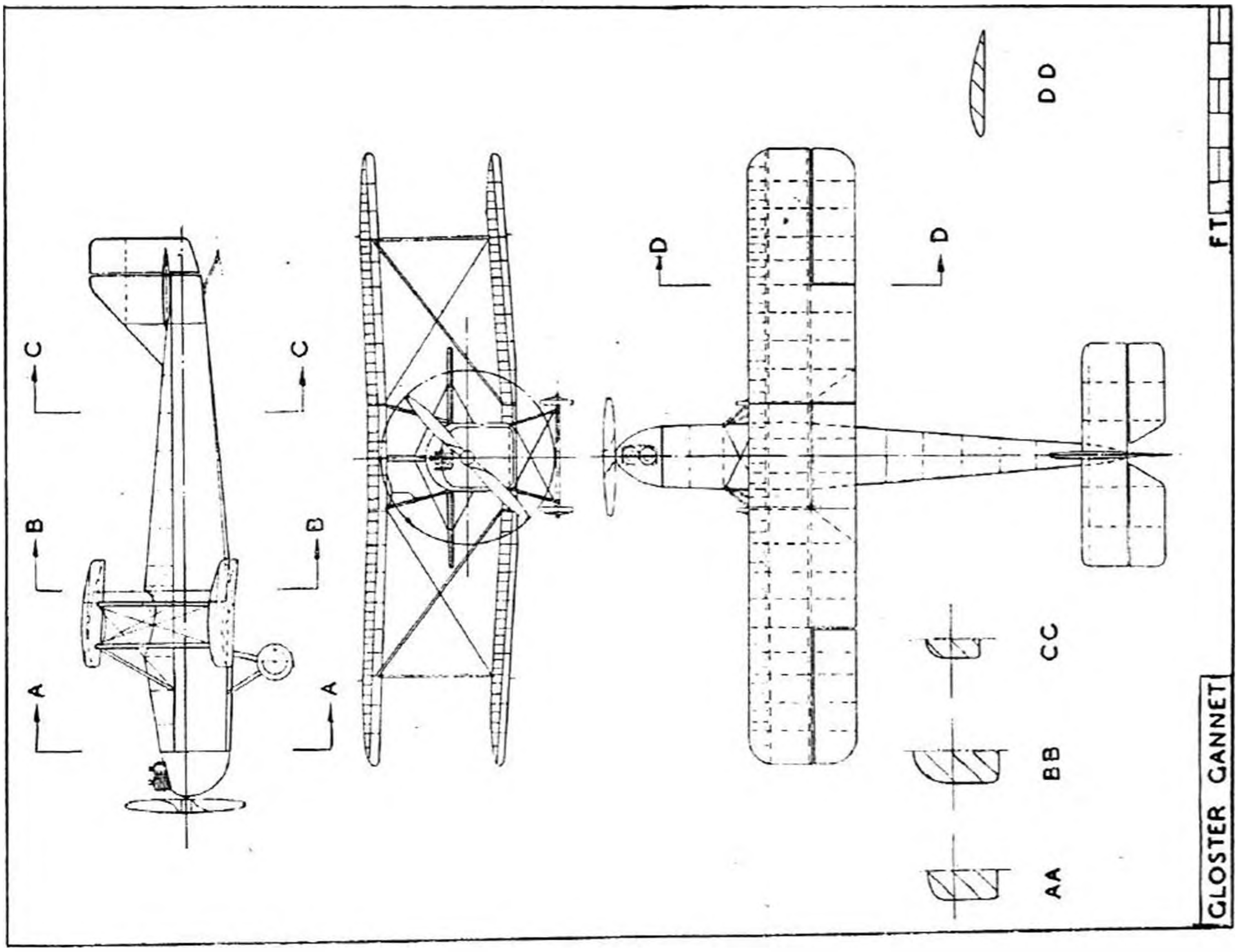
For appearance alone, the scale model has a great attraction. If it can be made to fly realistically, it adds extra zest to sport flying and it may be regarded as one of the most satisfying forms of aeromodelling we can experience.

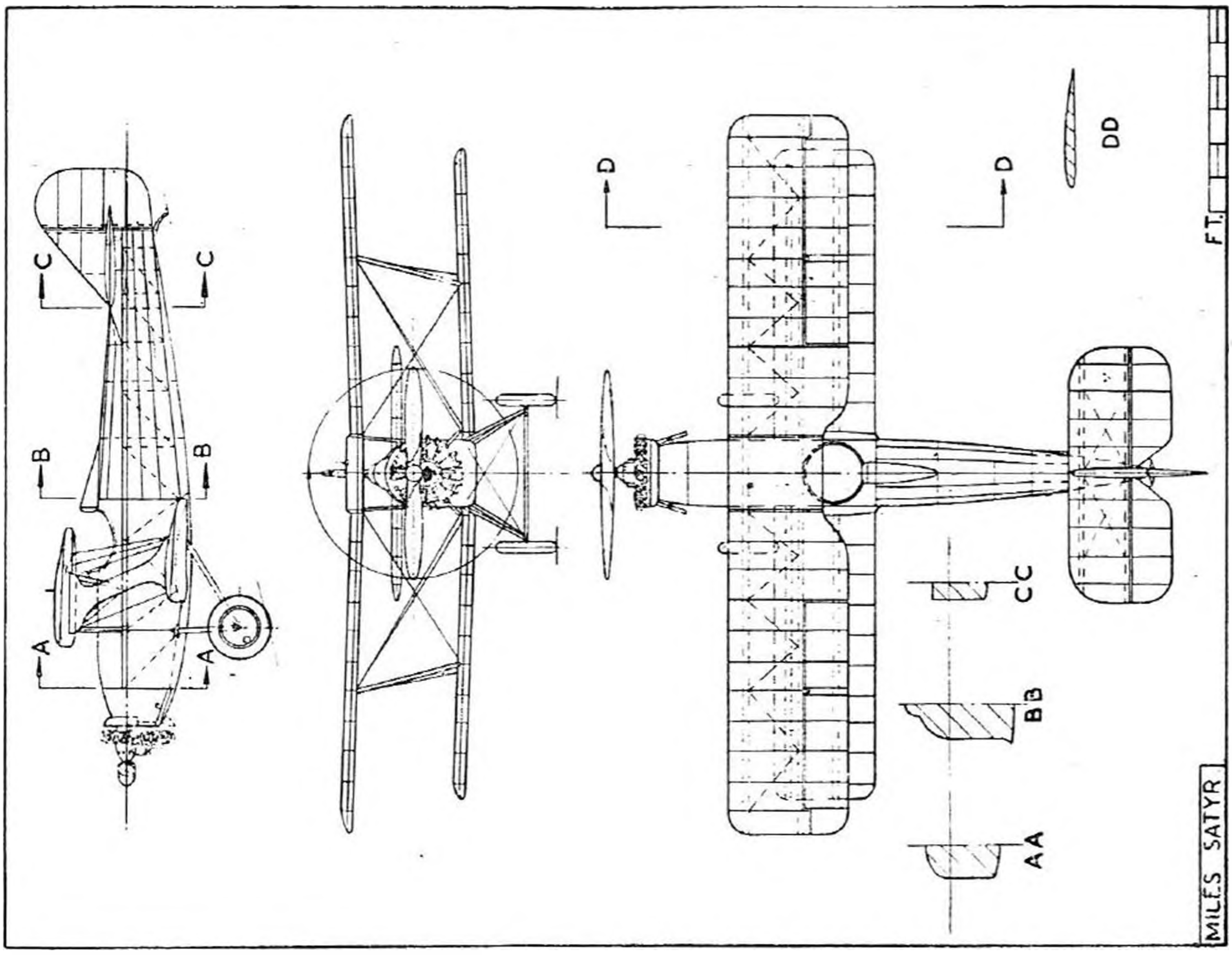
A scale model project can also be a very pleasant constructional exercise. Once you have obtained an accurate outline drawing of the selected type, your task is to fill in the model details to provide you with a miniature of the real thing. Then, when it is completed and ready for decoration, you may employ your paint brush and colour dope to best advantage with the military insignia, civil registration lettering or general decor. So you may see that in three



PIPER TRI-PACER
PA 22

Wing area 147 sq. ft.
Maximum weight 1,800 lb.
Maximum speed 133 m.p.h.
Ceiling 15,500 ft. Range 580 miles.
Constructed by Piper Aircraft Corp., Lock Haven, Penn., U.S.A.
Colouring: Polar Grey and Tennessee Red.


GLOSTER GANNET
FT.
A
B
C
D
AA
BB
CC
DD


MILES SATYR
FT.
A
B
C
D
AA
BB
CC
DD

different ways, flying, construction and in decoration, the scale model has considerable added attraction over its more orthodox counterpart.

Selection

Start looking for your proposed subject in the local Public Library. If they are able to loan you copies of " Janes All the World's Aircraft," you will find photographs as varied as that title suggests. Flip through your back numbers of the AEROMODELLER and study the types included in the " Aircraft Described " series. Ideal three view drawings were included in all seven volumes of " Aircraft of the Fighting Powers " and many thousands of silhouettes were published in the " Aeroplane Spotter." With these references available, one should have little difficulty in selecting a suitable aircraft. We might also mention the A.P.S. catalogue of no less than 480 scale plans which may be had from the AEROMODELLER offices for a nominal sixpence.

What type to select ? A fighter of the 1914/18 era with plenty of gaudy colouring, or a modern light plane with cantilever construction and simple undercarriage, or a biplane of the 1920/35 period of pert appearance, but little historic attachment ? Most people, it would seem, prefer to select a type with an air of glamour about it, probably renowned for special performance, and which can be decorated to identify itself with a certain single full size aircraft. The Fokker Triplane, Hawker Hart and Miles Hawk Speed 6, are but three easily found examples of this type of model and no one can deny that the performance of each is, like the appearance, a perfect representation of the full size craft.

If we forget glamour and look harder for *Biplanes* with reasonable proportions for model work, then two types immediately come to mind. The Miles Satyr and the Gloster Gannet are each single seater light biplanes with generous tail area and pleasing proportions. The Gannet is particularly easy to reproduce with its simple vertical in-line twin engine and slab sided round top fuselage. If its lines are a trifle austere for your taste, the attractive Satyr with its Pobjoy engine, " solid " inter-plane struts and neat cockpit with head fairing, will certainly tempt you. Designed in 1931 for Mr. Miles' personal use as an aerobatic aeroplane, the Satyr was the fourth Miles design, and may be said to be the one type which took Miles to Reading and played a great part in the foundation of the Miles organisation. Registered G-ABVG, the Satyr was sold to Mrs. Victor Bruce, for use by Mr. John Pugh with Hospitals Air Pageants, a touring air show.

Have a look at the accompanying drawings for these two pretty biplanes. The Hawker Cygnet is another light biplane, this time a two-seater, with the lower wing much smaller than the upper, and in view of its horizontally opposed engine, it would be more suitable if side mounting of your power unit is preferred.

Among *High-wing* Monoplanes, the Hillson Praga, a Czechoslovakian design, which was popular in Great Britain before the war, is an ideal proposition with its strut-less cantilever wing and very convenient tail moment arm and areas. The motor may be side mounted with an additional dummy cylinder to make it look like the real air-cooled twin, and the simple hexagonal fuselage may be easily reproduced.

Unfortunately, space does not permit us to reproduce three views of this ideal subject, but an excellent 1/36th scale drawing is available through the

1/36th scale drawings of the two aircraft opposite are obtainable through A.P.S.

Beautifully constructed 1/7th scale Newbury Eon by Cpl. Newman of the R.A.F. has an equipped cockpit. Pendulum ailerons are fitted to aid stability. Span is 5 ft. 6 in. and engine an Elfin 2.49 diesel (Bill Dean photo)

AEROMODELLER Plans Service for a florin. If this simple lightplane is your choice, you can be assured of success, for its proportions would lead one to think that the full-size aircraft was no more than a scaled-up model !

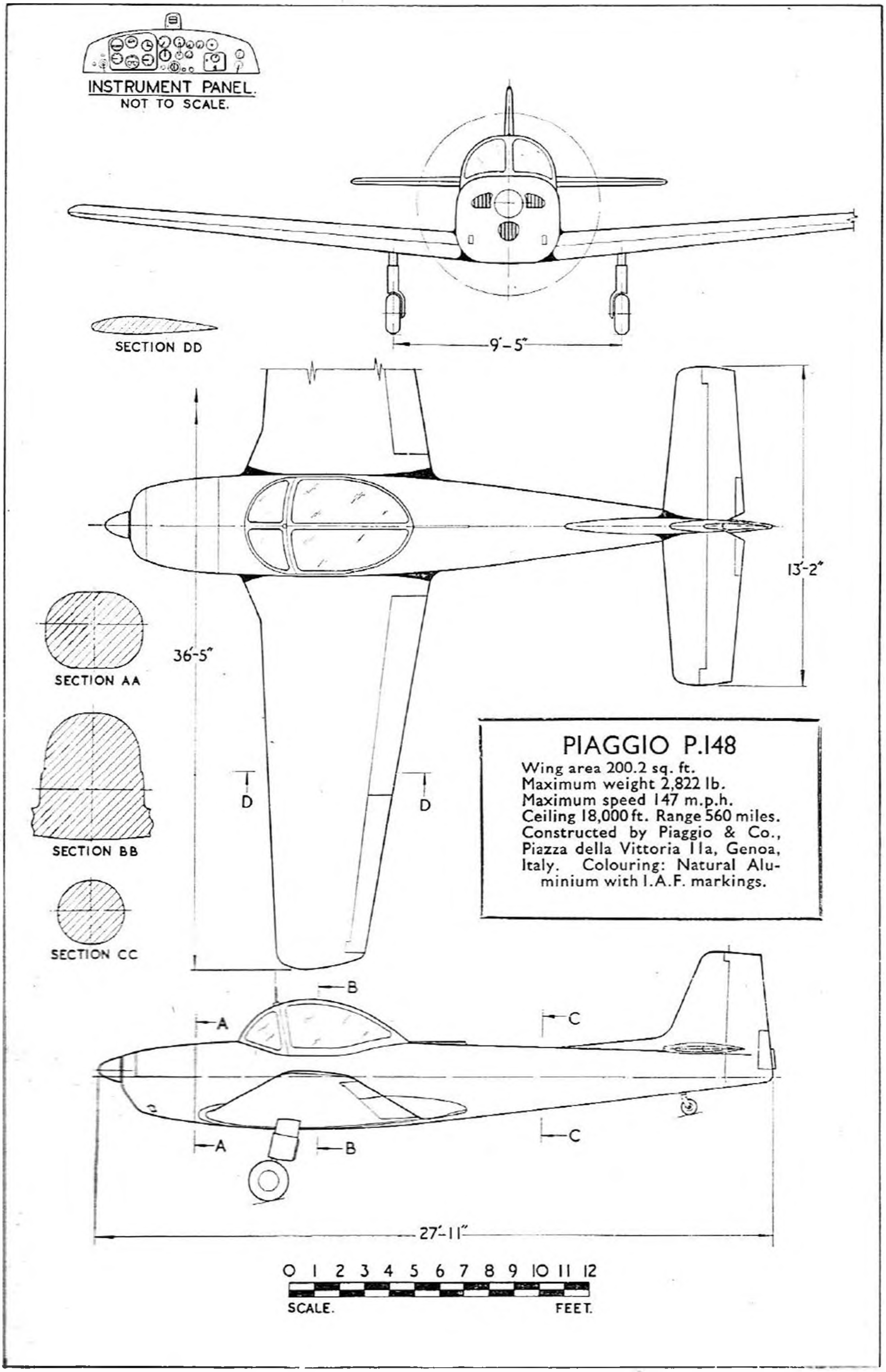
British registration of one such Hillson Tourer, was G-AEEU and a standard colour scheme would appear to have been all silver, with lettering in dark blue or black.

Two Modern Subjects

Two very modern light aircraft which lend themselves readily to scale modelling, are the Piaggio P.148 and the Piper P.A.22 Tri-pacer. By courtesy of the manufacturers in each case, we are able to supply accurate data on these types so that you may scale up the drawings presented here for your own use.

The Piper Tri-pacer is a "natural" with its large proportion tail, reasonable dihedral angle and very useful tricycle undercarriage. Scale propeller diameter can be adhered to and even the wing section bears a strong resemblance to that popular all-purpose Clark Y. Standard colour scheme is Polar grey with Tennessee red trim, which the reader may safely interpret as very light grey and pillar box red. The full size P.A.22 incorporates down-thrust and this might very well be included in the scale model to good effect.

Keen eyes will perceive the large passenger entrance door on the port fuselage side, and if such a scale door were incorporated in a model, it might easily follow that it could be used for accessibility in operating a radio controlled version. The fuselage is sufficiently commodious to absorb the bulkiest of equipment, yet the lines are still streamline enough for the model to fly with a low power/weight ratio. A solid cabin top is a structural advantage not often found nowadays.

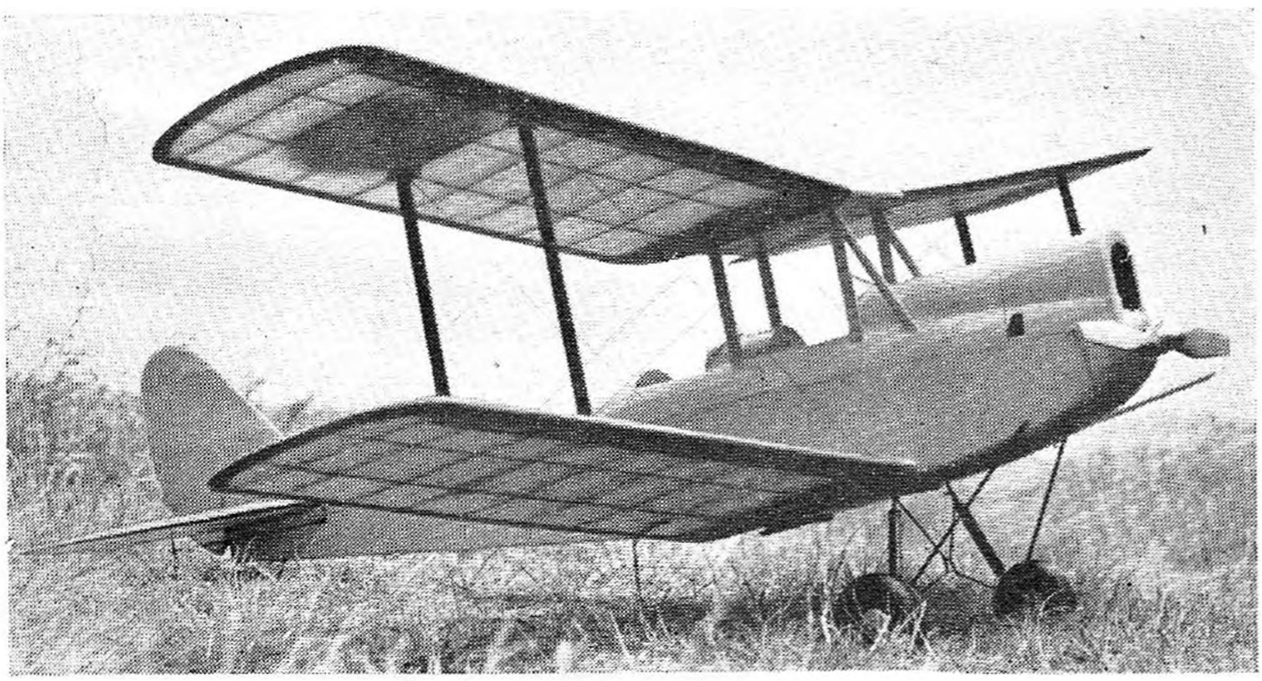

INSTRUMENT PANEL.
NOT TO SCALE.
SECTION DD
9'-5"
13'-2"
36'-5"
SECTION AA
SECTION BB
SECTION CC
D
D
PIAGGIO P.148
Wing area 200.2 sq. ft.
Maximum weight 2,822 lb.
Maximum speed 147 m.p.h.
Ceiling 18,000 ft. Range 560 miles.
Constructed by Piaggio & Co., Piazza della Vittoria 11a, Genoa, Italy. Colouring: Natural Aluminium with I.A.F. markings.
A
B
C
A
B
C
27'-11"
0 1 2 3 4 5 6 7 8 9 10 11 12
SCALE.
FEET.

The Piaggio is a low-wing aircraft that is adopted as a 2/3-seat trainer for the Italian Air Force. Its bubble hood would require an acetate sheet moulding, but otherwise its very simple lines involve no difficulty in construction. The dihedral would appear to be sufficient if, as on all the types mentioned in this article, a pendulum rudder is incorporated and the short stubby undercarriage can be firmly attached to a detachable wing. For this, and for the Tri-pacer also, the modeller may overcome one small difficulty in obtaining one of the plastic moulded Keil Kraft cowlings, which are available separately and were designed for the range of Super Scale Kits of the Cessna 170, Silvaire and Piper Super Cruiser. Most aircraft using American horizontally opposed engines use one of three standard cowling patterns and if your power unit is to be between .5 and .87 c.c., the scale can easily be arranged to make use of a ready-made cowling.

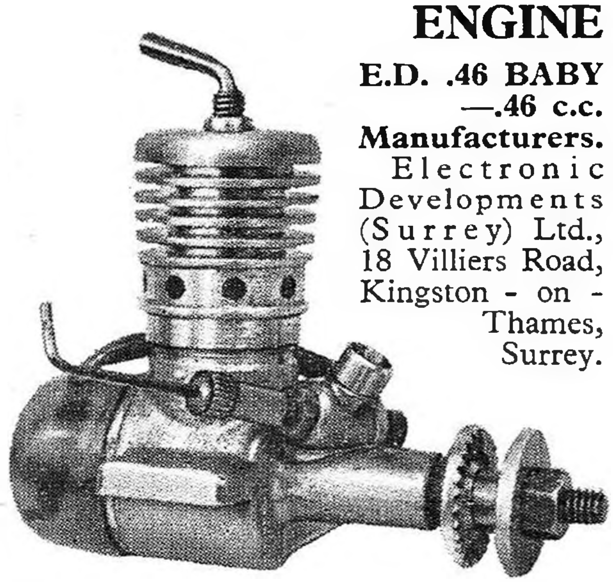
We have given you five aircraft for your own constructional design and have refrained from delving into the advantages of this or that form of construction. This is a subject which is fully covered in regular features in the AEROMODELLER under the heading "Airframe Construction." On only one point do we offer special advice and that is on the question of tail area which, though satisfactory at true-scale proportion, may be made more useful if enlarged to come nearer to 30 per cent of the total wing area. In the case of the biplanes, this figure should be nearer to 25 per cent.

Beware, though, of the method you use to enlarge a tailplane. It is all too easy to sketch around a scale size plan, build the tail and then find that increase of aspect ratio has spoilt the whole appearance. The only satisfactory method of enlargement is to utilise a proportional scale. Construct a right angle on the drawing board, mark off the scale half-span figure on the vertical line, and the desired increased half-span on the horizontal line, connect the two, and for every measurement that needs to be enlarged, measure off the scale length on the vertical, draw a line parallel to the half-span line, and the enlargement can be read off the horizontal line.

Few people realise that fullsize plans are available through A.P.S. for this 60-in. span de Haviland Gipsy Moth. Version below, by A. Woolf of St. John's Wood, is fitted with an Elfin 2.49, though the pre-war original had a 6 c.c. petrol engine



ENGINE ANALYSIS

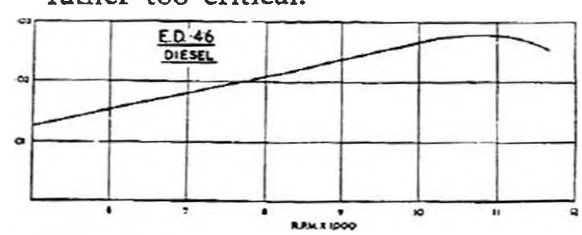


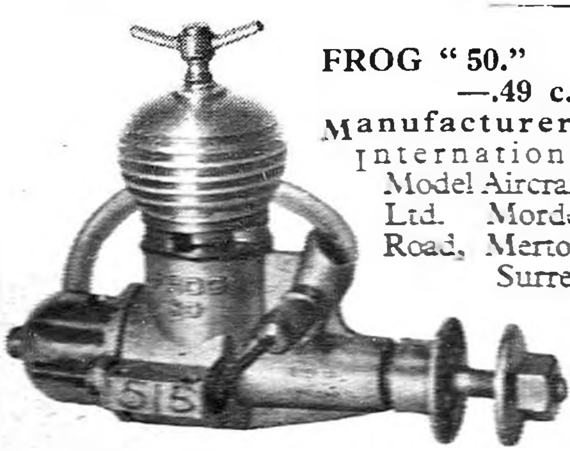
E.D. .46 BABY —.46 c.c.

Manufacturers. Electronic Developments (Surrey) Ltd., 18 Villiers Road, Kingston - on - Thames, Surrey.

Retail Price. £2 5s. plus 10s. P.T.
Delivery. From stock.
Spares. Seven days.
Type. Compression ignition (diesel).
Specified fuel. E.D. Standard.
Capacity. .046 c.c. .028 cu. ins.
Weight. 1.4 oz. (with tank).
Mounting. Beam, upright and inverted.
Recommended Airscrew. 6 by 3in. (E.D. Plastic).
Flywheel. 1oz., 1⅛in. dia. by ¼in. brass.
Bore. .312in.
Stroke. .375in.
Cylinder. Steel, case-hardened.
Cylinder Head. Duraluminium.
Crankcase. SS60 gravity casting.
Piston. Cast iron, Conical head.
Connecting Rod. Steel.
Crankshaft. Steel, case-hardened.
Main Bearing. Plain.
Induction. Crankshaft rotary valve.
Special features. Fuel control is placed at 30 degrees for comfortable access.
Compression Ratio. Variable.

TEST
Engine. E.D. .46.
Fuel. E.D. Standard.
Starting. Needle valve and compression settings critical.
Running. With 7in. dia., 4in. pitch prop gives even running at 7,500 r.p.m. Highest speed held consistently, 10,800 with 6 by 3in. propeller.
B.H.P. Starting about .013 at 5,000 r.p.m. the readings increased steadily to peak at 10,800 r.p.m. when .028 b.h.p. was registered.
Checked Weight. As quoted, 1.4oz. (tank empty).
Remarks. Best liked features : angled needle valve keeping needle valve clear of propeller disc ; and right-angled spray bar avoiding kinking of fuel line. Least liked : Opaque fuel line. "Needle end " of needle valve not uniform. Needle valve control rather too critical.





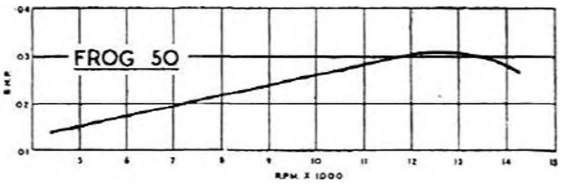
FROG "50." —.49 c.c.

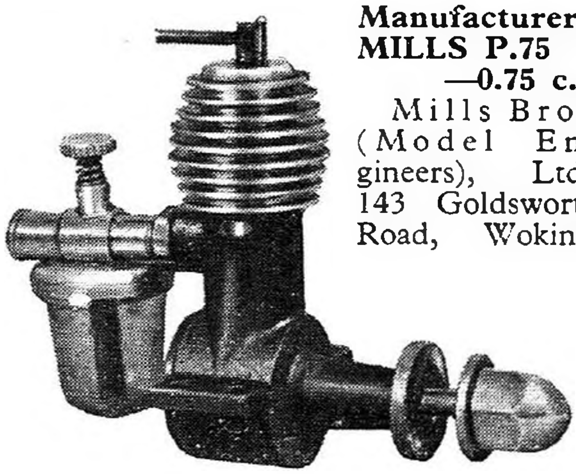
Manufacturers. International Model Aircraft, Ltd. Morden Road, Merton, Surrey.

Retail Price. £2 9s. 6d. (including tax).
Displacement. 0.49 c.c. (0.0305 cu. in.).
Bore. .343in.
Stroke. .330in.
Bore/Stroke Ratio. 1.04in.
Bare Weight (including tank). 1¼oz.
Bare Weight (without tank). 1⅛oz.
Mounting. Beam.
Material Specification Crankcase. Aluminium alloy.
Cylinder Liner. Mild steel, case hardened.
Cylinder Jacket (integral head). Duralumin.
Piston. Meehanite.
Contra Piston. Meehanite.

TEST
Engine. Frog 50.
Fuel. One-third each of paraffin, castor oil and ether (recommended manufacturers' mixture). Ether content may be doubled for easier starting at expense of power. Etherless fuels should NOT be used.
Starting. Not easy from cold : compression must be restored rapidly or engine stops abruptly. Good starter when hot.

Running. Requires good running in (manufacturers recommend 2 hours). Run-in engine ran steadily at 11,000 r.p.m. for 20 minutes. Lowest comfortable speed, 6,000 r.p.m.
B.H.P. Gives .015 at 5,000 r.p.m. to maximum of .031 at 12,500. Flat peak between 12/13,000 r.p.m.
Remarks. Best liked features : small compact size. Consistent high speed running and high power output. Least liked : needle valve assembly, compression adjustment lever.



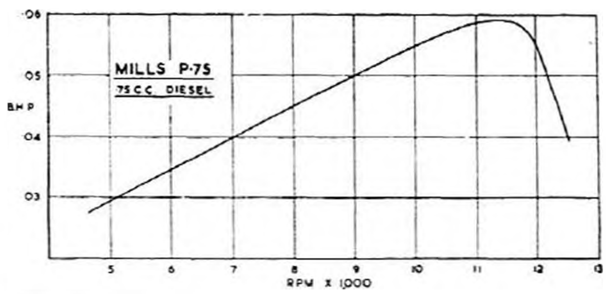


MILLS P.75 —0.75 c.c.

Manufacturers. Mills Bros. (Model Engineers), Ltd., 143 Goldsworth Road, Woking.
Retail Prices. P.75 £2 10s. plus 10s. 9d. P.T. ; S.75 £2 15s. plus 11s. 9d. P.T.
Delivery. Seven days service.
Spares. Seven days service (ex-works).
Type. Compression ignition.
Specified Fuel. Mills Blue Label.
Capacity. .75 c.c., 045 cu. ins.
Weight (Advertised). 1¾ ozs. (with tank).
Mounting. Beam, upright and inverted
Recommended Airscrew. 8 by 4in.
Flywheel. 2½ ozs., 1½in. dia. by ¼ in. brass.
Bore. .33in.
Stroke. .52in.
Cylinder. Nitraloy steel.
Cylinder Head. Light alloy, screwed on crankcase.
Crankcase. Magnesium gravity casting
Piston. Deflector type.
Connecting Rod. Hyduminium.
Crankshaft. 3 per cent nickel steel, hardened.
Main Bearing. Phosphor bronze.
Induction. Sideport.
Special Features. Easy starting, robust construction, flexibility in power.

TEST

Engine. Mills .75 c.c. diesel.
Fuel. Mills Blue Label.
Starting. Starting good and immediate at maker's settings.
Running. Excellent at all tested speeds.
B.H.P. As indicated by the graph, a maximum of .059 b.h.p. was reached at 11,350 r.p.m., with a drop of .0545 b.h.p. at 12.000 r.p.m. After this speed the curve falls steeply, and .040 b.h.p. is shown at 12,470 r.p.m. The curve indicates that the engine is running with good efficiency at speeds between 10,000 and 12,000 r.p.m., which allows a good margin.
Checked Weight. 1.8 oz. (including tank)
Power/Weight Ratio. .525 b.h.p./lb.
Remarks. Considering its size and light weight, this engine stood up to the test extremely well. Compression is exceptionally good, and seemed to improve with running.

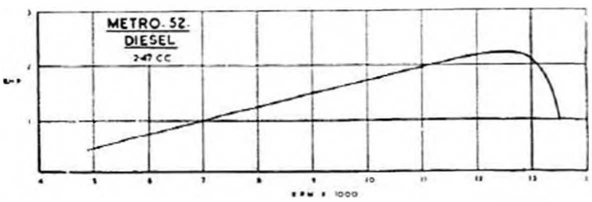


METRO 52—2.47 c.c.

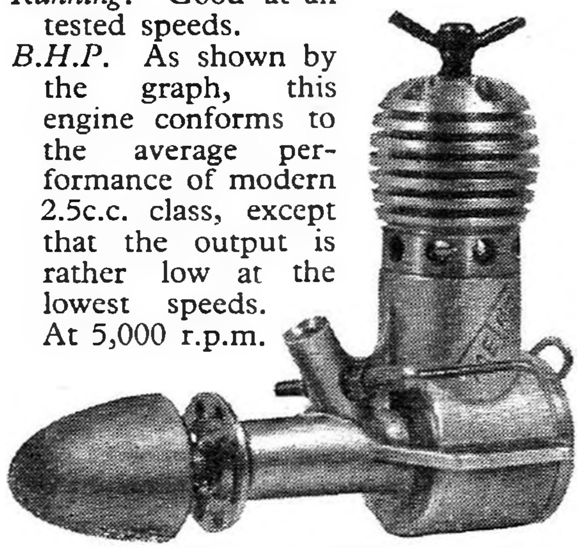
Manufacturers. W. Mayer & Sohn, Metallwarenfabrik, (13a) Rothenbrug ob der Tauber, Hessingstrasse 8 (U.S. Zone, Germany).
Retail Price. DM 50 (£4 5s. 2d.).
Delivery. Ex stock.
Spares. Ex stock.
Type. Compression Ignition.
Specified Fuel. 34 per cent. paraffin, 33 per cent. ether, 33 per cent. castor oil.
Capacity. 2.47 c.c., .150 cu. ins.
Weight (advertised). 112 grammes, 3.95 ozs.
Mounting. Beam.
Recommended Airscrew. 11 by 4¾ins. for Free Flight; 8 by 8ins. for Control Line.

Flywheel. 2.36ins. dia., 2.47 oz. weight.
Bore. 15 mm., .590ins.
Stroke, 14mm., .551ins.
Cylinder. Cast iron. Screw fit into crankcase.
Cylinder Head. Light alloy. Screw fit over cylinder.
Crankcase. Diecast light alloy.
Piston. Cast iron.
Connecting Rod. Light alloy.
Crankshaft. Steel.
Crankpin Bearing. Special alloy bearing material.
Induction. Crankshaft rotary valve.
Special Features. Dural propeller retaining bolt eliminates all risk of crankshaft bending. A unique wrench for dismantling is supplied with each engine. Boxwood Spinner supplied.

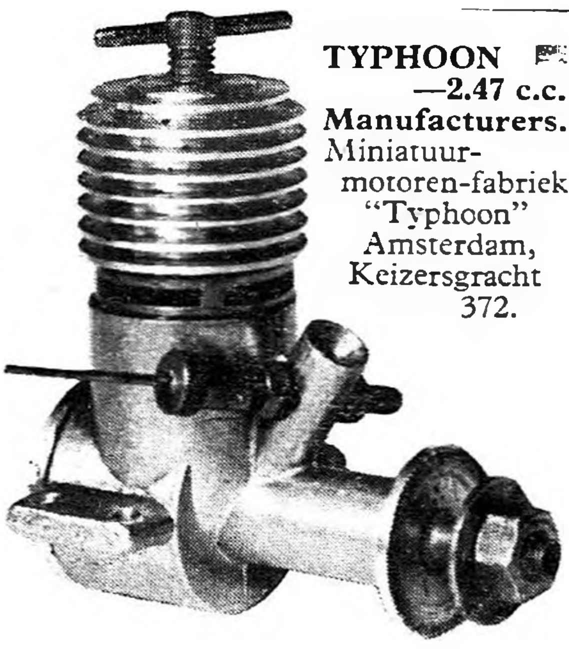
TEST
Engine. Metro 52 diesel, 2.47c.c.
Fuel. Equal parts, paraffin oil, ether, castor oil (maker's recommended fuel). To bring the test in line with that of other engines run on " pepped-up " fuel, I added 2 per cent. amyl nitrate.
Starting. Good, but did not conform to maker's settings, due, probably to the added amyl nitrate.



Running. Good at all tested speeds.
B.H.P. As shown by the graph, this engine conforms to the average performance of modern 2.5c.c. class, except that the output is rather low at the lowest speeds. At 5,000 r.p.m.



the b.h.p. is only .045, but rises well with speed increase until a maximum of .225 b.h.p. was recorded at 12,600 r.p.m. The top of the curve is remarkably flat, so that there is little variation in power between about 11,000 and 13,200 r.p.m.
Checked Weight. 3.95 ozs. (This is as stated by makers.)
Power/Weight Ratio. .92 b.h.p./lb.
Remarks. The engine showed leakage between piston and cylinder, and this probably accounted for the low output at the lower speeds. Leakage usually affects performance at the higher speeds to a less extent, so that maximum performance is very good. The engine is of extremely clean design and light weight, which reflects in the high power/weight ratio.

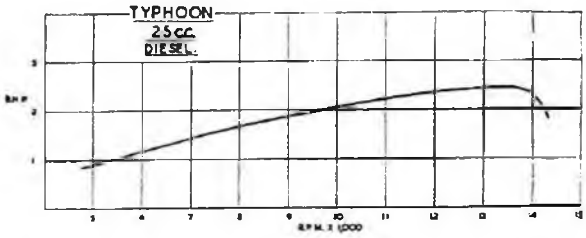


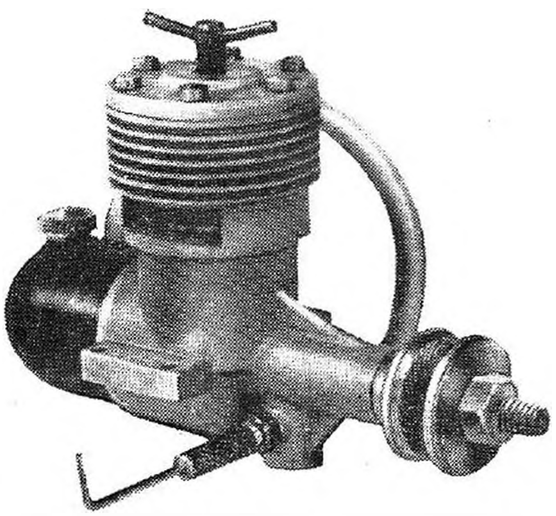
TYPHOON —2.47 c.c.
Manufacturers. Miniatuur-motoren-fabriek "Typhoon" Amsterdam, Keizersgracht 372.

Retail Price. DFL. 39.50 (Approx. £4).
Delivery. Ex stock.
Spares. Ex stock.
Type. Compression ignition.
Specified Fuel. One part castor oil, one part paraffin, one part ether, plus 2 per cent. amyl nitrate.
Capacity. 2.47c.c., .150 cu. ins.
Weight (advertised). 110 grammes, 3.88oz.
Mounting. Beam.
Recommended Airscrew. Free-flight 10in. x 4in., Control-line 8 by 8in. or 7½ by 10in.
Flywheel. 120 grammes, 4.5oz.
Bore. 15mm., .590in.
Stroke. 14mm., .551in.
Cylinder. Nickel Chrome Steel, screwed in crankcase.
Cylinder Head. Light alloy, screwed on liner.
Crankcase. Pressure die cast light alloy.
Piston. Plain, with conical deflector head.

Connecting Rod. Duralumin, turned.
Crankshaft. Nickel chrome steel, case hardened.
Main Bearing. Special bronze.
Induction. Crankshaft rotary valve.
Special features. Designed for flexible running and easy operation, with strong construction and small stature. Prop driving washer is splined on to crankshaft.

TEST
Engine. " Typhoon Diesel " 2.5c.c.
Fuel. Mercury No. " 8."
Starting. Excellent.
Running. This engine runs extremely well at all tested speeds, but seems happier at those above 10,000 r.p.m. The offset control needle is a good feature which keeps the fingers away from the spinning propeller.
B.H.P. This engine has a very good performance, and a maximum output of .241 b.h.p. was reached at 13,500 r.p.m. without undue trouble. Power fall-off is rapid after this point, although, like most modern engines of good design, the curve is remarkably flat. Thus, it may be seen that between 10,000 and 14,200 r.p.m. the output is .200 b.h.p. and over. This gives a wide scope for misadjustment without seriously affecting the performance. For general flying (i.e. not competition) it may be found convenient to run the engine at around 12,000 r.p.m., as this speed would be economical in both engine wear and fuel consumption, without sacrificing much performance.
Checked Weight. 3.9 ozs. (less tank).
Power/Weight Ratio. .987 b.h.p/lb.
Remarks. The compact design and porting arrangements—which follow closely standard practice—are reflected in the high power/weight ratio of this engine. Compression is remarkably good, and remained so throughout the tests.

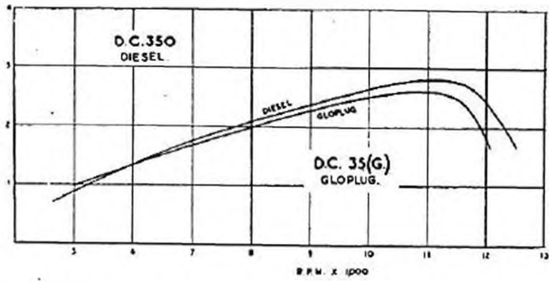




D.C. 350 MARK II and D.C. 35 (G) —3.44c.c.
Manufacturers. Davies - Charlton & Co., 13 Rainhall Road, Barnoldswick, via Colne, Lancs.
Retail Price. D.C. 350 Mark II, £3 6s. 8d. D.C. 35 (G), £3 5s. 0d.
Capacity. 3.44c.c., .21 cu./ins.
Compression Ratio. 350 Mk II, Variable. 35 (G), 8.65 : 1.
Mounting. Beam.
Recommended Airscrew. Free flight, 10 by 6ins. Control line, 9 by 8ins.
Bore. 11/16in.
Stroke. 9/16in.
Cylinder. Nickel chrome steel.
Cylinder Head. Alloy, retained by six screws.
Crankcase. Die-cast D.T.D. 424.
Piston. Meehanite, ground and honed.
Connecting Rod. Duralumin.
Crankshaft. Nickel chrome, ground and honed.
Induction. Rotary crankshaft valve.

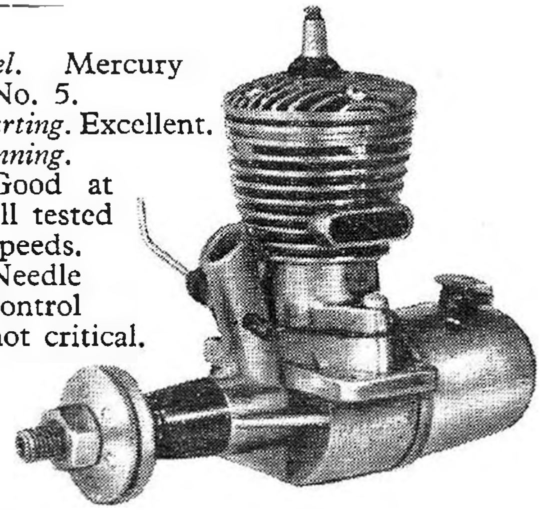
TEST
D.C. 350 *DIESEL*, 3.5*c.c.*
Fuel. Mercury No. 8.
Starting. Excellent.
Running. Excellent at all speeds. Needle control flexible and easy to handle.
B.H.P. Flat curve to maximum of .281 b.h.p. at 11,300 r.p.m. Fall-off not so sudden as with the glowplug version.
Checked Weight. 5.71ozs. (with fuel tank).
Power/Weight Ratio. .7808 b.h.p./lb.
Remarks. The attractive grey finish to the clean castings of this motor are well displayed by the contrasting amber coloured plastic fuel tank. Its robust construction should make it an ideal choice for the radio control enthusiasts.

D.C.35 (G) GLOWPLUG, 3.5c.c.
Fuel. Mercury No. 5.
Starting. Excellent, facilitated by priming through exhaust port.
Running. Very flexible needle control, and smooth running are characteristics of D.C. motors and are well evident in the 35 (G).
B.H.P. A good flat curve is obtained, with maximum output of .262 b.h.p. at 11,100 r.p.m.
Checked Weight. 5.4ozs. (less tank).
Power/Weight Ratio. .776 b.h.p./lb.
Remarks. There is very little difference in the performance of these two motors, showing that there is considerable research in the glowplug version.

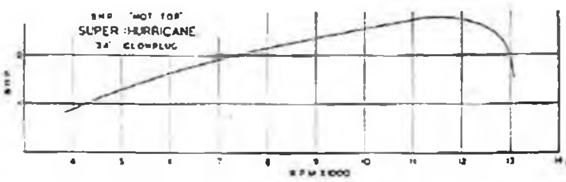


HOT TOP SUPER HURRICANE —3.98c.c.
Manufacturer. Hurricane Engines, 28½ Adelaide Street East, Toronto.
Retail Price. $16.50 (£5 7s. 6d. approx.).
Type. Glowplug.
Fuel. 1 to 2 parts nitropropane, 5 parts S.A.E. 70 oil, 13 parts gasoline (petrol).
Capacity. 3.98c.c., .24 cu. ins.
Advertised Weight. 5½ozs. (bare).
Compression Ratio. 10.2.
Mounting. Beam.
Recommended Airscrew. Free flight, 11 by 6ins. ; Stunt, 9 by 8ins. ; Speed, 8 by 8ins.
Recommended Flywheel. 5ozs.
Tank. Aluminium alloy.
Bore. 11/16ins.
Stroke. 21/32ins.
Cylinder. Meehanite, with die-cast alloy fins.
Cylinder Head. Separate die-casting.
Crankcase. Pressure die-cast. Light alloy.
Piston. Plain baffle type.
Connecting Rod. Aluminium alloy.
Crankshaft. Tool steel, hardened and ground.
Main Bearing. High speed bronze hone fitted.
Induction. Rotary valve on crankshaft.
Special Features. Torque maintained at high r.p.m.

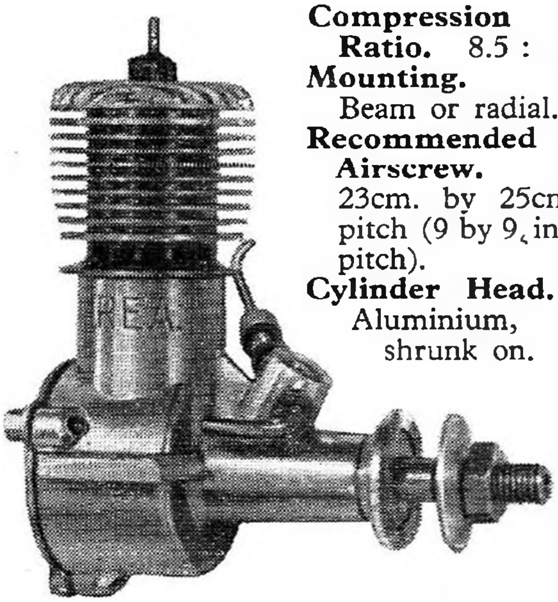
TEST
Engine. Super Hurricane " 24 " Glowplug version (" Hot-Top ").



Fuel. Mercury No. 5.
Starting. Excellent.
Running. Good at all tested speeds. Needle control not critical.
B.H.P. At a speed of 11,600 r.p.m. a maximum output of .279 b.h.p. was obtained, but no sudden fall in power was noticed until speeds of around 12,600 were reached. The curve shows that at this speed the output was still as high as .249 b.h.p., although at 13,000 r.p.m. it was down to about .200 b.h.p. At 4,000 r.p.m. an output of .090 b.h.p. was indicated.
Checked Weight. 6.4ozs. with tank.
Power/Weight Ratio. .697 b.h.p./lb.
Remarks. The " streamlined " cylinder head finning does effectively cool the rear part of the cylinder and also improves the general appearance.

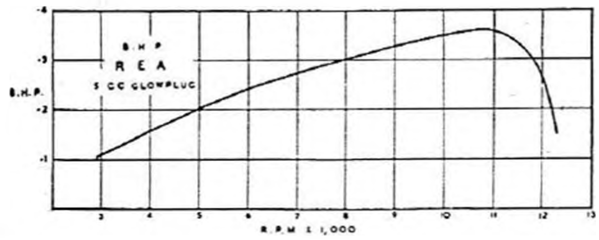


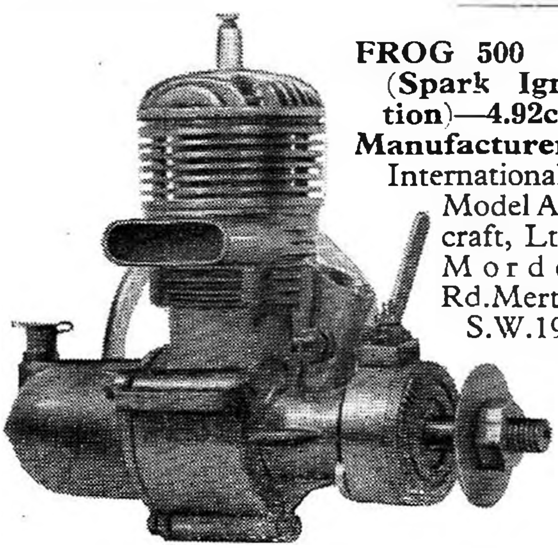
REA 5c.c.—4.79c.c.
Manufacturers. REA Motors, France.
Available from. La Source des Inventions, 56 Boulevard de Strasbourg, Paris (Xe).
Retail Price. 4,395 French Francs (£4 8s. 0d. approx.).
Delivery. Immediate.
Spares. Ex stock. **Type.** Glowplug.
Specified Fuel. 75 per cent. methanol 25 per cent. castor oil.
Capacity. 4.79c.c., .292 cu. ins.
Bore. 19 m/m. : 748ins.
Stroke. 17 m/m. : .667ins.
Advertised Weight. 170 grammes : 6 ozs.



Compression Ratio. 8.5 : 1.
Mounting. Beam or radial.
Recommended Airscrew. 23cm. by 25cm. pitch (9 by 9 ins. pitch).
Cylinder Head. Aluminium, shrunk on.
Cylinder. Steel ; screwed into crankcase.
Crankcase. Die-cast alloy.
Piston. Cast iron, lapped and individually fitted.
Connecting Rod. Machined duralumin
Crankshaft. Steel.
Induction. Rotary crankshaft valve.
Special Features. Inclined needle valve mounting. Light weight. Easy starting.

TEST
Engine. REA, 5c.c. Glowplug.
Fuel. Mercury No. 5.
Starting. Fairly good, but seemed to become more difficult as the test proceeded, due, probably, to the increasing crankcase leakage.
Running. This engine ran well and steadily over the whole tested range, even at speeds as low as 3,000 r.p.m. Needle adjustment was not unduly critical at any speed.
B.H.P. Starting at about 3,000 r.p.m. the readings showed a b.h.p. of .110, which increased steadily to a maximum of .360 b.h.p. at 10,900 r.p.m. Beyond this speed the output dropped quickly, and at 12,300 was down to .150 b.h.p.
Checked Weight. 5.8ozs. (less tank).
Power/Weight Ratio. 1.01 b.h.p./lb.
Remarks. Owing to its remarkably low weight, the power/weight ratio of this engine is particularly good, in spite of the fact that its peak output is lower than that of many modern engines of this capacity. There is little doubt that the figures obtained were lower than might be expected had the crankcase leakage not been in evidence.

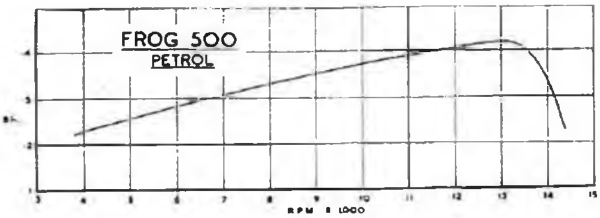




FROG 500 (Spark Ignition)—4.92c.c.
Manufacturers. International Model Aircraft, Ltd., Morden Rd. Merton S.W.19.
Retail Price. £4 5s., including Purchase Tax.
Delivery. Ex stock.
Spares. Ex stock.
Type. Spark-ignition.
Specified Fuel. Three parts petrol; one part castrol XXL.
Capacity. 4.92 c.c., .30 cu. in.
Weight. 7.75 ozs. including tank.
Compression Ratio. 8 : 1.
Mounting. Beam or radial, upright or inverted.
Recommended Airscrew. Free Flight : 10 by 6ins., 11 by 5ins., 11 by 6ins. Control line : 9 by 6ins., 10 by 6ins.
Flywheel. 2 by 7/16ins. 5ozs. weight.
Tank. Detachable, universal mounting.
Bore. .750in.
Stroke. .680in.
Cylinder. Hardened steel, retained by 4 6-B.A. screws deep spigoted to crankcase. One transfer port, one exhaust port.
Cylinder Head. Diecast aluminium, retained by four screws to cylinder.
Crankcase. Diecast aluminium.
Piston. Meehanite. Deflector type. No rings.
Connecting Rod. Forged hiduminium R.R.56.
Crankpin Bearing. Plain. Drilled for connecting rod retaining pin.

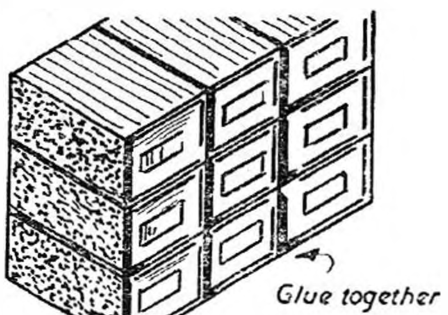
Crankshaft. Hardened steel, ground and honed.
Main Bearing. Phosphor bronze honed.
Little End Bearing. Plain.
Plug. ¼in. K.L.G., " Mini 2."
Special Features. Flexibility, with high power output. All parts machined to fine limits to ensure interchangeability.

TEST
Engine. FROG " 500." .492c.c. Petrol
Starting. Starts well at all loadings.
Running. Extremely even running at all speeds. This engine is very flexible, and responds well to spark advance and retard.
B.H.P. The extremely good output of .420 b.h.p. was obtained at 13,200 r.p.m., with a drop to .240 b.h.p. at 14,350 r.p.m. The engine is remarkable for its high torque at low speeds, as the graph shows a recording of over a quarter horse power at 5,000 r.p.m. At the lowest tested speed—about 4,000 r.p.m.—b.h.p. was as high as .230.
Checked Weight. 7.8ozs. (including tank).

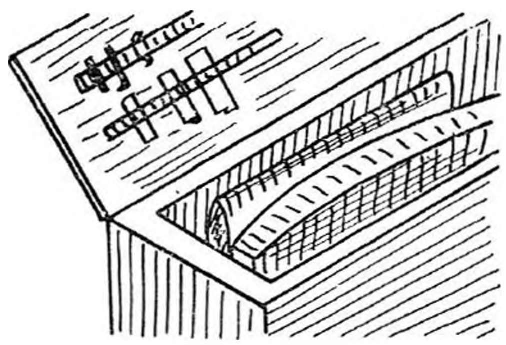


Power/Weight Ratio. .86 b.h.p/lb.
Remarks. The flexibility, good power output, and excellent control which this engine shows reminded me that the petrol engine has features which are sadly absent in most diesel and glowplug motors. In particular, the control given by the spark advance and retard was a delight now seldom experienced. The fuel used was composed of three parts Pool Petrol and one part Castrol XXL.

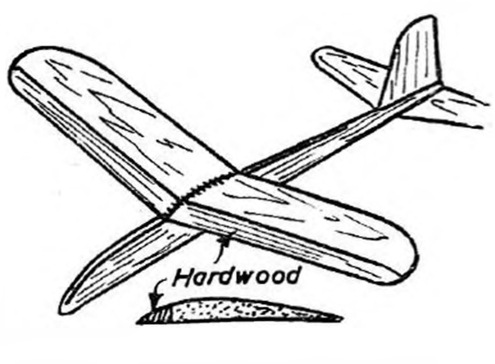
Special Note.—Tests of E.D.46 and Frog 50 by R. H. Warring should not necessarily be related too closely with other tests carried out by L. H. Sparey, as these tests are now being carried out specially for " aeromodellers " rather than as a pure " engineering " survey.



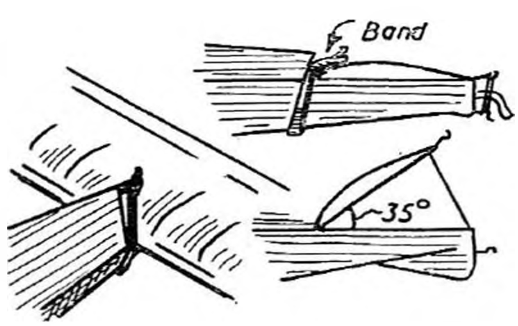
Small parts cabinet from matchboxes



Tack small parts in lid of model box



Hardwood inset saves balsa wing



Tip-tail dethermaliser action is simple

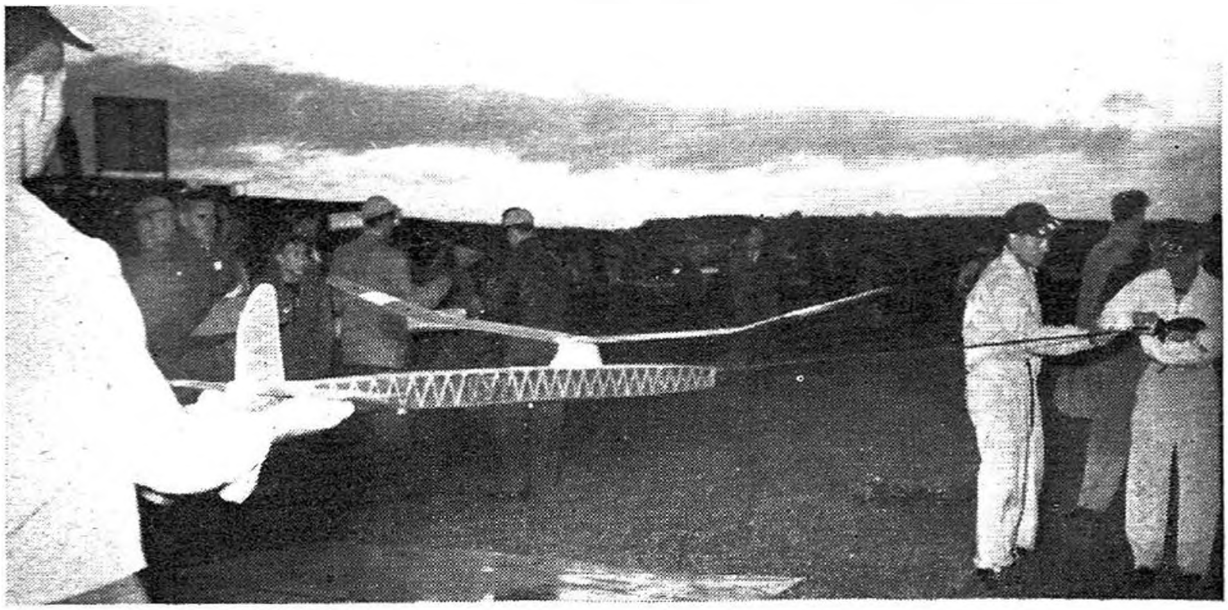
Second place man Jan Nilborn is tossed by team mates at 1952 Wakefield. Winner Arne Blomgren flew same model as Sune Stark's 1951 winner—which is a popular club design.

1952 INTERNATIONAL WAKEFIELD CONTEST

Placing	Contestant	Country	1st Flight	2nd Flight	3rd Flight	Total
1 (9) (2) ...	Blomgren, A. ...	Sweden ...	3:30	5:00	5:00	13:30
2 (11) (4)...	Nilborn, J.	Sweden	3:23	4:46	5:00	13:09
3 (4) (3) ...	Ellila, A.	Finland	4:00	4:16	4:39	12:55
4 (10) (14)	Lustrati, S. ...	Italy	3:28	3:16	5:00	11:44
5 (1) (6) ...	Bilgri, J.	U.S.A.	4:53	3:00	3:42	11:35
6 (7) (15)...	Kannenworff, L. ...	Italy	3:49	2:48	4:49	11:26
7 (16 (5) ...	Gerland, E. ...	France	3:08	5:00	3:00	11:08
8 (18) (8)...	Morisset, J. ...	France	3:03	4:34	2:55	10:32
9 (6) (8) ...	Evans, E. W. ...	G.B.	3:50	3:47	2:44	10:21
10 (11) (7)...	Montplaisir, C. M.	U.S.A.	3:23	4:21	2:33	10:17
11 (35) (27)	Gilg, P.	France	2:18	2:53	5:00	10:11
12 (3) (9) ...	Warring, R. H. ...	G.B.	4:02	3:25	2:22	9:49
13 (5) (10)...	Haslach, T. ...	Switzerland ...	3:52	3:34	2:20	9:46
14 (12) (22)	Cellini, G. ...	Italy	3:18	2:20	4:06	9:44
15 (15) (12)	O'Donnell, J. ...	G.B.	3:10	3:10	2:43	9:42
16 (6) (18)...	Stark, S.	Sweden	3:50	2:20	3:26	9:36
17 (36) (30)	Goetz, A.	France	2:16	2:42	4:24	9:22
18 (46) (36)	Marsh, B.	N.Z.	1:30	2:50	4:56	9:16
19 (36) (11)	Jossien, R. ...	France	2:16	4:54	1:31	8:41
20 (8) (1) ...	Maibaum, G. ...	Germany... ...	3:33	5:00	—	8:33
	Wood, J. H. ...	Canada	1:52	3:12	3:29	8:33
22 ...	de Vries, C. R. ...	Holland	3:16	2:08	3:06	8:30
23	Jarri, J.	Finland	2:40	2:34	3:11	8:25
24	Descheppa, P. ...	Belgium ...	2:45	2:56	2:29	8:10
25	Ariband, H. ...	France	2:48	3:24	1:53	8:05
26	Samaan, G. ...	Germany... ...	2:05	2:29	3:24	7:54
27	Figuera, T. M. ...	Trinidad ...	2:24	1:27	3:58	7:49
28	Lidgard, E.... ...	U.S.A.	2:33	3:32	1:43	7:48
29	Royle, J.	G.B.	3:11	2:43	1:45	7:39
30	Djikstra, A. ...	Holland	2:34	3:11	1:47	7:32

Placing	Contestant	Country	1st Flight	2nd Flight	3rd Flight	Total
31	Spring, H. ...	Finland	3:00	2:05	2:25	7:30
32	Knudson, E. ...	Denmark... ...	2:35	2:04	2:47	7:26
33	Ferber, M. ...	Belgium ...	3:08	2:04	1:56	7:08
34	Nicole, R. F. ...	G.B.	3:02	—	4:02	7:04
35	Wilson, —. ...	N.Z.	4:10	2:47	—	6:57
36	Follett, P.	Belgium ...	2:08	2:33	2:15	6:56
37	Tangney, J. F. ...	U.S.A.	2:59	2:13	1:35	6:47
38	Hakansson, A. ...	Sweden	3:07	3:15	0:09	6:31
39	Dunkley, T. ...	G.B.	2:25	1:52	2:07	6:24
40	Jorgensen, B. ...	Denmark... ...	2:12	1:46	2:20	6:18
41	Djikstra, G. ...	Holland	2:05	2:05	1:57	6:07
42	Kennedy, D. ...	N.Z.	2:39	2:00	1:20	5:59
43	Loates, F. C. ...	Canada	1:43	2:00	1:37	5:20
44	Lippens, G. ...	Belgium ...	2:21	2:17	0:07	4:45
45	Huhtmen, P. ...	Finland	2:55	1:45	—	4:40
46	Ferber, Mme. L. ...	Belgium ...	2:37	—	1:46	4:23
47	Reeve, W. R. ...	Australia ...	2:16	0:13	1:41	4:10
48	Bachli, B.	Switzerland ...	1:37	2:23	0-04	4:04
49	du Toit, D. ...	S. Africa ...	1:33	2:21	—	3:54
50	Berge, G.	Norway	1:01	1:28	1:25	3:44
51	Visser, P.	S. Africa ...	1:04	2:10	—	3:14
52	Prhavg, J.	Yugoslavia ...	0:45	2:17	—	3:02
53	Peligi, G.	Italy	3:01	—	—	3:01
54	Seldon, S.	U.S.A.	2:01	0:42	0:03	2:46
55	Olsson, R.	Sweden	2:45	—	—	2:45
56	Piccini, F.	Italy	1:56	0:40	—	2:36
57	Faiola, D.	Italy	2:16	—	0:01	2:17
58	Ferrer, T.	Switzerland ...	0:04	0:06	2:06	2:16
59	Hopkins, L. D. ...	Australia ...	0:46	1:25	—	1:44
60	Lipinski, G. ...	Germany ...	1:33	0:11	—	1:44
61	Macauley, A. ...	N.Z.	1:11	—	—	1:11
62	Melzen, R. ...	Germany... ...	0:44	0:22	—	1:06
63	Gray, S. W. ...	Australia ...	0:49	0:04	—	0:53
64	Lichte, M.	Germany... ...	0:45	—	—	0:45
65	Larsen, J. M. ...	Denmark... ...	0:15	—	—	0:15
66	Norjesson, B. ...	Sweden	0:09	—	—	0:09
	Connor, M. G. ...	N.Z.	0:09	—	—	0:09

C. M. Montplaisir's typical long fuselage American entry having the turns put on. Honours were shared between "classical" geared models and the long fuselage entries—leaving the issue of the "best" design still in doubt.



2nd WORLD SPEED CHAMPIONSHIPS & 4th CHAMPIONSHIP OF EUROPE FOR CONTROL LINE MODELS HELD AT BRUSSELS

Successful British team at Brussels: *Back row, left to right:* Pote Ridgway, Colonel Yates, John Claydon. *Front row:* Pete Wright and R. Davenport

This year's Belgian Championship of Europe and World Speed Contest held at Brussels on Melsbroek Aerodrome, served to confirm the British team as pre-eminent in virtually all branches of control line flying, taking all events except 5 cc. and 10 cc. speed, where they were perforce content with seconds.

In the speed events competition is always keen, and world records can confidently be expected if weather conditions prove kind, so that British victories can only be achieved against really competent opposition. Alas, in the stunt field, many entrants representing their countries are not capable of tackling " the book " under the most favourable circumstances—and indeed put up performances which would not give them any chance in purely local rallies in this country. We can only express the hope that American experts can ultimately be persuaded to attend this annual event.

As usual the Belgian hosts provided a most competently run competition, with adequate officials, fully briefed team managers, and a time schedule that worked perfectly. In addition, they arranged suitable entertainment for entrants' leisure moments, and a magnificent banquet to wind up proceedings. As organisers of this annual event, Belgium have always gained full marks in this respect, unfortunately as the most likely group to challenge British stunt supremacy they must subordinate the pleasure of winning to the less spectacular one of organisation.

RESULTS

Speed—2.5 c.c.

			km.h.
1	Wright	Great Britain	158.590
2	Sorensen	Denmark	155.844
3	Labarde	France	138.995
4	Claydon	Great Britain	130.909
5	Garlato	Italy	129.963
6	Ridgway	Great Britain	126.315
7	Cordier	Belgium	124.967
8	Millet, Junior	France	124.137
9	Millet, Senior	France	122.033
10	Cogorcena	Spain	117.263

Speed—5 c.c.

			km.h.
1	Dr. Millet	France	198.395
2	Wright	Great Britain	193.548
3	Labarde	France	191.489
4	Janssens	Belgium	189.473
5	Batagne	France	178.217
6	Haocke	Denmark	175.609
7	Hagedoorn	Holland	171.428
8	Claydon	Great Britain	162.895
9	Lippens	Belgium	157.894
10	Cordier	Belgium	156.521
11	Brambini	Norway	136.882

Speed—10 c.c.

			km.h.
1	Battistella	Italy	233.766
2	Davenport	Great Britain	225.000
3	Dr. Millet	France	216.867
4	Labarde	France	211.764
	Bastagne	France	211.764
5	Cordier	Belgium	205.714
6	Cogorcena	Spain	204.545
7	Millet, Junior	France	196.721
8	Hagedoorn	Holland	190.476

Stunt

			points
1	Ridgway	Great Britain	632
2	Janssens	Belgium	597
3	Follie	Belgium	543
4	Cappi	Italy	540
5	Suls	Holland	490
6	Sorensen	Denmark	484
7	Haocke	Denmark	465
8	Cordier	Belgium	315
9	Madsen	Denmark	136
10	Batlio	Spain	119
11	Eriksen	Denmark	105
12	Claydon	Great Britain	90
13	Hristic	Jugoslavia	30

Team Racing

1 Equipe Janssens—Cordier (Belgium), 15 km. in 20 min. 14 sec.

Jet Speed

			km.h.
1	Yllan	Spain	225.000
2	Cogorcena	Spain	214.285
3	Kreulen	Holland	189.473

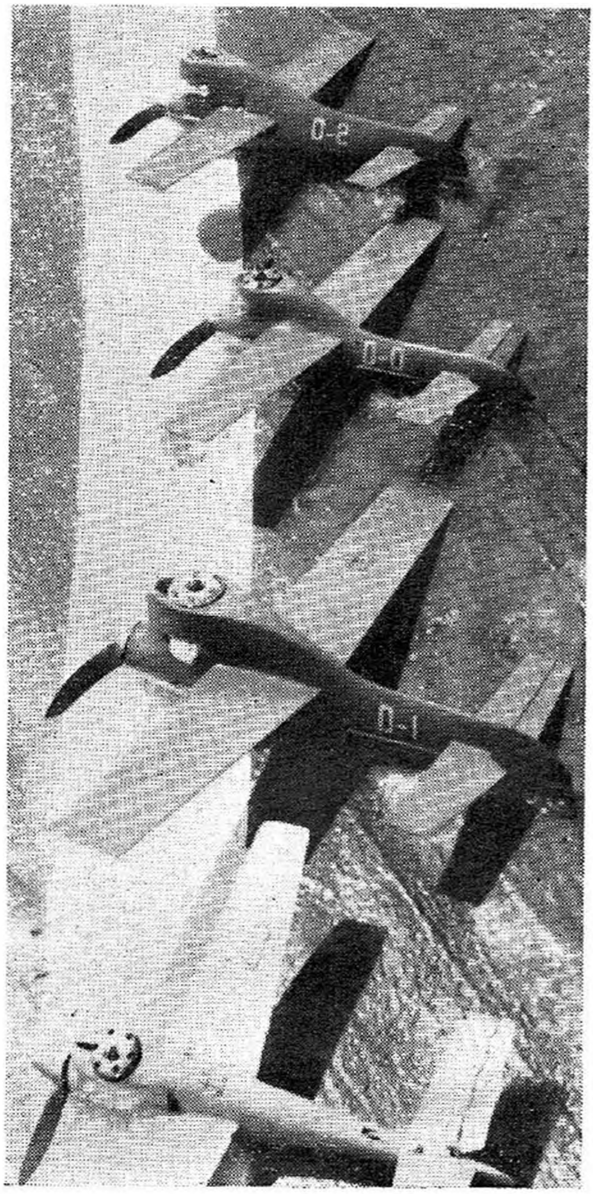
Concours d'Elegance

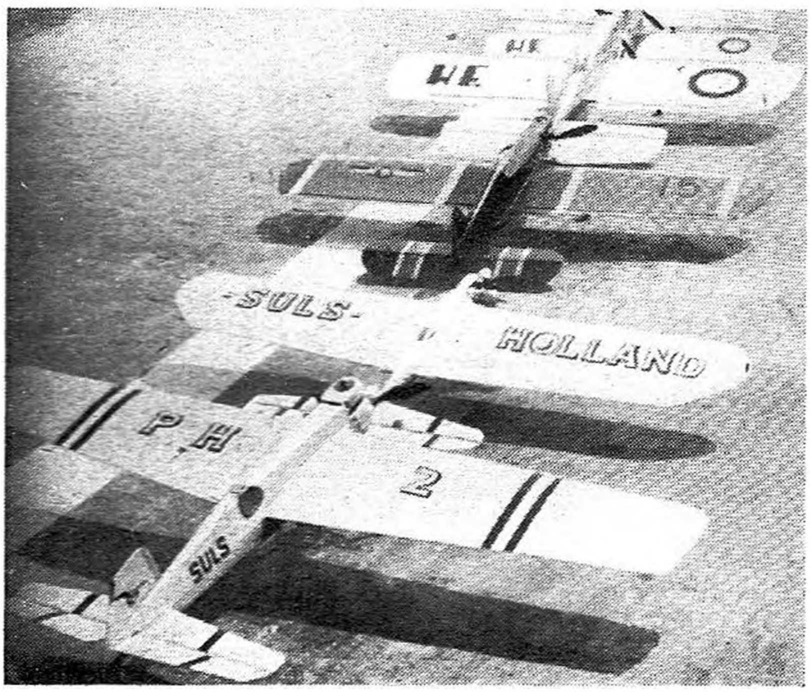
Stunt	1	Claydon	Great Britain
	2	Haocke	Denmark
	3	Ex-aequo Cappi	Italy
		Suls	Holland
Speed	1	Schoenfeldt	Norway
	2	Dr. Millet	France
	3	Battistella	Italy
Team Racing	1	Hagedoorn	Holland
	2	Batilo	Spain
	3	Janssen	Holland

Jet. An Honourable Mention for Mr. Cogorcena (This category not qualifying for points)

Inter-Team Contest for Championship of Europe

		points
1	Great Britain	480
2	Belgium	695
3	Italy	850
4	France	975
5	Denmark	1,125
6	Holland	1,175
7	Spain	1,345





Above: Typical speed models at the meeting, in this case part of the Belgian team's entries, which all follow a finless pattern.

Right: Part of the stunt "Concours d'Elegance" line-up, with Dutch models in foreground, No. 15 in the middle is British winner, and in background the "HE" marked models are Spanish entries.

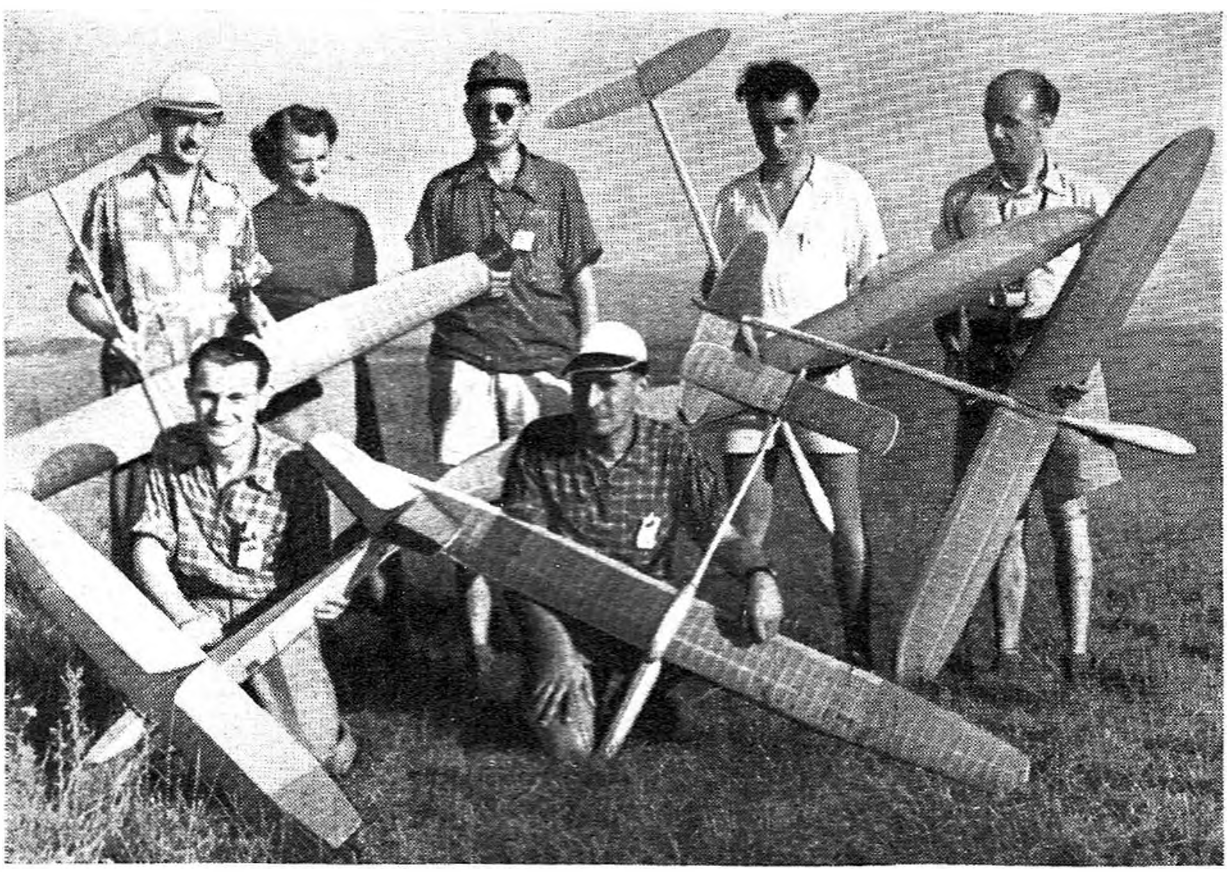
SWEDISH GLIDER CUP—WORLD MODEL GLIDER CHAMPIONSHIP

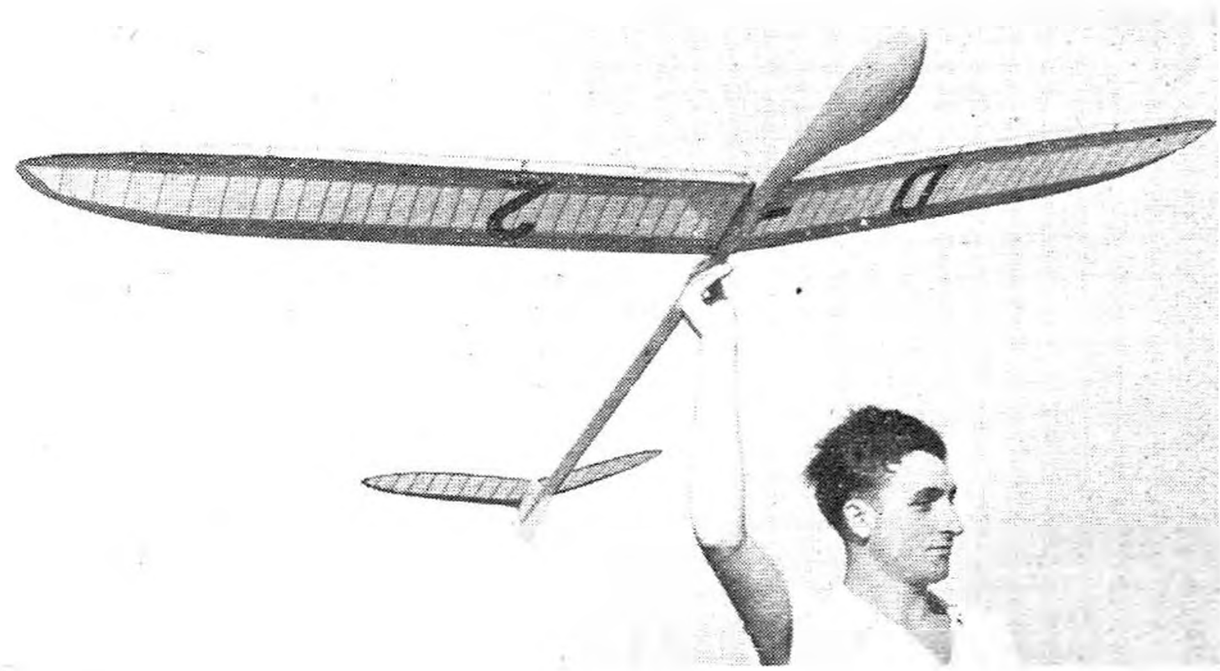
Placing	Contestant	Country	1st Flight	2nd Flight	3rd Flight	Total
1 (3) (1)	Gunic, B.	Yugoslavia ..	4:24	4:44	5:00	14:08
2 (7) (2)	Hacklinger, M. ..	Germany.. ..	4:07	5:00	4:23	13:30
3 (6) (4)	Saamann, G. ..	Germany.. ..	4:12	4:11	5:00	13:22
4 (8) (5)	Hansen, B. ..	Denmark.. ..	3:59	4:19	4:29	12:47
5 (4) (6)	Stelzmuller, J. ..	Austria	4:20	3:39	4:12	12:12
6 (5) (7)	Fresl, E.	Yugoslavia ..	4:18	3:40	3:30	11:28
7 (14) (18)	Templier, P. ..	France	3:28	2:44	5:00	11:11
8 (10) (10)	Odenman, R. ..	Sweden	3:39	3:36	3:48	11:03
9 (16) (13)	Schoder, W. ..	Switzerland ..	3:20	3:39	4:00	11:00
10 (21) (19)	Tasic, T.	Yugoslavia ..	2:23	3:33	4:52	10:47
11 (11) (8)	Byrd, M.	Gt. Britain ..	3:31	4:07	2:59	10:38
12 (2) (3)	Hansen, A. ..	Denmark.. ..	4:31	4:13	1:36	10:20
13 (18) (23)	Pegel, H.	Germany.. ..	2:42	2:25	5:00	10:07
14 (1) (16)	Christensen, O. ..	Denmark.. ..	5:00	1:38	3:26	10:05
15 (15) (11)	Schnabel, H. ..	Switzerland ..	3:28	3:38	2:45	9:50
16 (25) (25)	Choy, W.	New Zealand ..	2:09	2:27	4:58	9:33
17 (12) (12)	Sandberg, K. ..	Sweden	3:30	3:30	2:30	9:29
18 (29) (15)	Skalla, G. ..	Austria	1:54	5:00	2:22	9:16
19 (9) (9)	Farrance, W. ..	Gt. Britain ..	3:47	3:35	1:26	8:48
20 (19) (17)	Schover, J. ..	Austria	2:40	3:50	1:56	8:27

Placing	Contestant	Country	1st Flight	2nd Flight	3rd Flight	Total
21	Lustrati, S. ..	Italy	3:29	3:29	1:22	8:19
22	Denzin, K. H. ..	Germany.. ..	2:20	2:38	3:16	8:14
23	Schenker, R. ..	Switzerland ..	1:38	2:43	3:17	7:38
24	Lapierre, B. ..	France	1:29	2:58	3:07	7:33
25	Boscarol, C. ..	Italy	2:02	1:09	4:18	7:29
26	Andersen, R. ..	Sweden	2:03	2:02	3:22	7:27
27	Mokry, P.	France	3:03	2:52	1-29	7:24
28	Czepa, O. ..	Austria	1:14	1:38	4:30	7:22
29	Johnson, R. ..	New Zealand ..	2:36	2:54	1:28	6:58
30	O'Brien, J.	New Zealand ..	2:15	2:14	2:18	6:47
31	Cavatera, O. ..	Italy	1:25	2:48	1-56	6:09
32	King, M. A. ..	Gt. Britain ..	2:03	3:13	:50	6:07
33	Christensen, U. ..	Denmark.. ..	:35	:32	4:20	5:27
34	Mayer, A.	Switzerland ..	1:33	2:23	1:26	5:22
35	Piazza, P.	Italy	2:11	:41	2:25	5:17
36	Royle, P. J... ..	Gt. Britain ..	1:34	2:20	1:15	5:09
37	Haug, E.	Norway	2:05	1:23	:47	4:15
38	Cheurlot, M. ..	France	1:33	2:00	:30	4:04
39	Nesic, L.	Yugoslavia ..	1:22	1:29	:00	2:52
40	Penniket, J. R. ..	New Zealand ..	:27	:35	1:31	2:33
41	Guttmann, A. ..	Israel	:00	1:15	:45	2:00

Left: Bora Gunic with his cosmopolitan winning model, the B.G.4, containing English modelspan, Swedish dope, Italian balsa and superb Yugoslav construction.

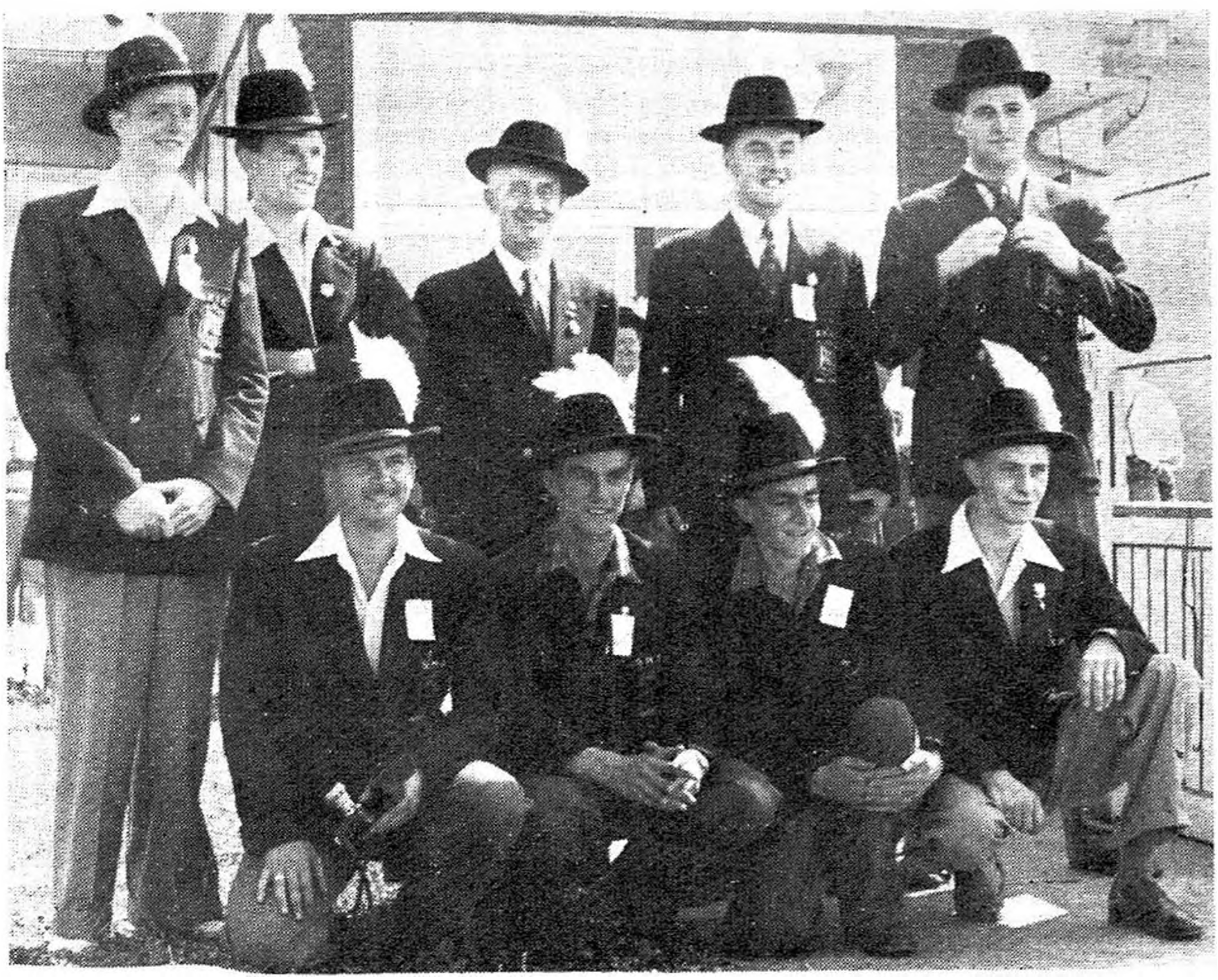
Below: The German team making their second successful appearance in the contest. *Back row left* is third man Gustav Saamann, and second from right Max Hacklinger.





Max Hackinger with his second place development of the Hannover " Banana " design (see plans section). Note thread " interruptor " mounted some 1½ in. in front of L.E.

Below: British and New Zealand proxy teams in traditional Austrian headgear (not Olympic conversions !). British team (*back row*) *left to right:* Bill Farrance, Max Byrd, Bob Gosling, P. Royle and Mick King. *Front row*, New Zealand proxies: Harry Hundleby, John Lamble, Dave Waters, and " Our Kid," Farrance



G. W. Woolls and the latest development of his British record holder. Span is 42 in., length 36 in., and a variable pitch propeller has proved most promising in trials (*Bill Dean Photo*)

CONTEST RESULTS 1952

Results of S.M.A.E. Contests to date of going to press are published on the following pages, together with principal Club Galas. Due to our earlier press date this year, complete results for the 1952 season cannot be published, but they will be contained in the next edition of the Annual.

March 23rd—GAMAGE CUP
(148 competitors)

Open Rubber Decentralised

1	North, R. J.	Croydon	13 : 44
2	Bennett, E.	Croydon	13 : 31
3	Gravett, E.	Southern Cross	12 : 49
4	Harrison, I.	Cheadle	12 : 48
5	Copland, R.	Northern Heights	12 : 38
6	Ward, R.	Croydon	12 : 37
7	Chesterton, R.	Northern Heights	12 : 33
8	Gamblin, R.	Northern Heights	12 : 32
9	Rockell, W.	Gainsborough	12 : 31
10	Royle, J.	Littleover	11 : 35
11	Nicholson, G.	Tynemouth	11 : 28
12	Warring, R. H.	Zombies	11 : 06

March 23rd—PILCHER CUP
(400 competitors)

Open Glider Decentralised

1	Gates, G. K.	Southern Cross	19 : 18
2	Woodward D. (Junior)	Central Essex (Junior)	18 : 50
3	Fuller, T.	Grange	16 : 18
4	Keilly, W. (Junr.)	Regent's Park	15 : 00
5	Cope, H.	Barking	14 : 48
6	Russell, A.	Kentish Nomads	14 : 44
7	Farrance, E.	West Yorks	14 : 15
8	Donald, K.	Southern Cross	14 : 07
9	Grasmeder, R.	West Essex	14 : 06
10	Brooks, A.	Grange	14 : 02
11	Davidge, F.	Southern Cross	14 : 00
12	Wiggins, E.	Leamington	13 : 48

April 6th—S.M.A.E. CUP (A/2 Trials)
(498 competitors)

Duration A/2 Nordic Gliders Area Centralised

1	Farrance, W.	W. Yorks	13.28
2	Aitenhead, G.	Glevum	11.42
3	Phillips, J.	Cardiff	10.52
4	Farrance, E.	W. Yorks	10.49
5	Sugden, D.	Loughboro' Coll.	10.33
6	Dulson, W.	Salford (J)	10.20
7	Verry, M.	Birmingham	10.19
8	Rogers, J.	Solihul	9.58
9	Hanson, M.	Solihull	9.56
10	Exley, C.	Sheffield	9.52
11	Calvert, R.	Bradford	9.38
12	Teece, E.	Salford	9.36

April 6th—HALFAX TROPHY (206 competitors)

F.A.I. Duration for Power Area Centralised

1	Lanfranchi, S.	Bradford	13.36
2	John, E.	Grange	11.21
3	Nelson, W.	Sheffield	9.26
4	Coleman, A.	Bradford	8.47
5	Verney, N.	Swansea	8.19
6	Wright, P.	St. Albans	8.18
7	Barker, P.	R.A.F. St. Albans	8.06
8	Lord, E.	Accrington	7.56
9	Littley, P.	West Bromwich	7.42
10	Byrd, G.	Loughboro' Coll.	7.38
11	Bamford, R.	Exeter	7.36
12	Illingworth, G.	W. Yorks	7.22

April 20th—WESTON CUP (Wakefield Trials) (258 competitors)

Wakefield Rubber Area Centralised

1	Monks, R. C.	Birmingham (4 flights)	16 : 58
2	O'Donnell, J.	Whitefield	15 : 00
3	Marcus, N. G.	Croydon	14 : 58
4	Bennett, G.	Croydon	14 : 09
5	Rockell, W.	Lincoln	13 : 39
6	Gorham, J.	Ipswich	12 : 26
7	Clarke, F.	Bolton	12 : 19
8	Warring, R. H.	Zombies	12 : 17
9	Nicole, R.	West Middx.	12 : 13
10	Palmer, J.	Croydon	11 : 59
11	Collins, R.	West Essex	11 : 48
12	Royle, P.	R.A.F. St. Mawgan	11 : 46

April 20th—ASTRAL TROPHY (220 competitors)

F.A.I. Power Duration Area Centralised

1	Wyatt, P.	R.A.F. Melksham	14 : 10
2	Perkins, G.	Croydon	13 : 21
3	Waldron, J.	Henley	11 : 39
4	Bickerstaffe, J. E.	Accrington	11 : 27
5	Linford, G. W.	Loughboro' Coll.	11 : 09
6	Brimelow, G.	Cheadle	11 : 03
7	Bennett, K.	Chorley Wood	11 : 02
8	Verney, N.	R.A.F. St. Athans	10 : 56
9	North, R. J.	Croydon	9 : 55
10	Standing, R.	Croydon	9 : 48
11	Buskell, R.	Surbiton	9 : 39
	Motler, H.	Accrington	9 : 39

May 4th—KEIL TROPHY (86 competitors)

Ratio/Duration Power Decentralised

			Ratio
1	Bennett, A.	Whitefield	65.91
2	Butcher, N.	Croydon	63.90
3	Chinn, J.	Gt. Yarmouth	55.15
4	Woodhouse, R.	Whitefield	52.2
5	Brooks, A.	Grange	50.85
6	Upfold, A.	Headley	49.82
7	Lamble, J.	Wayfarers	49.80
8	Down, J.	South Bristol	48.63
9	Belfield, K.	Macclesfield	46.29
10	Yates, R.	Headley	46.26
11	Monks, R.	Birmingham	45.06
12	Dilly, M.	Croydon	44.03

May 4th—LADY SHELLEY CUP (26 competitors)

Duration Contest for Tailless Models of any type Decentralised

1	Lucas, A. R.	Port Talbot	12 : 08
2	Edwards, D.	St. Albans	11 : 06
3	Gates, G. K.	Southern Cross	10 : 28
4	Rowe, B.	St. Albans	9 : 38
5	Boulter, O.	Port Talbot	7 : 51
6	Dorsett, A.	Blackheath	7 : 22
7	Smith, F.	Southern Cross	6 : 11
8	Donald, K.	Southern Cross	6 : 08
9	Waters, D.	Grange	5 : 37
10	Woolls, G. A. T.	Bristol & West	5 : 24
11	Hume, J.	Belfairs	5 : 00

May 11th—K.& M.A.A. CUP (362 competitors)

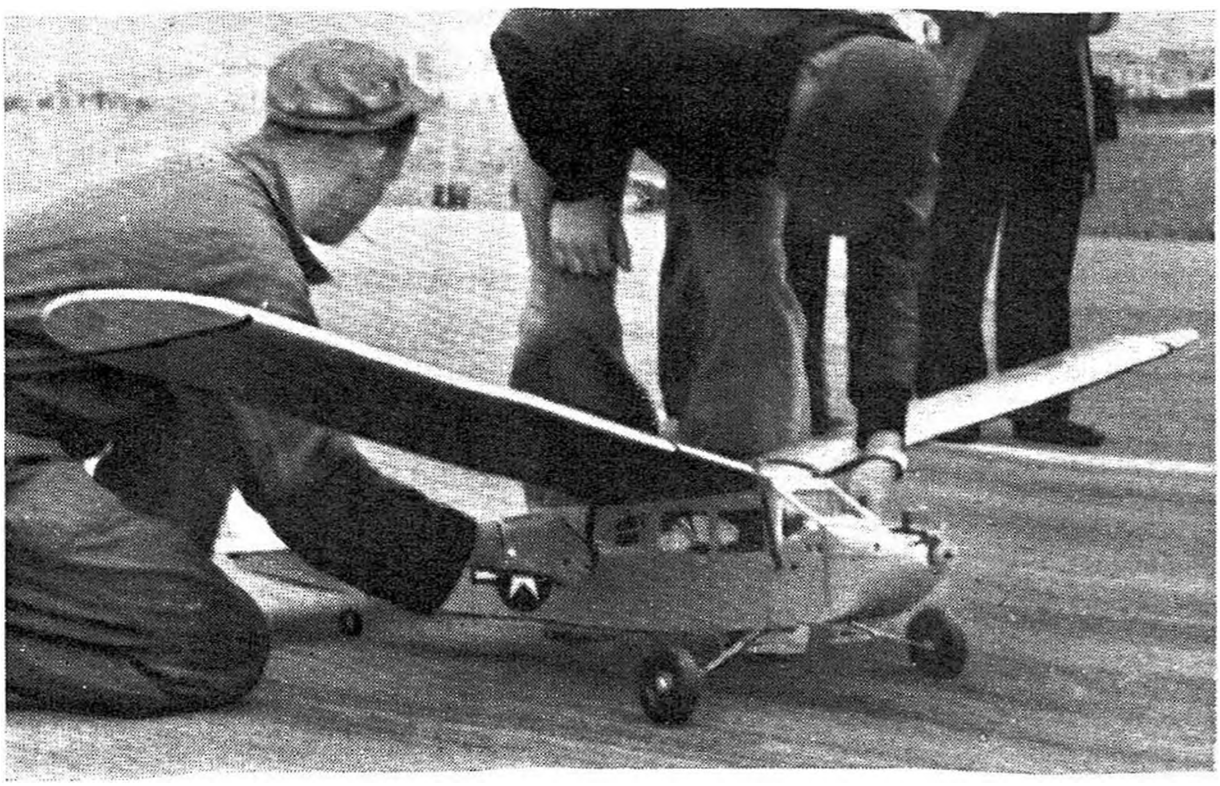
A/2 Nordic Glider 2nd Qualifying Trials Area Centralised

1	O'Donnell, H.	Whitefield	(J)	13 : 29
2	Askew, R.	Whitefield		11 : 55
3	Riddihough, T.	Leamington	(J)	11 : 03
4	Bower, B.	Salford		10 : 51
5	Harris, B.	Prestwick		10 : 45
6	Ellison, I.	Burnley Skyrangers		10 : 27
7	Thomas, M.	Bolton		9 : 53
8	Bennett, Miss W.	Whitefield	(J)	9 : 52
9	White, G.	Littleover		9 : 50
10	Targett, S.	Whitefield		9 : 23
11	Jackson, G.	Littleover		9 : 15
12	Dulson, W.	Salford		9 : 01

May 11th—GUTTERIDGE TROPHY (149 competitors)

Wakefield Rubber 2nd Qualifying Trials Area Centralised

1	Vickary, P.	Swansea	10 : 30
2	Allaker, P.	Surbiton	10 : 08
3	Picken, B.	Wigan	9 : 27
4	Robinson, K.	Bolton	9 : 25
5	Copland, R.	N. Hts.	9 : 13
6	Boxall, F.	Brighton	8 : 45
7	Sandy, R.	Henley	8 : 40
8	Dalloway, W.	Birmingham	8 : 35
9	Jackson, C.	Ashton	8 : 23
10	Rhead, T.	Wigan	8 : 18
11	Bennett, D.	Whitefield	8 : 07
12	Buskell, P.	Surbiton	7 : 59



Ron Warring test launches his 1952 Wakefield model, featuring gears and twin skeins of rubber. Like all his models it bears the stamp of the typical "Warring School of Design!" *(Photo Ed. Stoffel)*

N. G. Marcus, who missed the trip to Sweden by one place only, launches his long fuselage Wakefield in the classic manner.

(Photo Ed. Stoffel)

Opposite Page: Staff Sergeant Saich of U.S.A.F. Weisbaden, with his E.D. Queen, powered with Frog 500, and radio controlled with the latest E.D. Mk. IV tuned reed receiver, with four pawl escapement, with separate ignition control.

June 1st—INTERNATIONAL POWER TRIALS (Qualifiers only)

F.A.I. Power Centralised

1	Buskell, P.	Surbiton	11 : 50
2	Monks, R. C.	Birmingham	10 : 02
3	North, R. J.	Croydon	8 : 04
4	Byrd, G. C. M.	Loughboro' Coll.	7 : 03
5	Brooks, A.	Grange	6 : 53
6	Horwick, E.	Whitefield	6 : 50
7	Marcus, N. G.	Croydon	6 : 46
8	Linford, G.	Loughboro' Coll.	6 : 46
9	Gorham, J.	Ipswich	6 : 42
10	Butcher, N.	Croydon	6 : 31
11	Tubbs, H.	Leeds	5 : 50
12	Royle, P. J.	R.A.F. St. Mawgan	5 : 44

June 1st/2nd—*AEROMODELLER* RADIO CONTROL TROPHY

			Points
1	Allen, S.	West Essex	100
2	Allen, D.	West Essex	50

June 2nd—SHORT BROS. CUP

For P.A.A. Load Models Centralised

1	Snodin, P.	Northampton	6 : 09
2	Warring, R. H.	Zombies	3 : 31
3	Lucas, I.	Brighton	3 : 28
4	Bennett, A.	Whitefield	3 : 19
5	Spence, E.	Brighton	2 : 45
6	Upfold, E.	Headley	1 : 35
7	Russell, P.	Chingford	1 : 14
8	Waters, D.	Grange	1 : 10
9	Lewis, G.	Zombies	1 : 04

June 1st/2nd—INTERNATIONAL CONTROL LINE ELIMINATORS

Centralised

Stunt			Points
1	Ridgeway, P.	Macclesfield	302.75
2	Hewitt, A. J.	S. Birmingham	295.25
3	Jarvis, M.	Outlaws	254.75
4	Piacentini, A.	Salisbury	250

Vic Jays, who has had a most successful contest season, entering as a country member, with his Arden 19 powered model. As he has been lucky enough to have several trips to the United States, his models naturally follow American trends and receive in American engines (*Photo Ed. Stoffel*)

5	Taylor, C.	West Essex	239
6	Crowe, C.	Harrow	216
Team			
1	CLAYDON, J.	East London	
2	HARPER, B.	Outlaws	
Speed I			
1	WRIGHT, P.	St. Albans	105.0 m.p.h.
2	Eifflaender, J. G.	Macclesfield	100.3
3	HEWITT, A. J.	S. Birmingham	95.99
Speed II			
1	WRIGHT, P.	St. Albans	110.5
2	Peek, G.	Chelmsford	109.6
3	Claydon, J.	East London	97.1
Speed III			
1	DAVENPORT, R.	East London	128.075
2	Guest, F.	C/Member	127.8
3	BILLINTON, M.	Brixton	123

(Team members in capitals)

June 2nd—SUPER SCALE TROPHY

Power Scale Centralised

			Points
1	Bridgewood, J.	Woodlands	85.5
2	King, V.	Thames Valley	53

June 7th/8th—PREMIER SHIELD (Qualifiers only)

Wakefield Rubber Centralised

1	ROYLE, J.	Littleover and Rolls Royce	15 : 00
2	NICOLE, R.	West Middlesex	14 : 20
3	WARRING, R. H.	Zombies	13 : 22
4	O'DONNELL, J.	Whitefield	13 : 22
5	Albone, A.	Croydon	13 : 22
6	DUNKLEY, T.	Northampton	13 : 19
7	EVANS, E. W.	Northampton	12 : 56
8	Marcus, N. G.	Croydon	12 : 47
9	Ward, S. A.	Whitefield	12 : 47
10	Nicholls, D.	Southend Senior	12 : 41
11	Haisman, B. V.	Whitefield	12 : 28
12	Dowsett, I.	West Middlesex	12 : 15

(Team members in capitals)

June 7th/8th—*AEROMODELLER* A/2 SAILPLANE CHALLENGE TROPHY (Qualifiers only)

A/2 Nordic Glider Centralised

1	FARRANCE, W.	West Yorks	15 : 00+8 : 02
2	ROYLE, P.	R.A.F. St. Mawgan and Littleover	15 : 00+2 : 27
3	KING, M. A.	Belfairs	15 : 00+2 : 05
4	BYRD, G. C. M.	Loughboro' Coll.	15 : 00+1 : 49
5	Giggle, P.	Brighton	14 : 44
6	Law, P.	W. Middx.	14 : 26
7	Wilkinson, P.	Northampt'n	13 : 56
8	Laxton, D.	Oundle	13 : 40
9	Wrigley, A.	Whitefield	13 : 26
10	Thomas, M.	Bolton	13 : 22
11	Jackson, G.	Littleover	13 : 14
12	Farrance, E.	West Yorks	12 : 55

(Team members in capitals)

June 22nd—FLIGHT CUP (47 competitors)

Open Rubber Decentralised

1	Cooke, A.	Henley	14 : 15
2	Gorham, J.	Ipswich	12 : 42
3	Atkinson, R.	Ipswich	12 : 24
4	Royle, J.	Littleover	12 : 13
5	Bennett, A.	Whitefield	12 : 13
6	Warring, R. H.	Zombies	12 : 04
7	Palmer, J.	Croydon	11 : 17
8	Marcus, N. G.	Croydon	10 : 06
9	Rutter, K.	Leeds	10 : 02
10	Blount, J.	Croydon	9 : 37
11	Firth, R.	York	9 : 34
12	Bennet, E.	Croydon	9 : 28

June 22nd—C.M.A. CUP (73 competitors)

Glider Duration Decentralised

1	Lamb, B.	York	13 : 19
2	Painter, D.	Henley	13 : 10
3	Morgand, B.	Streatham	13 : 00
4	Lefever, G.	West Essex	12 : 51
5	Standing, R.	Croydon	12 : 43
6	Marsh, C.	Ilford	12 : 38
7	Cooke, A.	Henley	12 : 32
8	North, R. J.	Croydon	12 : 19
9	Bagnall, A.	Whitefield	12 : 15
10	Ferrar, G.	Northern Hts.	11 : 59
11	Pearce, P.	By-Pass	11 : 47
12	Gravett, E.	Southern Cross	11 : 46

July 6th—HAMLEY TROPHY
(32 competitors)
Open Power Duration Decentralised

1	Upfold, E.	Headley	24 : 47*
2	John, E.	Grange	22 : 25*
3	Brooks, A.	Grange	18 : 20*
4	Perkins, G.	Croydon	12 : 32
5	Bishop, M.	Solihull	12 : 10
6	Gorham, J.	Ipswich	10 : 16
7	Williams, R.	Swansea	10 : 04
8	Lucas, I.	Brighton	9 : 33
9	Blount, J.	Croydon	9 : 29
10	Dilly, M.	Croydon	8 : 41
11	Lanfranchi, S.	Bradford	8 : 35
12	Bickerstaffe, J.	Accrington	8 : 25

* After fourth flight

July 6th—FROG JUNIOR CUP
No Contest

July 20th—JETEX CHALLENGE CUP
(34 competitors)
Ratio Duration for Jetex Powered Models.
Area Centralised

			ratio
1	Allaker, P.	Surbiton	45.3
2	Luscombe, D.	Cambridge	34.1
3	Hardwick, P.	Wolves	31.0
4	Ransom, L.	West Essex	29.6
5	Amor, R.	Ilford	24.2
6	Cope, H. A.	Barking	23.9
7	Jays, V.	C/Member	23.8
8	Gordon, E.	Southampton	23.1
9	Dallaway, W.	Birmingham	22.4
10	Judge, A.	C/Member	21.0
11	Stobart, W.	Northampton	20.0
12	O'Donnell, H.	Whitefield	19.4

July 20th—FARROW SHIELD (22 competitors)
Team Contest for Open Rubber Area Centralised

1	Croydon D.M.A.C.	50 : 12
2	Solihull M.A.C.	44 : 21
3	Northampton M.A.C.	40 : 20
4	Whitefield M.A.C.	40 : 18
5	Coventry D.M.A.C.	38 : 29
6	Cheadle M.A.S.	35 : 18

July 20th—WOMEN'S CHALLENGE CUP
(22 competitors)
Open Duration for Rubber or Gliders
Area Centralised

1	Averill, Mrs. R.	Solihull	13 : 55
2	Lloyd, Mrs.	Solihull	13 : 36
3	Clayton, Miss M.	West Yorks	12 : 22
4	Holt, Mrs.	Upton	11 : 15
5	Healey, Miss P.	Belfairs	11 : 01
6	Owen, Mrs.	Thames Valley	8 : 47
7	Copley, Miss M.	Halifax	6 : 50
8	Edwards, Mrs.	Grimsby	6 : 13
9	Mortiboys, Miss	Small Heath	5 : 53
10	Bennett, Mrs.	Whitefield	5 : 42
11	Marshall, Mrs. S.	Boston	5 : 16
12	Stringer, Mrs. S.	Huddersfield	4 : 11

BRITISH NATIONALS held at H.M.S. "Siskin," Gosport, August 3rd/4th

August 3rd—THURSTON CUP
Open Glider Duration (2 flights)

1	O'Donnell, J.	Whitefield	5 : 49
2	Lamble, J.	Wayfarers	5 : 16
3	Mason, E.	Sevenoaks	5 : 00
4	Neve, N.	Brighton	4 : 26
5	Law, R.	West Middlesex	4 : 14
6	Wyatt, P.	R.A.F. Felixstowe	4 : 11

August 3rd—MODEL AIRCRAFT TROPHY
Open Rubber (2 flights)

1	O'Donnell, J.	Whitefield	7 : 24
2	Warring, R.	Zombies	6 : 51
3	Green, M.	Men of Kent	5 : 30
4	Bennett, A.	Whitefield	4 : 36
5	Meechan, A.	Dublin Phoenix	
6	Buskell, P.	Surbiton	

" Gadget " Gibbs shows his 10 cc. B.R.E. engined control line speed model to engine designer R. Checksfield. This model was flown at Namur, where it put up a speed of 149 m.p.h., equalling present world record

August 3rd—GOLD TROPHY
Aerobatic Control Line

			points
1	Hewitt, A.	South Birmingham	348
2	Smith, P.	Chingford	332
3	Piacentini, A.	Salisbury	241
4	Plant, C.	Stockton	205

August 3rd—EASTBOURNE TROPHY

			T/R(A)
1	Edmonds, D.	High Wycombe	10 miles
2	Tutte, R.	Salisbury	
3	Butcher, N.	Croydon	

August 3rd—GODALMING TROPHY

			T/R(B) m.p.h.
1	Muscutt, K.	West Essex	10 miles at 64
2	Greenwood, R.	Worthing	
3	Morley, W.	West Essex	

August 3rd/4th—S.M.A.E. RADIO CONTROL TROPHY

			points
1	Sallis, C.	Cambridge	211
2	Hemsley, O.	Bushy Park	134
3	Sutherland, S.	West Essex	100
3	Tickner, W.	West Essex	100

August 4th—SIR JOHN SHELLEY CUP
Power Duration (2 flights)

1	Brooks, A.	Grange	8 : 46
2	Barr, L.	West Middlesex	7 : 47
3	Wheeler, B.	Birmingham	7 : 11
4	Bennett, A.	Whitefield	7 : 06
5	Dallaway, W.	Birmingham	6 : 43
6	Buskell, P.	Surbiton	5 : 48

August 3rd/4th—CONTROL LINE (SPEED)

				m.p.h
Speed I	Dilly, W.	Croydon	126 k.p.h.	79.6
Speed II	Wright, P.	St. Albans	167 k.p.h.	103.5 (new record)
Speed IV	Timms, H.	Harrow	176 k.p.h.	109.6

WEST ESSEX GALA RESULTS

Open Rubber
1 J. Gorham — Ipswich
2 J. B. Knight — Kentish Nomads
3 J. Palmer — Croydon

Open Glider
1 A. G. Swale — Streatham
2 M. Mayhew — Apsley
3 R. Gilroy — Croydon

Open Power Ratio
1 P. Buskell — Thames Ditton
2 A. J. Brooks — Grange
3 G. Fuller — St. Albans

Radio Control
1 R. Clark — Battersea
2 T. Hemsley — Bushy Park
3 J. Fox — Hatfield

Control Line Aerobatic
1 Alan Hewitt — S. Birmingham
2 P. Smith — Chingford
3 B. Harper — Outlaws

Team Race
Class A
1 D. Langston — High Wycombe
2 R. Edmunds — High Wycombe
3 P. Johnson — High Wycombe

Class B
1 R. Bourne — Godalming
2 Miss B. McCann — Worksop

Chuck Glider (best three flights out of five)
1 J. Barker — Surbiton
2 Jackson — Satyrs
3 Coles

NORTHERN HEIGHTS GALA RESULTS

THE QUEEN ELIZABETH CUP *(Power)*

1	Vic Smeed	Canterbury Pilgrims	451.5
2	J. Lewis	Northern Heights	442
3	R. Mead	Northern Heights	408

FLIGHT CUP *(Glider)*

1	E. Wallace	Surbiton	523
2	L. Wheatley	Sutton-by-Pass	402
3	M. Lobban	St. Albans	380

FAIREY CUP *(Rubber)*

1	E. Bennett	Croydon	566
2	R. Atkinson	Ipswich	515
3	P. Allaker	Surbiton	504

THURSTON TROPHY *(Helicopter)*

1	M. Ingram	Jetex
2	P. Vashford	Pharos
3	V. King	Pharos

DE HAVILLAND TROPHY *(Open Power)*

1	J. Swainways	W. Middlesex	430
2	M. G. Marcus	Croydon	383
3	F. Chatwin	Birmingham	352

R.A.F. REVIEW CUP *(Radio Control)*

			yards
1	R. C. Lawyer	W. Middlesex	13
2	S. Collins	Northern Heights	19
3	S. Sutherland	West Essex	21

CORONATION CUP *Race. (Team "A")*

		mls.	*m.p.h*
D. Langston	High Wycombe	10	50.5

MODEL ENGINEER CUP *(Team Race "B")*

W. Morley	West Essex	10	66

THE "AEROMODELLER" CHALLENGE CUP *(Points Champion)*
Tony Brooks — Grange

Roy Yeabsley with his successful A.P.S. glider Revenge, which has showed up well in current contests (*Photo: Ed. Stoffel*)

NATIONAL MODEL AIRCRAFT GOVERNING BODIES

In most instances the full-size national aero club is directly responsible for the conduct of model aeronautics, but in some cases, as for example the S.M.A.E., a specialist group has been delegated to handle affairs on behalf of the parent body. To avoid delays in correspondence any letters dealing with model aeronautics should always be very clearly marked as such.

GREAT BRITAIN	The Society of Model Aeronautical Engineers, Londonderry House, Park Lane, London, W.1.
AUSTRALIA	The Model Aeronautical Association of Australia, Sec.: M. G. McSpedden (A.C.A. Aust.), 195 Elizabeth Street, Sydney, New South Wales.
AUSTRIA	Osterreichischer Aero Club, Vienna 1, Dominikanerbastei 24.
ARGENTINE	Aero Club Argentino (Seccion Aeromodelismo), Rodriguez Piera 240, Buenos Aires.
BELGIUM	Federation de la Petite Aviation Belge, 1, Rue Montoyer, Brussels.
BRAZIL	Aero-Clube de Brasil, 31, Rua Alvaro Alvim, Rio de Janiero.
CANADA	Model Aeronautics Association of Canada, 1555, Church Street, Windsor, Ontario.
CHILE	Club Aereo de Chile, Santa Lucia 256, Santiago.
CUBA	Club de Aviacion de Cuba, Edificio Larrea, Havana.
CZECHOSLOVAKIA	Aeroklub Republiky Ceskoslovensko, Smecky 22, Prague 11.
DENMARK	Det Kongelige Aeronautiske Selskab, Norre Farrimagsgade 3 K, Copenhagen.
EGYPT	Royal Aero-Club d'Egypte, 26 Rue Sherif Pacha, Cairo.
FINLAND	Suomen Ilmailuliitto, Mannerheimintie 16, Helsinki.
FRANCE	Federation Nationale Aeronautique (Modeles Reduits), 7, Avenue Raymond Poincare, Paris XVI.
	Aero-Club de France (Modeles Reduits), 6, Rue Galilee, Paris.
	(Communications should always be addressed in duplicate to both these bodies as they jointly share responsibility for certain aspects of aeromodelling.)
HOLLAND	Koninklijke Nederlandsche Vereeniging voor Luchvaart, Anna Paulownaplein 3, The Hague.
HUNGARY	Magyar Repulo Szovetseg, V. Sztalin-ter 14, Budapest.
ICELAND	Flugmalafelag Islands, P.O. Box 234, Reykjavik.
INDIA	All India Aeromodellers Association, 8 Lee Road, Calcutta, 20.
IRELAND	Model Aeronautics Council of Ireland, Abbey Buildings, Middle Abbey Street, Dublin.
ISRAEL	Aero Club of Israel, 9 Montefiore Street, P.O.B. 1311, Tel Aviv.
ITALY	Federazione Aeromodellistica Nationale Italiana (F.A.N.I.), Via Cesare Beccaria 35, Rome.
JUGOSLAVIA	Aero-Club Jugoslavije, Uzun, Mirkova IV/I, Belgrade.
LUXEMBOURG	Aero-Club du Grande-Duche de Luxembourg, 5 Avenue Monteray, Luxembourg.
MONACO	Monaco Air-Club, 8 Rue Grimaldi, Monaco.
NEW ZEALAND	New Zealand Model Aeronautical Association, c/o Mr. L. R. Mayn, 120 Campbell Road, Onehunga, Auckland.
NORWAY	Norske Aero Club, Ovre Vollgae 7, Oslo.
PERU	Aero Club del Peru, Lima.
POLAND	Aeroklub Rzeczypospolitej Polskiej, Ul. Hoza 39, Warsaw.
PORTUGAL	Aero Club de Portugal, Avenida da Liberdade 226, Lisbon.
RUMANIA	Aeroclubul Republico al Romaniei, Lascar Catargi 54, Bucharest.
SOUTH AFRICA	South African Model Aeronautic Association, 302 Grand National Buildings, Rissik Street, Johannesburg.
SPAIN	Real Aero-Club de Espana (Subeseccion de Aeromodismo), Carrera de Jan Jeronimo 19, Madrid.
SWEDEN	Kungl. Svenska Aeroklubben, Malmskillnadsgatan 27, Stockholm.
SWITZERLAND	Aero Club de Suisse (Modeles Reduits), Hirschengraben 22, Zurich.
SYRIA AND LEBANON	Aero Club de Syrie et du Libon, Beyrouth.
TURKEY	Turk Hava Kurumu (T.H.K.), Enstitu Caddesi, 1, Ankara.
UNITED STATES OF AMERICA	Academy of Model Aeronautics, 1025 Connecticut Avenue, Washington 6, D.C.
U.S.S.R.	Aero Club Central de l'U.S.S.R. V. P. Tchkalov, Moscou-Touchino.
URUGUAY	Aero-Club del Uruguay, Paysandu 896, Montevideo.

WORLD AND INTERNATIONAL RECORDS

As at 31st August, 1952

ABSOLUTE WORLD RECORDS

Duration	Petoukhov, V.	U.S.S.R.	21/ 7/1951	5 hr. 10 min.
Distance	Lioubouchkine, G.	U.S.S.R.	22/ 7/1951	356.794 km.
Altitude	Lioubouchkine, G.	U.S.S.R.	13/ 8/47	4,152 m.
Speed (Straight) ...	Stiles, Eug.	America	20/ 7/1949	129,768 km/h
Speed (Circular) ...	Laniot, G.	France	25/10/1951	231.270 km/h

RUBBER DRIVEN

Duration				hr.	min.	sec.
Orthodox	Kiraly, M.	Hungary	20/ 8/1951	1	27	17
Seaplane	Egorovskaya, Mlle. I.	U.S.S.R.	21/ 7/1951	1	13	26
Special	Evergary, G.	Hungary	13/ 6/1950		7	43
Tailless	Kiraly, M.	Hungary	23/ 8/1950		35	42
Tailless Seaplane ...	Szabo, D.	Hungary	15/ 7/51		2	41

Distance				km.	metre
Orthodox	Benedek, G.	Hungary	20/ 8/1947	50.260	
Seaplane	Horvath, E.	Hungary	10/ 9/1949	45.150	
Special	Roser, N.	Hungary	9/ 4/1950		238
Tailless	Halle, J.	Hungary	—	5.250	
Tailless Seaplane ...	Abaffy, E.	Hungary	10/ 7/49		435

Altitude				
Orthodox	Poich, R.	Hungary	31/ 8/1948	1,442
Seaplane	Gasko, M.	Hungary	18/ 8/1949	939

Speed				km/h
Orthodox	Davidov, V.	U.S.S.R.	11/ 7/1940	107.080
Seaplane	Abramov, B.	U.S.S.R.	6/ 8/1940	76.896
Tailless	Koumanine, V.	U.S.S.R.	13/ 8/1951	43.924
Tailless Seaplane ...	Koumanine, V.	U.S.S.R.	28/ 7/1950	31.824

POWER DRIVEN

Duration				hr.	min.	sec.
Orthodox	Pethoukhov, V.	U.S.S.R.	21/ 7/1951	5	10	
Seaplane	Vassiltchenko, M.	U.S.S.R.	28/ 7/1950	2	50	
Special	Khoukhra, Y.	U.S.S.R.	18/ 8/1950		27	35
Tailless	Lipinsky, L.	U.S.S.R.	14/ 8/1951	3	31	
Tailless Seaplane ...	Ivanov, Y.	U.S.S.R.	—		33	05

Distance				km
Orthodox	Lioubouchkine, G.	U.S.S.R.	22/ 7/1951	356.794
Seaplane	Koutcherov, E.	U.S.S.R.	14/ 8/1951	130.597
Special	Koukhra, Y.	U.S.S.R.	14/ 8/1950	12.201
Tailless	Lipinsky, L.	U.S.S.R.	14/ 8/1951	109.284
Tailless Seaplane ...	Rakov, M. E.	U.S.S.R.	—	8.650

Altitude				metre
Orthodox	Lioubouchkine, G.	U.S.S.R.	13/ 8/1947	4.152
Seaplane	Kavsadze, I.	U.S.S.R.	8/ 8/1940	4.110
Tailless	Lipinsky, L.	U.S.S.R.	14/ 8/1951	2.813
Tailless Seaplane ...	Rakov, M. E.	U.S.S.R.	—	1.550

Speed (Straight Line)				km/h.
Orthodox	Stiles, Eug.	America	20/ 7/1949	129.768
Seaplane	Khabarov, R.	U.S.S.R.	18/ 8/1948	50.050
Tailless	Martinov and Rakov	U.S.S.R.	12/ 8/1950	49.680

Speed (Circular) Class I				
Orthodox	Rusiska, Z.	Czechoslovakia	3/ 5/1952	156.724
Seaplane	Vassiltchanko, M. B.	U.S.S.R.	16/ 8/1950	70.056
Special	Gall, T.	Hungary	9/12/1951	85.714
Tailless	Khoukhra, I.	U.S.S.R.	28/ 4/1950	66.888

Speed (Circular) Class II				
Orthodox	Labards, R.	France	9/ 7/1950	192.240
Seaplane	Vassiltchenko, V.	U.S.S.R.	28/10/1951	98.362
Special	Jancso, B.	U.S.S.R.	14/10/1951	111.801
Tailless	Sprague, R. K.	America	7/10/1951	155.509
Tailless Seaplane ...	Vassiltchenko, V.	U.S.S.R.	27/11/1951	97.875

Speed (Circular) Class III				
Orthodox	Laniot, G.	France	25/10/1951	231.270
Special	Eskov, V.	U.S.S.R.	25/ 9/1951	54.972
Tailless	Gaevsky, O.	U.S.S.R.	23/ 5/1950	163.447

Speed (Circular) Class IV (Jet)				
Orthodox	Paur, S.	Czechoslovakia	3/ 5/52	231.632
Tailless	Doonan, W.	America	6/10/51	193.352

SAILPLANES

Duration				hr.	min.	sec.
Orthodox	Aidadinov, S.	U.S.S.R.	6/ 7/1950	3	18	
Tailless	Mourastchenko, B.	U.S.S.R.	6/ 6/1951	1	16	32

Distance				km.
Orthodox	Szomolanyi, F.	Hungary	23/ 7/1951	139.8
Tailless	Mourastchanko, B.	U.S.S.R.	6/ 6/1951	33.36

Altitude				metre
Orthodox	Benedek, G.	Hungary	23/ 5/1948	2.364
Tailless	Koutcer, M.	U.S.S.R.	17/ 8/1950	347

RADIO CONTROLLED

Duration				hr.	min.	sec.
Orthodox	Aizenchtiene and Bachkine	U.S.M.R.	19/ 8/1951		23	07

LIST OF BRITISH NATIONAL MODEL AIRCRAFT RECORDS

31st August, 1952

OUTDOOR (Minimum F.A.I. Loading)

Rubber Driven				
Monoplane	Boxall, F.H.	(Brighton)	15/ 5/1949	35 : 00
Biplane	Young, J. O.	(Harrow)	9/ 6/1940	31 : 05
Wakefield	Boxall, F. H.	(Brighton)	15/ 5/1949	35 : 00
Canard	Harrison, G. H.	(Hull Pegasus)	23/ 3/1952	6 : 12
Scale	Marcus, N. G.	(Croydon)	18/ 8/1946	5 : 21.75
Tailless	Woolls, G. A. T.	(Bristol)	4/ 5/1952	2 : 00
Helicopter	Tangney, J. F.	(U.S.A. & Croydon)	2/ 7/1950	2 : 43.75
Rotorplane	Crow, S. R.	(Blackheath)	23/ 3/1936	: 39.5
Floatplane	Parham, R. T.	(Worcester)	27/ 7/1947	8 : 55.4
Flying Boat	Rainer, M.	(North Kent)	28/ 6/1947	1 : 09
Sailplane				
Tow Launch	Best, F.	(Leeds)	20/ 6/1948	63 : 46
Hand Launch	Campbell-Kelly, G.	(Sutton Coldfield)	29/ 7/1951	24 : 30
Tailless (T.L.)	Lucas, A. R.	(Port Talbot)	21/ 8/1950	22 : 33.5
Tailless (H.L.)	Wilde, H. F.	(Chester)	4/ 9/1949	3 : 17
Nordic (T.L.)	Whittall, L.	(Birmingham)	2/ 7/1950	29 : 51.7
Nordic (H.L.)	Campbell-Kelly, G.	(Sutton Coldfield)	29/ 7/1951	24 : 30
Power Driven				
A (0-2.5 cc.)	S'ringham, H. E.	(Saffron Walden)	12/ 6/1949	25 : 01
B (over 2.5-5 cc.)	Dallaway, W. E.	(Birmingham)	17/ 4/1949	20 : 28
C (over 5-15 cc.)	Gaster, M.	(C/Member)	15/ 7/1951	10 : 44
Tailless	Poile, W.	(C/Member)	23/ 8/1950	2 : 09.6
Scale	Tinker, W. T.	(Ewell)	1/ 1/1950	1 : 36.5
Floatplane	Stainer, J. R.	(Canterbury)	14/ 8/1949	2 : 59.4
Flying Boat	Gregory, N.	(Harrow)	18/10/1947	2 : 08.5
Control Line Speed				
Class I	*Tothill, R. J.	(Enfield)	24/ 8/52	84.72 m.p.h.
Class II	Coles, A. V.	(Bristol & West)	18/ 8/1951	99.41
Class III	Billington, M.	(Brixton)	6/ 8/1951	95.00
Class IV	Wright, P.	(St. Albans)	14/ 7/1951	124.54
Class V	Shaw, C. A.	(Zombies)	19/ 6/1949	118.42
Class VI	Guest, F.	(C/Member)	14/ 7/1951	133.10
Class VII (Jet)	Stovold, R. V.	(Guildford)	25/ 9/1949	133.33

*Subject to confirmation

INDOOR

Free Flight				
Stick (H.L.)	Copland, R.	(Northern Heights)	22/ 1/1937	18 : 52
Stick (ROG)	Mackenzie, R.	(Blackheath)		8 : 42
Fuselage (H.L.)	Parham, R. T.	(Worcester)	19/ 8/1951	7 : 15
Fuselage (ROG)	Parham, R.T.	(Worcester)	18/ 8/1951	7 : 30
Tailless (H.L.)	Parham, R. T.	(Worcester)	18/ 8/1951	2 : 59
Tailless (ROG)	Parham, R. T.	(Worcester)	18/ 8/1951	2 : 28
Helicopter	Parham, R. T.	(Worcester)	18/ 8/1951	2 : 09
Rotorplane	Mawby, L.	(Ealing)		: 32.2
Round the pole				
Class A	Muxlow, E. C.	(Sheffield)	10/12/1948	6 : 05
Class B	Parham, R. T.	(Worcester)	20/ 3/1948	2 : 26
Speed	Jolley, T. A.	(Warrington)	19/ 2/1950	42.83 m.p.h.

OUTDOOR (Lightweight)

Rubber Driven				
Monoplane	Barnacle, N. A.	(Leamington)	--/ 8/1952	17 : 55
Biplane	O'Donnell, J.	(Whitefield)	18/ 5/1952	6 : 46
Scale	Dubery, V. R.	(Leeds)	14/ 7/1951	1 : 11
Floatplane	O'Donnell, J.	(Whitefield)	14/ 1/1951	1 : 43.5
Sailplane				
Tow Launch	Hunt, P.	(Bury St. Edmunds)	25/ 5/1952	32 : 10
Hand Launch	Gates, G. K.	(Southern Cross)	16/ 2/1952	8 : 45
Tailless (T.L.)	Couling, N. F.	(Sevenoaks)	3/ 6/1951	22 : 22
Tailless (H.L.)	Donald, K.	(Southern Cross)	23/ 5/1952	3 : 29
Power Driven				
Class A	Archer, W.	(Cheadle)	2/ 7/1950	31 : 05
Class C	Ward, R. A.	(Croydon)	25/ 6/1950	5 : 33
Tailless	Gates, M. M.	(Non-member)	28/ 1/1951	2 : 47

MODEL SHOP DIRECTORY

LONDON

Robsons,
149/151 Morning Lane,
HACKNEY, E.9

"Craftex,"
277 High Road,
LEYTONSTONE, E.11

Russell & Sons,
5 Chingford Road,
WALTHAMSTOW, E.17

Ripmax, Ltd.,
39 Parkway,
CAMDEN TOWN, N.W.1

H. A. Blunt & Sons, Ltd.,
133 The Broadway,
MILL HILL, N.W.7

Chas. Stevenson & Son,
239-241 High Street,
LEWISHAM, S.E.13

Palace Model Shop,
13 Central Hill,
S.E.19

Norman's Model Supplies,
145 Kingston Road,
WIMBLEDON, S.W.19

Jones Bros. of Chiswick,
56 Turnham Green Terrace,
CHISWICK, W.4

BEDFORDSHIRE

S. Brightman & Sons,
29 St. John's Street,
BEDFORD

Golding & Co.,
107 High Street,
BEDFORD

Luton Model Supplies,
1a Waldeck Road,
LUTON

BERKSHIRE

R. N. Pugh
(*Prop:* A. Niven),
32 Bath Street,
ABINGDON

James Rogerson Ltd.,
24 Market Place,
READING

BUCKINGHAMSHIRE

Keen's Model Shop,
1 Bridge Street,
HIGH WYCOMBE

E. Langley,
465 Bath Road,
Cippenham,
SLOUGH

H. D. Peirce,
5 Public Market,
SLOUGH

CAMBRIDGESHIRE

Automodels,
21 King's Parade,
CAMBRIDGE

The Aeromodellers' Stores,
North End,
WISBECH

CHESHIRE

Barnbys Ltd.,
31 Frodsham Street,
CHESTER

E. N. Carless,
234 Nantwich Road,
CREWE

DERBYSHIRE

Radio Electrical Service,
16 Beetwell Street,
CHESTERFIELD

DEVONSHIRE

"Model Corner,"
Exeter's Pram and Toy Shop,
174 Sidwell Street,
EXETER

P. G. Cooper,
Old Fore Street,
SIDMOUTH

ESSEX

Page's of Barkingside,
3 Broadway Parade,
Fencepiece Road,
BARKINGSIDE

Chelmsford Model Co.,
14 Baddow Road,
CHELMSFORD

The Hobby Store,
49/50 Victoria Arcade,
SOUTHEND-ON-SEA

Paramount Model Aviation,
695 London Road,
WESTCLIFF-ON-SEA

GLOUCESTERSHIRE

Fletchers (Sports) Ltd.,
Toy and Model Dept.,
20/24 King's Square,
GLOUCESTER

HAMPSHIRE

P. E. Gregory & Son (Alton) Ltd.,
9 Anstey Road,
ALTON

"Robin Thwaites,"
248 Fratton Road,
PORTSMOUTH

Technical Models (So'ton) Ltd.,
8 St. Mary Street,
SOUTHAMPTON

HERTFORDSHIRE

St. Albans Model Depot,
1 Hatfield Road,
ST. ALBANS

HUNTINGDON

E. Hildred & Son,
86 High Street,
RAMSEY

MODEL SHOP DIRECTORY

KENT

Meers (Engineering) Ltd.,
22 Sun Street,
CANTERBURY

Modern Models,
12 The Market,
Lowfield Street,
DARTFORD

G. H. Wheatley,
80 Harold Road,
Cliftonville.
MARGATE

LANCASHIRE

Ashton Model Supplies,
201 Old Street,
ASHTON-UNDER-LYNE

Mercers,
68 Darwen Street,
BLACKBURN

P.J. Models & Handicrafts,
87 Moss Lane,
LIVERPOOL 9

Lawrence Model Aircraft Shop,
106 Lawrence Road,
LIVERPOOL 15

H. Welch,
85 Church Street,
PRESTON

S. Chappell,
243-5 Eccles New Road
SALFORD 5

The Hobby Shop,
19 Bold Street,
SOUTHPORT

LEICESTERSHIRE

Waterloo Plywood Co.,
23 Waterloo Street,
LEICESTER

The Model Shop,
6 Market Street,
LOUGHBOROUGH

LINCOLNSHIRE

W. S. West & Son,
18 Market Place,
CLEETHORPES

W. G. Harrison, Ltd.,
38/9 High Street,
GRANTHAM

Musgrave & Co. (Tools) Ltd.,
13 Clasketgate,
LINCOLN

W. A. Roberts,
16 West Street,
SLEAFORD

MIDDLESEX

Staines Model Shop Ltd.,
53 Thames Street,
STAINES

Enfield Caravan & Model Supplies,
194 Baker Street,
ENFIELD

The Model Stadium,
5 Village Way East,
Rayners Lane,
HARROW

Teddington Model Supplies,
86 Broad Street,
TEDDINGTON

Beazley's,
138/140 Heath Road,
TWICKENHAM

Arcade Model Supplies,
5 & 6 Main Market Arcade,
UXBRIDGE

Wally Kilmister Ltd.,
6-7 Neeld Parade,
WEMBLEY

NORFOLK

H. & C. Williment,
39 & 41 St. Benedicts,
NORWICH

NORTHUMBERLAND

The Model Shop,
3 Ridley Place,
NEWCASTLE-ON-TYNE

Whitley Model Shop,
67 Park View,
WHITLEY BAY

NOTTINGHAMSHIRE

Raylite Supplies, Ltd.,
21 Arkwright Street,
NOTTINGHAM

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R. E. Papel,
94 St. Clements,
OXFORD

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W. Alcock & Sons,
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SHREWSBURY

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Dunns,
67 Lower High Street,
CRADLEY HEATH

John W. Bagnall,
South Walls Road,
STAFFORD

J. E. Cooke,
396 Waterloo Road,
Hanley,
STOKE-ON-TRENT

Walsall Models & Crafts,
14 St. Paul's Street,
WALSALL

The Regent Cycle Stores, Ltd.,
Cleveland Street,
WOLVERHAMPTON

H. Start & Sons, Ltd.,
61 Victoria Street,
WOLVERHAMPTON

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GODALMING

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GUILDFORD

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102 Brighton Road,
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By-Pass,
SUTTON

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BRIGHTON 1

Planet Model Aircraft Co.,
The Hornet,
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Eastbourne Aeromodel Shop,
35 Seaside,
EASTBOURNE

Mechanical & Model Supplies,
39 King's Road,
ST. LEONARD'S-ON-SEA

Modelcraft,
316 Bexhill Road,
ST. LEONARDS-ON-SEA

WARWICKSHIRE

The Model Mecca,
(G. I. & N. Rowand),
204-206 Witton Road,
BIRMINGHAM

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A. N. Cutler,
7 Bridge Street,
WORCESTER

WILTSHIRE

"Hal,"
57 Market Street,
STOURBRIDGE

Hobby's Corner,
10 Rodbourne Road,
SWINDON

YORKSHIRE

Modellers' Corner,
110 Commercial Street,
BRIGHOUSE

A. Volkel & Son,
Bank Street,
CASTLEFORD

The Modellers' Mecca,
178 Beverley Road,
HULL

Bruce Johnston,
24 Cook Lane,
KEIGHLEY

Leeds Aeromodellers Supply,
94 Woodhouse Lane,
LEEDS

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14 Wilson Street,
MIDDLESBROUGH

Chas. Skinner,
82 Station Road,
REDCAR

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SHEFFIELD 3

Sheffield Electrical Model
Engineers,
302 Shalesmoor,
SHEFFIELD

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30 Thomas Street,
BALLYMENA,
Co. Antrim

SCOTLAND

Arthur West,
4 Primrose Street,
ALLOA

Martin Models,
42 Belmont Street,
ABERDEEN

Brian Sherriff,
266-258 George Street,
ABERDEEN

Brian Sherriff,
93 Victoria Road,
DUNDEE

"Modelcrafts,"
112 High Street,
FALKIRK

Caledonia Model Co.,
5 Pitt Street,
GLASGOW, C.2

Jimmy Glassford,
89 Cambridge Street,
GLASGOW, C.3

The Radio Doctor,
94 Titchfield Street,
KILMARNOCK

Allison & Montgomery,
273 High Street,
KIRKALDY

Prestwick Model Supplies,
140 Main Street,
PRESTWICK

"The Model Shop,"
50 Caledonian Road,
WISHAW

WALES

Bud Morgan,
22 & 22a Castle Arcade,
CARDIFF,
Glamorgan

Watkins Stores,
6 Waungron Road,
Llandaff,
CARDIFF