

# Lazy Taperwing

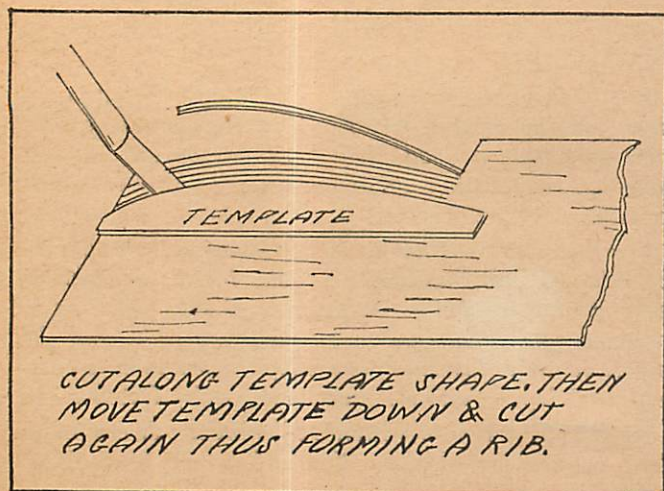
*Here's a low-flying indoor stick model with plenty of lasting quality that's handy for beginner and expert alike.*

THIS "lazy taperwing," capable of turning out flights of 15 minutes or more in the hands of the more experienced builders, is also simple enough for the beginner to construct and fly.

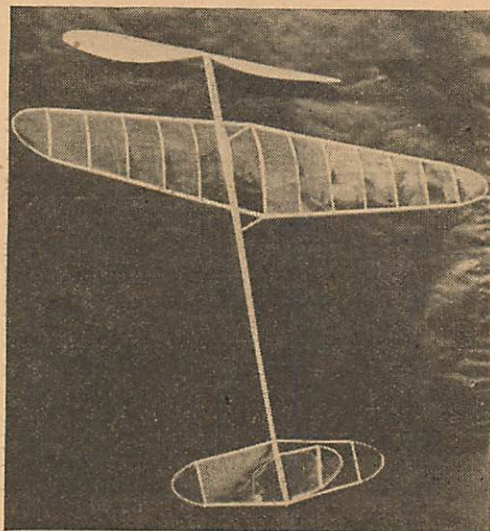
Inherently a low flier, this model seldom reaches a height greater than 40 feet on a 10-minute flight. This is one thing you builders who are handicapped with low ceilings will appreciate. Another point is the fact that this ship requires very little adjustment to put it into flying shape. The original ship flew almost 8 minutes on its second flight. As is characteristic of indoor models, the cost of materials is small; about 40 cents will cover every detail and leave enough material unused to build two or three more wings.

## WING CONSTRUCTION

The first thing to be done is to draw the wing on cardboard or paper in full size. The spars are sliced  $3/32$ " wide from a sheet of  $1/16$ " balsa of 4.5 to 5 pounds per cubic foot stock. A template of the ribs can be made from cardboard or sheet aluminum. Cut fourteen ribs  $1/32$ " deep from  $1/32$ " sheet balsa. The diagram shows clearly how they are cut. Pin the spars to the drawing and cement the two center ribs in place. The other ribs are fitted into place by cutting off equal lengths from the leading and trailing edges of the oversized ribs until they will fit between the spars.



by Lawrence N. Smithline



## CLASS B TRACTOR

Then cement them into position. Make a cardboard template of the tip shape, bend two pieces of  $1/32$ " square balsa around it, let it dry and attach the tips with cement. The wire clips are bent as shown in the diagram and cemented to the balsa stilts. These stilts are cemented in place after the wing has been covered and assembled. The wing is finished now except for covering.

## TAIL

The elevator and rudder are made in the same fashion as the wing. Draw them full size and pin the  $1/32$ " spars on the plan. Put in the ribs, make a template of the tips and finish as has been explained above.

## MOTOR STICK AND BOOM

As it is essential that an indoor model be as light as possible, the motor stick and boom are always made hollow. Some experienced builders make microfilm-covered props in order to cut down weight. Ambitious builders sometimes go to extremes by making hollow spars for their wings.

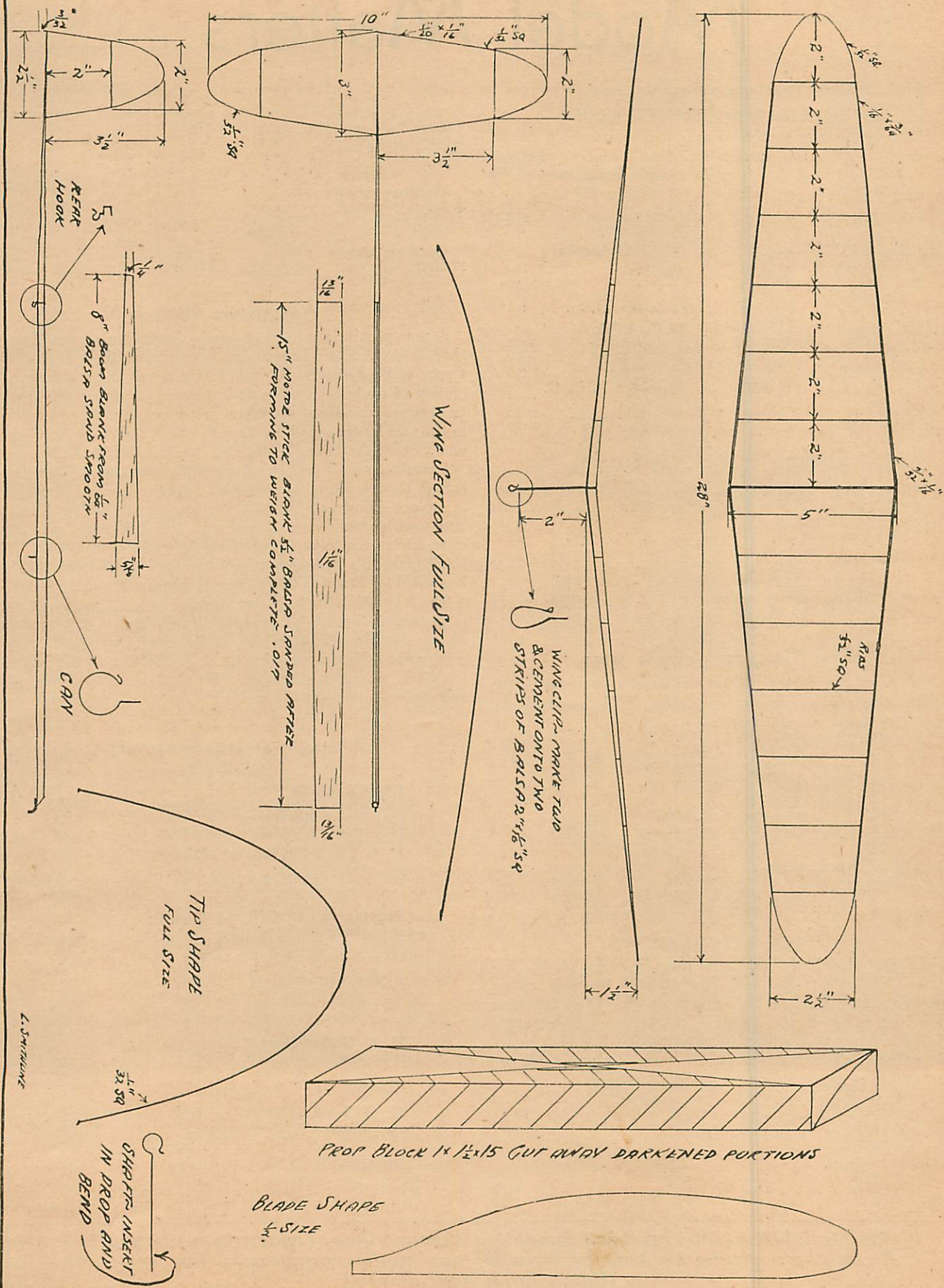
The former for the hollow fuselage is made of hard wood 15 inches long,  $1/8$ " thick, and  $3/8$ " wide at the center, tapered to  $1/4$ " at the ends. This stick should be kept, as it is a standard size. A motor stick blank of  $1/32$ " sheet balsa  $1\ 1/16$ " wide at the center, tapered to  $13/16$ " at the ends, is soaked in hot water, bent around the former (seam on top) and wrapped with  $1/2$ " bandage. When the blank has dried out, remove the bandage and sandpaper the balsa smooth. Then remove the balsa fuselage from the former and cement the seam. Cut the front end of the tube at an angle and cement caps of  $1/32$ " balsa over the front and rear. When the caps have dried, cement the thrust bearing, rear hook and can in place. This finishes the motor stick.

The boom blank of  $1/64$ " sheet balsa is bent around a former  $3/16 \times 3/32$ " tapered to  $1/16$ " square by 8 inches long in exactly the same way as the motor stick. The blank necessary for this boom is  $5/8 \times 1/4 \times 8$ " of  $1/64$ " sheet balsa.

## PROPELLER

On an indoor model the most important thing is the propeller. An indoor model depends (Turn to page 94)







Flight records  
and contestants in  
competitions.

# Model Matters

Club notes and  
news of model or-  
ganizations.

In the contest tabulations below, results are to be read as minutes (to the left of the colon), seconds, and fractions.

## NEW ENGLAND CHAMPIONSHIP

The seventh annual New England Championship Model Airplane Contest, held at Boston, June 6 and 7, produced the following times, new Boston records being marked by an asterisk (\*):

Indoors		Outdoors	
Stick R. O. G.		Gliders	
1-Torrey L. Capo	12:02*	1-Robert Shea	3:15*
2-Hewitt Phillips	10:20	2-Bruno Marchi	:50
3-Leslie Woodman	9:53.4	3-Frank Barrett, Jr.	:45*
H. L. Stick		H. L. Stick	
1-Hewitt Phillips	14:38.4*	1-Maurice Sulkin	3:13
2-Wilbur Tyler	14:24.5	2-Richard Stuart	3:00
3-Bruno Marchi	12:57.4	3-Roy Carlson	2:45
Fuselage R. O. G.		Fuselage R. O. G.	
1-Daniel J. Cline	9:08*	1-Levi Walba	3:55
2-Stephen J. Sardella	8:36.5	2-Frank Barrett, Jr.	2:32
3-Richard K. Stuart	8:09	3-Arthur Sampson	2:30
Gliders			
1-Bruno Marchi	:42.2*		

## EASTERN STATES GAS MEET

Results of the International Gas Model Airplane Association's contest at Hadley Field, New Brunswick, N. J., on May 9:

1-Maxwell Bassett, Philadelphia, Pa.	24:18
2-Walter Dickerson, Newark, N. J.	9:18
3-William Dombert, Ridgewood, N. Y.	6:53
4-Fred Knoll, Woodmere, N. Y.	6:45
5-Carl Thompson, Jr., Wilmington, Del.	6:00
6-Stephen Kowalik, Wilmington, Del.	5:55
7-Robert Long, Reading, Pa.	5:45
8-Julius Gottlieb, Jersey City, N. J.	5:31

## EASTERN STATES INDOOR MEET

Results of the Eastern States indoor contest, held in the navy's huge airship dock at Lakehurst, N. J., on April 25, show some interesting times:

H. L. Stick	
1-Bruno Marchi, Medford, Mass.	20:06
2-Mayhew Webster, Philadelphia, Pa.	19:25.6
3-William Wert, Philadelphia, Pa.	19:03.2
Fuselage R. O. G.	
1-Ervin Leschner, Philadelphia, Pa.	11:42.4
2-Herbert Greenberg, Newark, N. J.	11:21.6
3-Walter Lees, Philadelphia, Pa.	10:03
Baby R. O. G.	
1-Merrill Malley, Atlantic City, N. J.	10:41.8
2-Mayhew Webster, Philadelphia, Pa.	9:43.2
3-William Lutz, Philadelphia, Pa.	9:39.4

## ST. LOUIS ELIMINATIONS

The contest held by the Stix, Baer & Fuller Model Airplane Club at St. Louis on June 12 and 13, with indoor events at the Arena and outdoor events at Curtiss Steinberg Airport, resulted in the selection of Marvin Schmidt, 1934 Moffett winner, and Albert W. Courtial, Jr., as club representatives at the national meet. Best times were as follows:

Open		Indoor Stick	
Outdoor Cabin		Junior	
1-Carl Fries	1:58	1-Bill Azbell	14:12
2-Robert Baum	1:30	2-Carl Fries	11:35
3-C. C. Magrath	1:08	3-Jake Friedman	2:47
Outdoor Stick		All-types Contest	
1-Jake Friedman	4:10	1-Robert Gibbs	6:12
2-C. C. Magrath	1:37	2-Lennox Murphy	1:38
3-Bill Azbell	:58	3-Pat Owens	1:11

Twin Pusher		Indoor Stick	
1-Harry Purviance	2:51	1-A. W. Courtial, Jr.	16:29
2-Robert Guilfooy	2:27	2-Bill Gray	10:53
3-Hugh Schneidewind	2:25	3-Louis Reidinger	8:42
Senior		Indoor Cabin	
Outdoor Stick		1-A. W. Courtial, Jr.	11:30
1-Marvin Schmidt	11:58	2-Louis Sutter	7:10
2-Louis Sutter	7:11	3-Donald Dodd	2:40
3-Robert Guilfooy	6:29		
Outdoor Cabin			
1-Marvin Schmidt	12:42		

## CANADIAN NEWS

A new provincial model group, to be known as the Maritime Model Aircraft League, has been organized by J. Arthur Covey of St. John, N. B. The league hopes to assist in promotion of contests in cities and towns in the Maritimes, and to organize an annual Maritime Provinces contest. Included in the new league are clubs from Perth, St. John, St. Stephen, and Chance Harbour, N. B., and Summerside, P. E. I.

Canadian model builders learn with regret of the loss of two of their outstanding members. Albert Levy of Toronto, first-place winner at the 1933 national meet at New York and present world-record holder in the indoor flying scale class, has moved to Chicago. Harry Burrows, also of Toronto, the Dominion's best indoor modeler during 1934 and 1935, has sailed for England, where he will join the Royal Air Force.

The Toronto branch of the Model Aircraft League of Ontario held a contest for Wakefield-type ships at the airport of the Toronto Flying Club on Saturday, June 6th. The meet was under the direction of G. J. McKinnon, the league secretary. Results were: first, Frank Leat, 2:05.2; second, Jeff Noble, 1:22; third, Jim Haffey, 1:00.

## OFFICIAL CANADIAN RECORDS

### Indoors

Baby R. O. G.	
Junior: Clarence Dunn, Hamilton, Ont.	4:19
Senior: Ernest Houslander, Hamilton, Ont.	8:34
Open: Melvin Bardsley, St. Catherine, Ont.	6:47
H. L. Stick (30-150 sq. in.)	
Junior: Don McIntyre, Guelph, Ont.	5:43
Senior: Alex Smilie, Galt, Ont.	9:53
Open: John T. Dilly, Galt, Ont.	7:03

Fuselage R. O. G. (30-150 sq. in.)	
Junior: George Reed, Toronto, Ont.	3:56
Senior: Fred Hollingsworth, Vancouver, B. C.	6:53
Open: John T. Dilly, Galt, Ont.	6:23

Flying Semi-scale (R. O. G.)	
Junior: Jack Barton, Weston, Ont.	1:46
Senior: Harold Frier, Toronto, Ont.	2:19
Open: Albert, Levy, Toronto, Ont.	4:14

H. L. Glider (30-150 sq. in.)	
Junior: Bill Holden, Galt, Ont.	:14
Senior: Ernest Barrie, Galt, Ont.	:33

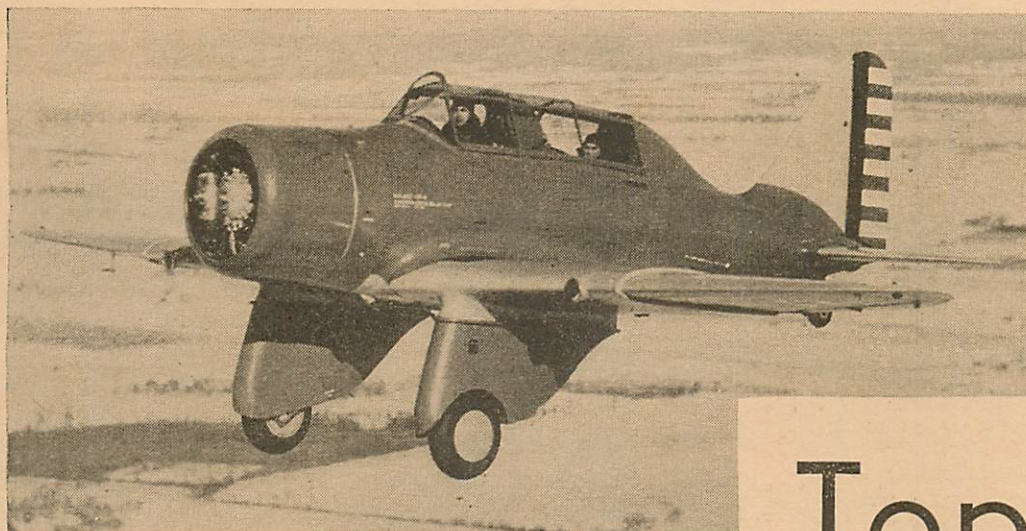
### Outdoors

H. L. Stick (100-200 sq. in.)	
Junior: Joe Purvis, Toronto, Ont.	3:47
Senior: Victor H. Davey, Winnipeg, Man.	5:41

Fuselage R. O. G. (200 sq. in.)	
Junior: Tom Smith, Winnipeg, Man.	:58
Senior: Victor H. Davey, Winnipeg, Man.	1:54
Open: Fred J. Rogerson, Hamilton, Ont.	:43

*The Model Workshop has been compelled, through lack of space, to postpone Alan D. Booton's article on balloon tires for gas models, announced for this issue. Watch for it next month!*





by  
William  
Winter

*All-metal construction, speed and maneuverability are combined for the lowly cadet in the army's latest basic trainer, presented herewith in solid-model form.*

# Tops in Trainers

THE new Seversky advanced or "basic" trainer for the army air corps is a low-wing monoplane of all metal construction. It is said to be the first trainer purchased by the government entirely designed as a basic trainer rather modified from some previous design.

The high speed of this ship, now designated by the army BT-8, is 176 m.p.h. and the landing speed, because of a newly developed flap arrangement, is less than 60 m.p.h. It is worthy of note that in addition to being the fastest trainer the army has ever bought, this latest Seversky is the equal of most of the tactical service ships in climb and maneuverability.

The purpose of the basic trainer is to prepare by practice those students who have advanced from the primary training stage for the actual handling of fast pursuit, attack and bombing planes.

Because of its equipment and flying characteristics, the BT-8 enables the intermediate student to get the "feel" of the average high-performance tactical plane. The instruments and radio provided for training purposes are the equals of those found on the latest air liners. These instruments are complete enough to allow not only the usual flight training, but also blind flying and blind landings.

An important feature of the Seversky trainer is the interchangeability of the float-type landing gear to convert the ship into an amphibian. The pontoons are so constructed that emergency landings are possible on snow, ice, mud, or heavy sand. For this reason the BT-8 is adaptable to service anywhere from Florida to Alaska. The army's contract calls for the construction of thirty of these ships.

## FUSELAGE

The fuselage block is first trimmed down to its outside required dimensions. The profile is then drawn on the side of the block. With a sharp knife, cut away the excess wood. On the top of the block draw the

thrust line and the side lines of the body. As before, cut away the excess balsa. That portion to be enclosed by the cellophane hood must be slightly cut out to provide a flat surface at this spot.

Having completed this preliminary operation, trace or cut out the templates and paste them on stiff paper. The block is now rounded, using the templates frequently to check the shape. The filleted portions will be treated later, so don't become alarmed at this point.

The cowling is cut from a block pared down to the diameter size. Note that the cowling tapers toward the front. After you have shaped it, hollow out the face to provide for a dummy engine. Sand the completed cowl first with medium paper and then with progressive grades of finer papers. The double cowling effect is obtained by cutting a shallow ridge around the fuselage

block the proper distance from the nose.

Sand the finished block to a satin finish and cement the cowling in place. Before advancing further it is necessary to provide means for attaching the wings at a later stage. If you are careful, the butt ends of the wings may be cut concave to match the fuselage curve. The original model had a notch cut in the bottom of the fuselage block to fit the wing. In either case, the fillets are to be molded in with wood filler or some similar substance. Therefore the wing joints need not be well fitted, as they will be concealed. If it is decided to fit the wings in the last mentioned manner, cut the wing cavity in the bottom of the block. Glue the tail wheel in place on a light wire axle.

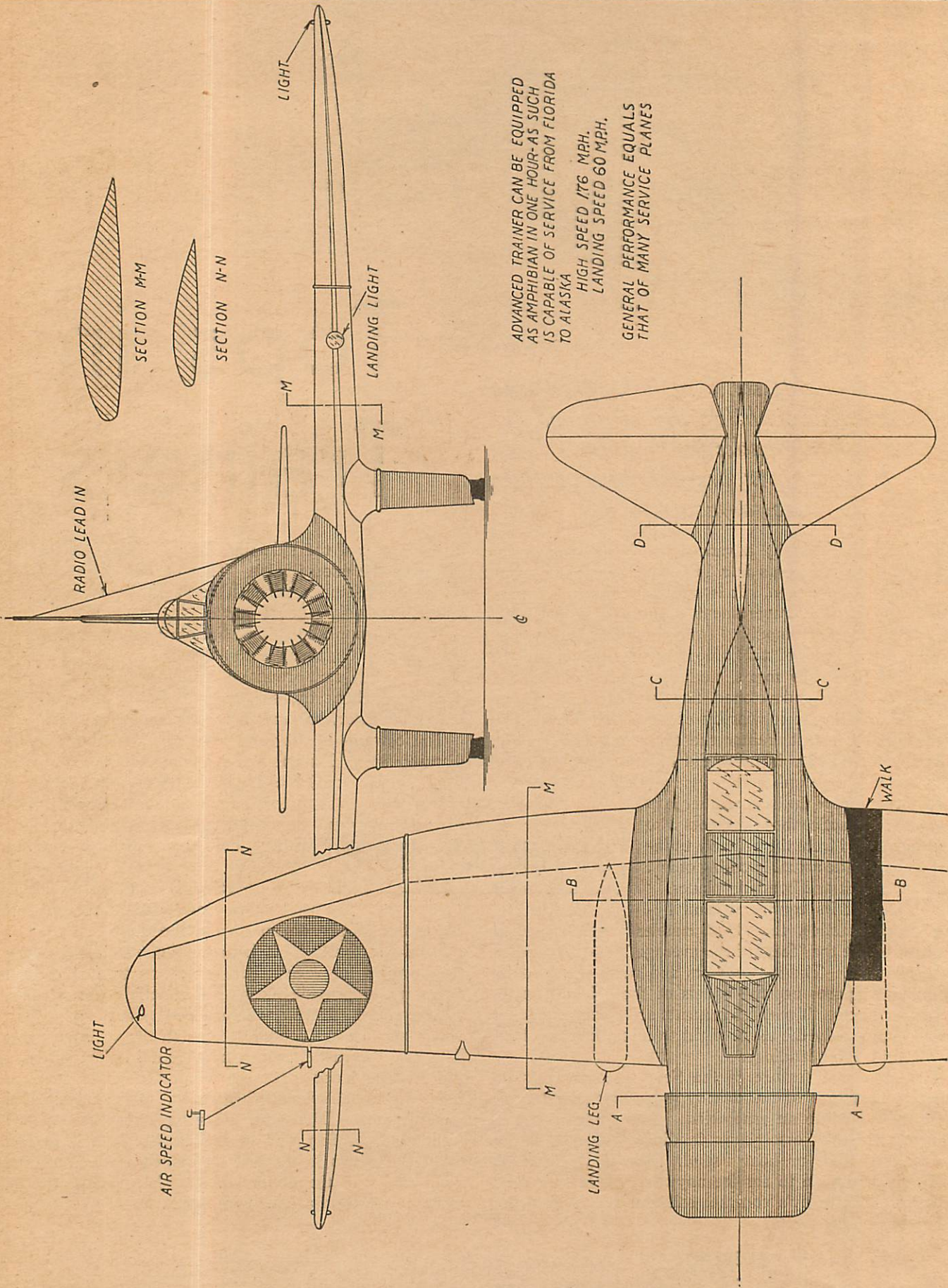
## TAIL

Cut the tail surface units to their outline shapes from soft  $\frac{1}{8}$ " sheet balsa. Each piece tapers toward the tip, as seen on the front view. With a razor trim both stabilizer pieces and rudder to a

(Turn to page 96)

SEVERSKY BT-8



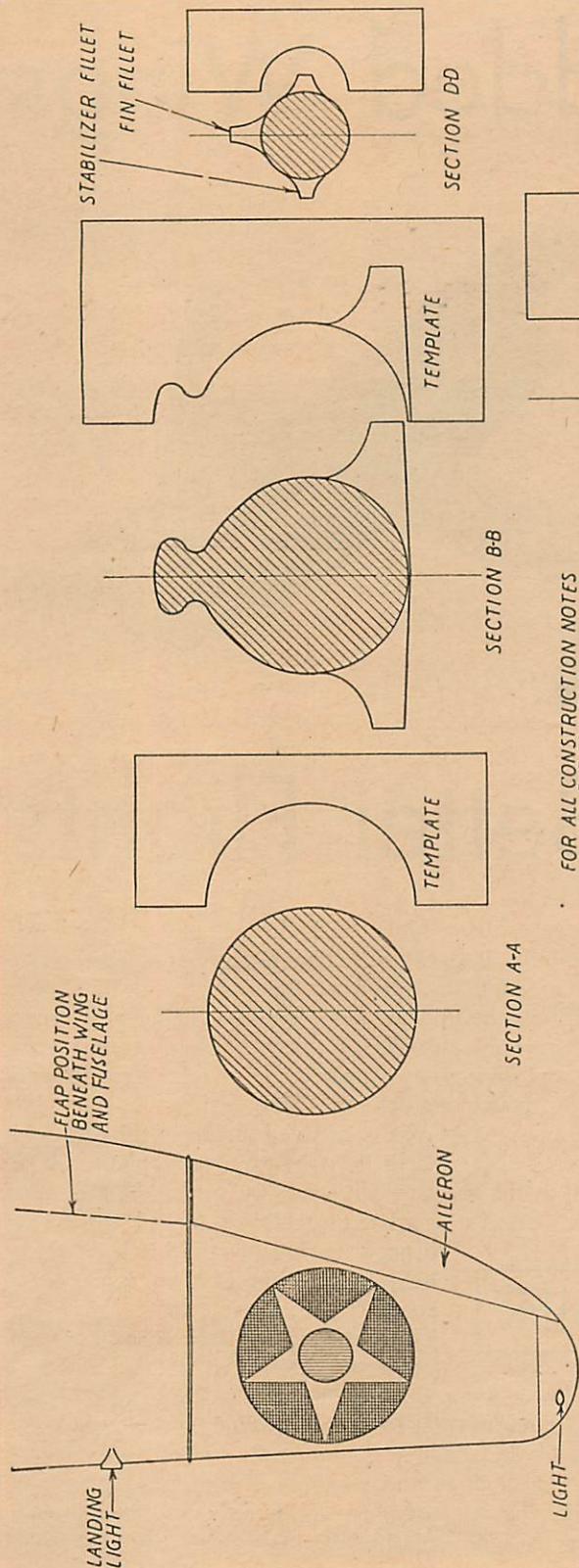


ADVANCED TRAINER CAN BE EQUIPPED  
AS AMPHIBIAN IN ONE HOUR-AS SUCH  
IS CAPABLE OF SERVICE FROM FLORIDA  
TO ALASKA  
HIGH SPEED 176 MPH.  
LANDING SPEED 60 MPH.  
GENERAL PERFORMANCE EQUALS  
THAT OF MANY SERVICE PLANES

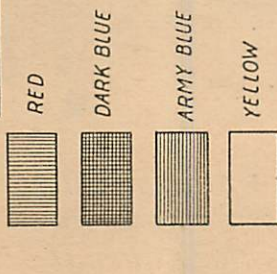
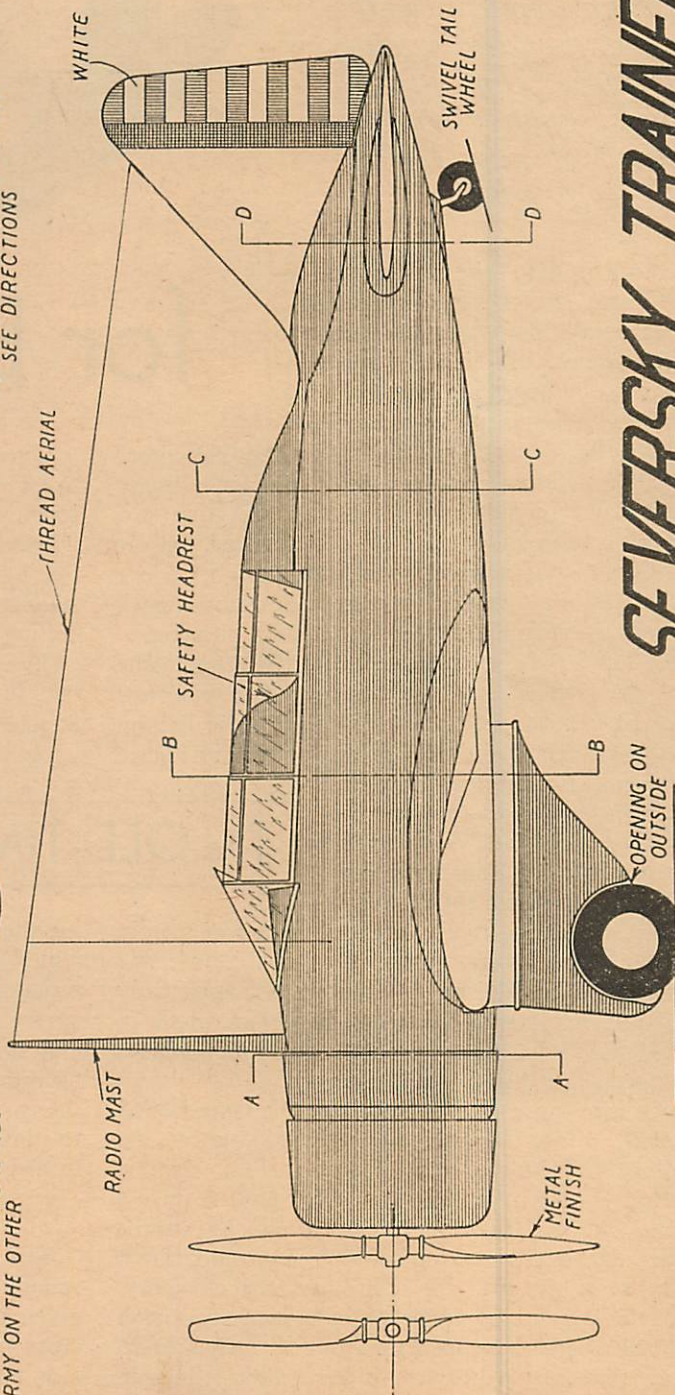


# U.S. ARMY

LETTERS ON BOTTOM READING  
LEFT TO RIGHT WITH TOPS  
TOWARD NOSE- U.S. ON ONE SIDE  
ARMY ON THE OTHER



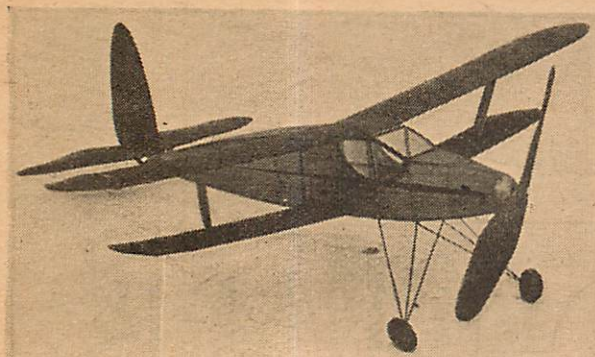
FOR ALL CONSTRUCTION NOTES  
SEE DIRECTIONS



## SEVERSKY TRAINER BT-8

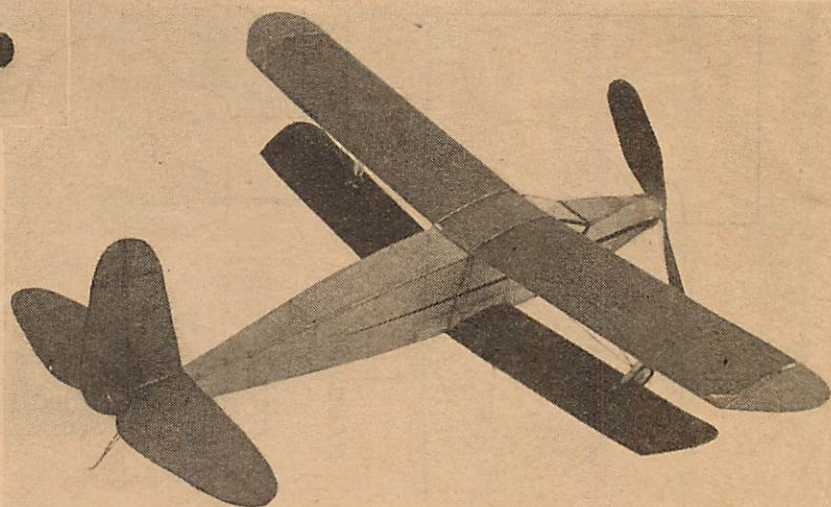
SCALE  $\frac{1}{4}'' = 1'$





*Longitudinal and lateral stability seem inherent in this unusual biplane design, as well as commendable endurance. In other words, grab yourself a load of new flying thrills!*

# Added Wings



## for Better Flights

FLYING-MODEL biplanes have become rare. In the last ten years I cannot recall more than one or two successful biplanes. Modelers have neglected them in the quest for longer flights. But the old biplane still packs a good performance and the fine flights turned in by the Old-Timer make me feel a trifle guilty for neglecting biplane design. The stability and smoothness of the flight in gusty air, together with a flat glide and slow sinking speed, deliver a performance that is a credit to biplane design. Since no special effort was made to develop a duration model, the 65-second average flight was particularly pleasing.

The Old-Timer has several interesting features. The upper wing is movable, that is, it can be moved backward and forward along the top of the fuselage. The bottom wing, in this respect, is fixed. However, the incidence can be changed through a wide range of angles. The model was not sensitive to adjustments and extremely simple to get flying. There was no stalling tendency. When the elevator was badly adjusted the model climbed to a nice height and then seemed to "hang" there. That is, the nose was pointed up and the model seemed motionless, apparently neither gaining nor losing altitude. There was none of the pitching and diving that is so common in monoplanes when they are slightly out of adjustment.

The total wing area of the Old-Timer biplane is 265 square inches. Since the total weight is 3.68 ounces, the wing loading is .7 ounce per 50 square inches. This is slightly below contest regulations, which would require a weight of 5.3 ounces. But from all indications, the chords of the upper and the lower wing could be reduced without cutting down on the lift, yet improving the efficiency. Then, too, the size of the propeller on a contest version of this model could be stepped up from 13 inches to 16 inches, thus requiring a heavier rubber motor. This in turn would boost the weight and the contest requirement could be met without any trouble.

### The OLD-TIMER

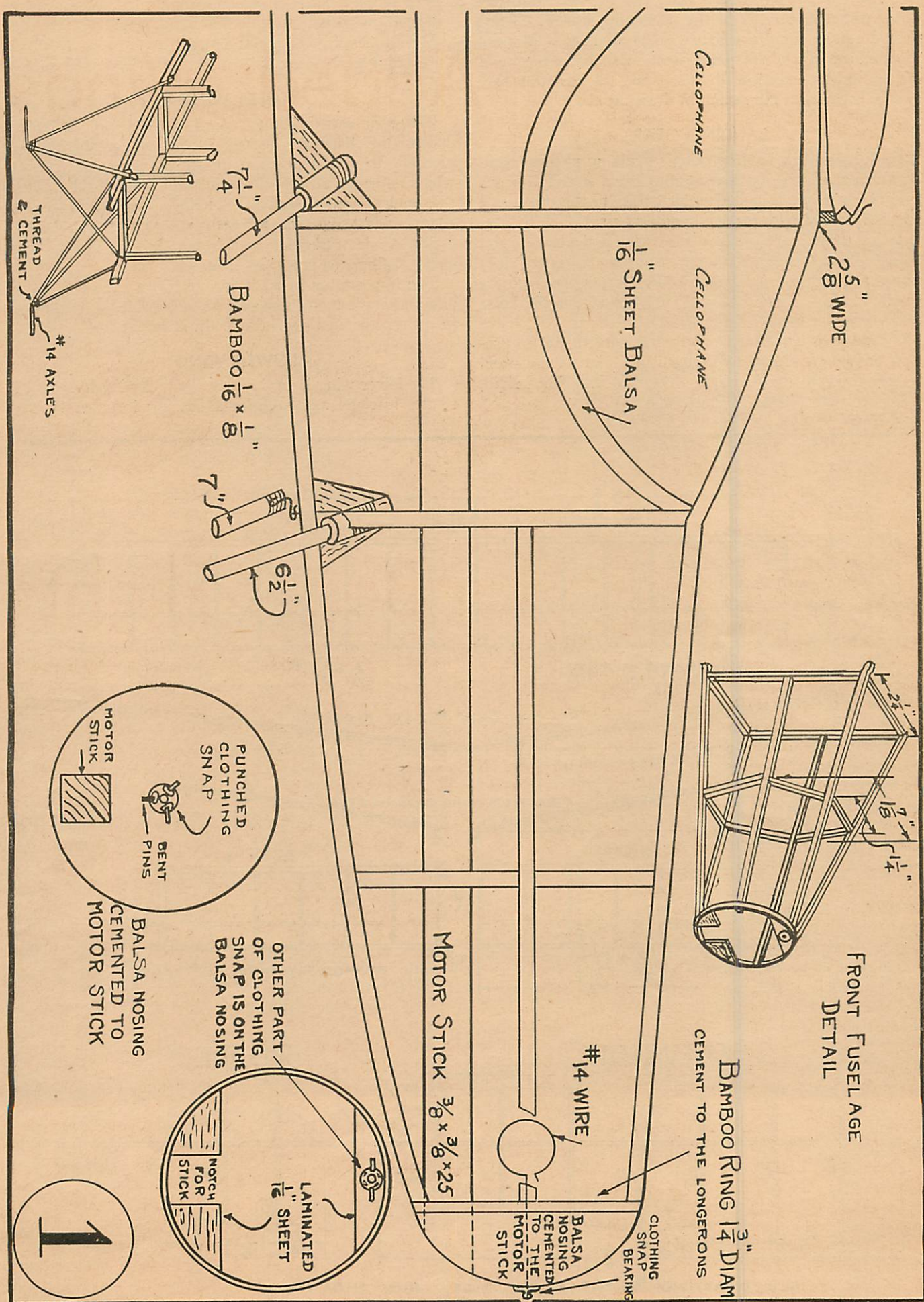
One feature in a biplane which contributes immensely to its stability is decalage. That is the name for the difference in angular setting of the upper and the lower wing. Since the upper wing is set at a higher angle than the lower, it is positive decalage. Decalage prevents stalling and diving—two maneuvers which are as disconcerting to modelers as to real plane designers.

The upper wing of the model is made rigid throughout, just as if it was to be used on a monoplane. It is attached to the fuselage with rubber bands. The bottom wing is made in two halves and is attached with wire prongs that fit into the fuselage. It is held in position by two small balsa struts that join it to the top wing. These struts are attached so the upper wing may be moved without disturbing the lower wing, outside of a slight change in dihedral which is not sufficient to change any of the flying characteristics of the model. The resulting wing structure is strong, yet flexible, and requires a minimum of fittings and tinkering to assemble. The only additional work necessary to build this biplane instead of a monoplane is the easy task of building the lower wing and attaching it to the upper one. Let's start construction, and the fuselage is the logical place to begin.

#### FUSELAGE

The full-size side view of the fuselage, built of  $\frac{1}{8}$ " square balsa, is given in drawings #1, 2, and 3. I have given the width of the fuselage at the positions of the cross braces in the drawing, rather than include a full-size top-view drawing. Joining the two fuselage side panels is simple if you first put in place the cross braces at the wing, making the fuselage  $2\frac{5}{8}$ " wide here. Then







add the cross brace at the rear, making the width 1". After these have set, add the remaining braces. These should round out the fuselage so it assumes a pleasant streamlined curve. The cross-section shape is rectangular throughout except at the nose, and the variation here will be clear from the sketch in drawing #1.

### LANDING GEAR

Each half of the landing gear is made up of three bamboo struts. Two of these fit into balsa sockets on one side of the fuselage and the third runs to the other side and is fastened with a wire hook-and-eye.

Balsa sockets are easily made. Select a piece of soft balsa. Push the bamboo strut (split to  $1/16 \times 1/8$ " size) into the end of the balsa piece. Force the strut into the wood for 3". Now cut away the outside of the balsa piece until the walls of the balsa socket are  $1/8$ ". Give the wood a coat of cement and wrap with thread to prevent breaking. Cut the 3" length into four sections and cement them to the fuselage. To make this joint rigid, reinforce with pieces of sheet balsa.

The actual lengths of struts are indicated. The wheels will be at the correct position if you duplicate these lengths.

Wire axles are cemented and threaded to each half of the landing gear and a pair of  $1\frac{3}{4}$ " wheels slipped on.

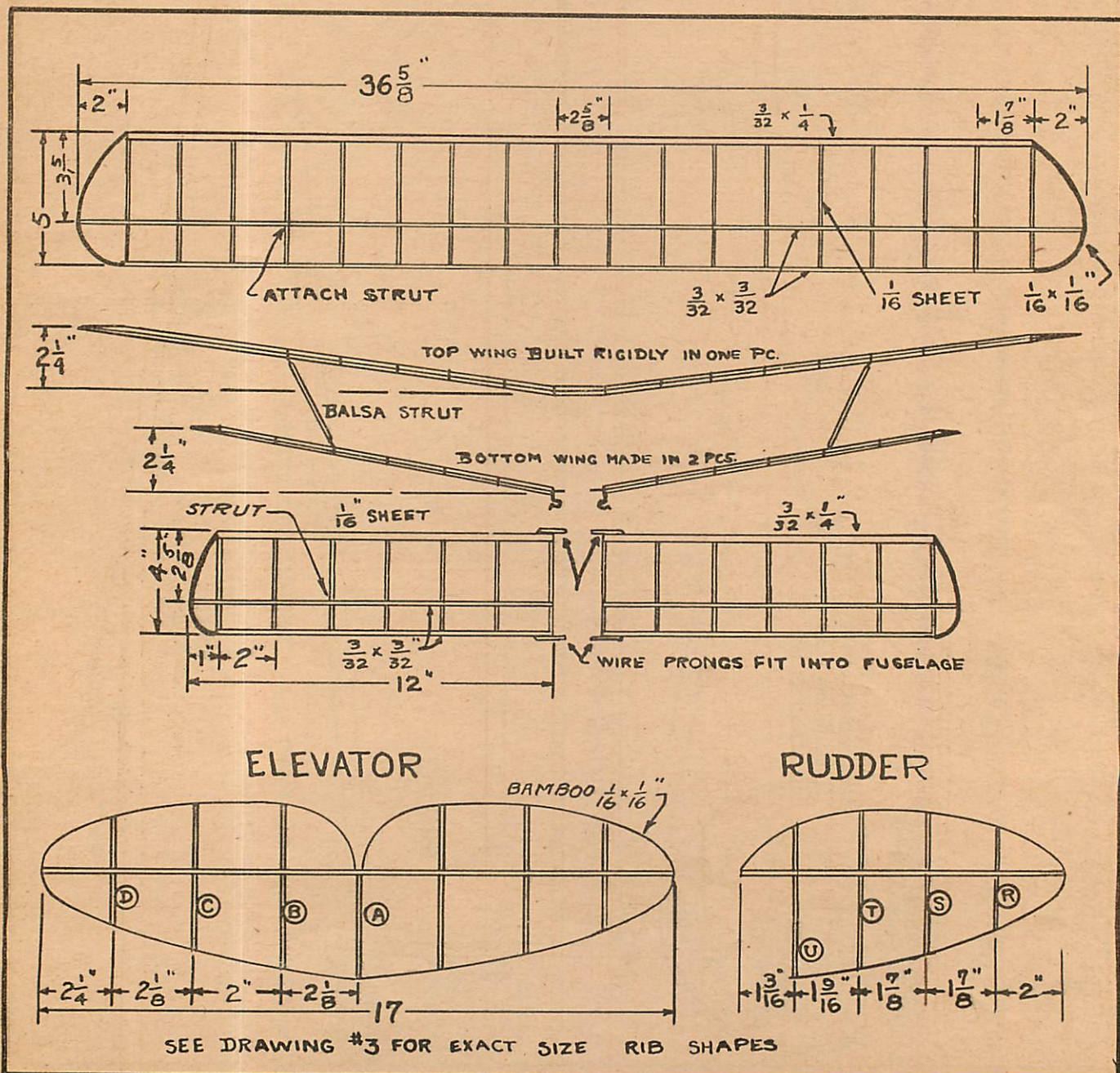
### UPPER WING

Two-spar construction is used in the wing. That is,  $3/32 \times 3/32$ " spars are inserted in the top and the bottom of each rib at the position indicated in the rib pattern which is drawn on top of the fuselage. Notice, too, that the wing leading edge is  $3/32 \times 3/32$ " and is inserted edgewise into the front of each rib. The trailing edge,  $3/32 \times 1/4$ ", is triangular and is butt-jointed to the rear ends. Wing tips are  $1/16$ " bamboo.

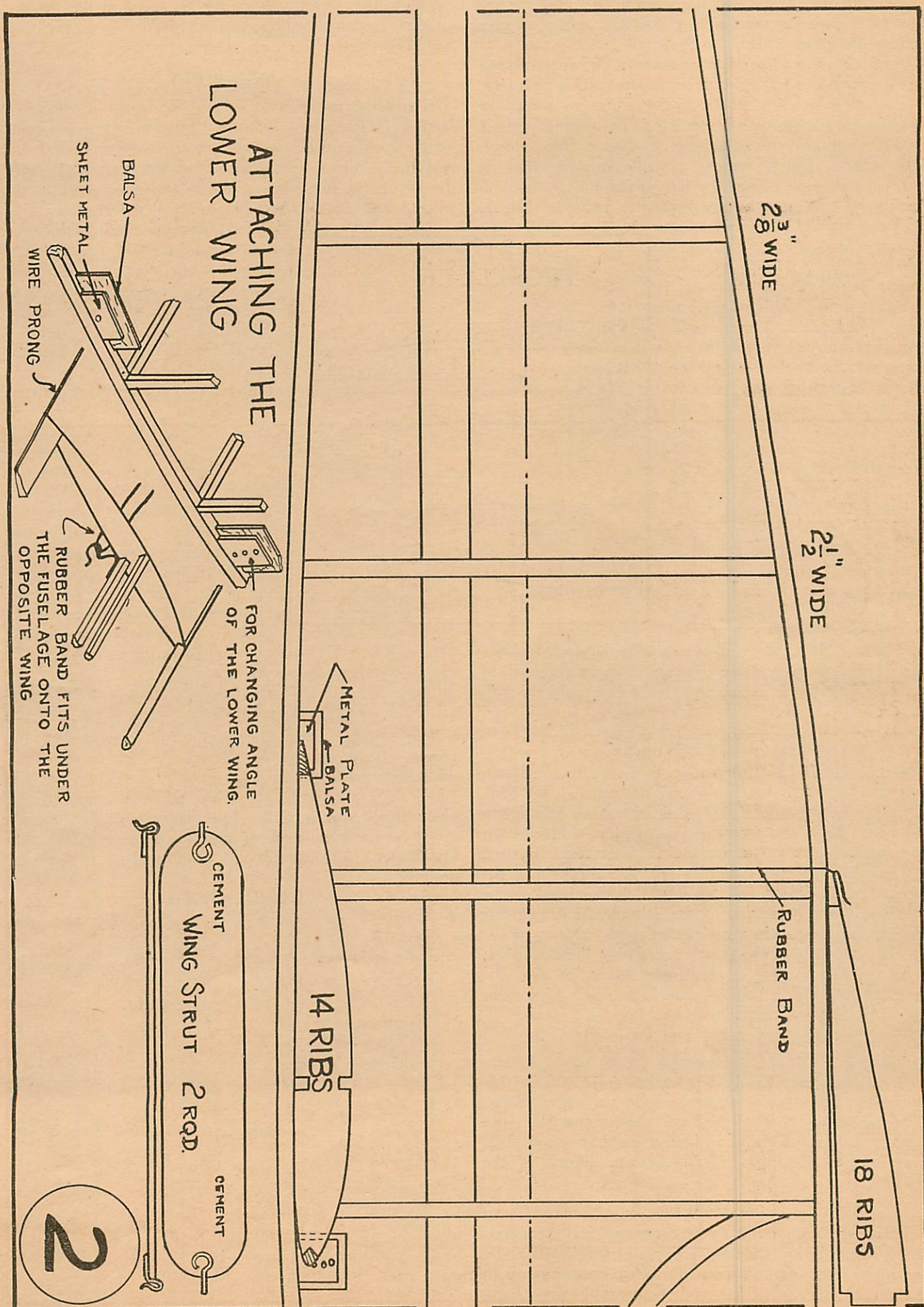
The upper wing is made in one piece. In adding the dihedral angle the center section,  $2\frac{3}{8}$ " wide, is left flat to fit on top the fuselage. Each tip is raised  $2\frac{1}{4}$ ".

### LOWER WING

The lower wing is made in two halves. Each is joined to the fuselage and additional bracing is given by the









balsa strut which attaches it to the upper wing. Construction procedure and size of material follow exactly that of the upper wing.

Small  $1\frac{1}{2}$ " lengths of #10 piano wire are cemented to the leading and trailing edges at the end of each half. These wires are for attaching the wings as shown in drawing #2. The metal plates can be made of almost any sort of metal ranging from tin cans to sheet dural. The holes should be punched small enough so they fit the wire prongs. The three holes in the front plate should be close together so the wing incidence can be changed a slight amount at a time.

### MOTOR STICK

Select a medium hard piece of balsa  $\frac{3}{8} \times \frac{3}{8} \times 25$ ". The shape of the balsa nosing which is cemented to the front of the stick is shown in drawing #1. In case you weren't able to bend a perfectly circular ring of bamboo for the front of your fuselage, be sure you cut the balsa nosing to fit the particular shape of your bamboo nosing rather than the one given in the drawing. The balsa nosing should fit snugly against the bamboo.

The method of attaching the stick inside the fuselage should be clear from studying drawings #1 and #3. When removing the motor stick, separate the clothing snap with the tip of a knife. Don't depend on cement alone to hold the snaps, but reinforce them with bent pins.

### ELEVATOR AND RUDDER

Despite the fact that the rudder and elevator are drawn in greatly reduced size, you'll have no trouble assembling them since all ribs, of  $1/16$ " sheet, are given full size in drawing #3. The spars in both rudder and elevator are  $3/32 \times 3/32$ ". The outline is bent from bamboo  $1/16 \times 1/16$ ". The elevator is left flat throughout the length. The rudder is cemented to the rear of the fuselage. Allow sufficient space between rib U and the fuselage top to slip in the elevator.

The only fitting necessary for attaching the elevator is shown in drawing #3. This wire hook fits over the fuselage and the elevator is held in place by rubber bands passing underneath.

### PROPELLER

A 13" propeller has been selected for this model because it revolves fairly fast and provides a snappy flight. However, if you happen to have a spare propeller, use it even though it might be an inch or so larger or smaller. Four stages of propeller carving are shown in the drawing.

### COVERING

In using tissue don't forget you can get the maximum strength by running the grain lengthwise. Be careful to iron out all wrinkles before attaching with banana oil; spray the covered model with water, and all wrinkles will disappear. Give the tissue one or two

coats of dope, depending on the thickness of the doping mixture. Don't neglect to cover the cabin windows with cellophane.

### ASSEMBLING

Mount the upper wing by rubber bands which pass around the fuselage. Slide the wire prongs on the lower wing into the metal sockets. Keep the two halves in position by linking with a rubber band, as shown. Attach the two balsa struts to eyelets in the upper and lower wings. Notice that these removable struts, by reason of their round ends and wire fittings that are bent short or long, will permit adjustment in the upper wing—either moving it backward or forward, or changing the angle of incidence.

Likewise the elevator angle can be changed by raising or lowering the rear edge with different-sized balsa blocks.

### FLYING

The setting of the wings as shown in the drawing proved to be the most efficient. Your model may require a slightly different adjustment. Stalling and diving can be controlled by moving the top wing backward or forward. However, be careful about adding positive incidence to the lower

wing. Keep this setting as near zero as possible. A slight negative angle was beneficial. Likewise a zero setting in the elevator was helpful. That is, the bottom of the elevator should parallel the line of flight.

The original Old-Timer flew in left circles under power. As the power diminished the turn became less until the model was turning in right circles during the glide. The climb was steep, yet the model never seriously threatened a stall. Sinking speed and forward speed on the glide were remarkably slow. In fact, the Old-Timer's performance just about sold me on biplane designs.

### SPECIFICATIONS

Area upper wing	165 sq. in.
Dihedral upper wing	$2\frac{1}{4}$ " each tip
Area lower wing	100 sq. in.
Dihedral lower wing	$2\frac{1}{4}$ " each tip
Rudder area	20 sq. in.
Elevator area	43 sq. in.
Elevator incidence	zero degrees
Incidence upper wing	$3/16$ " at leading edge
Incidence lower wing	zero
Center of gravity location: 3" back from L. E. of upper wing, $1/4$ " below rubber motor.	

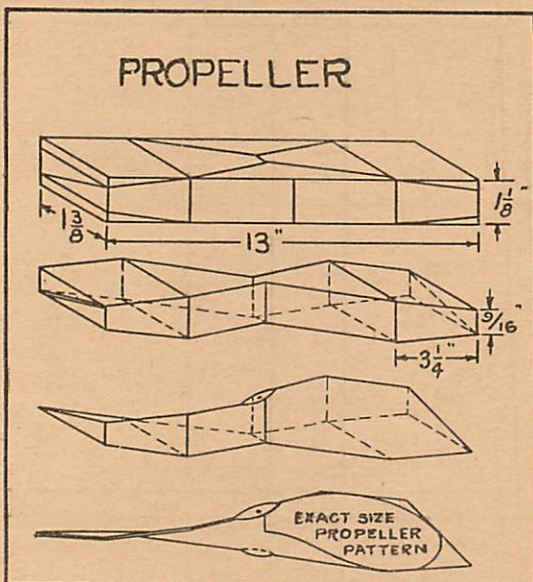
### WEIGHTS

Propeller and motor stick	.57 ounces
Landing gear	.49 "
Fuselage and rudder	.86. "
Elevator	.17 "
Lower wing	.39 "
Upper wing	.44 "
Rubber (14 strand of $1/8$ " flat)	.76 "

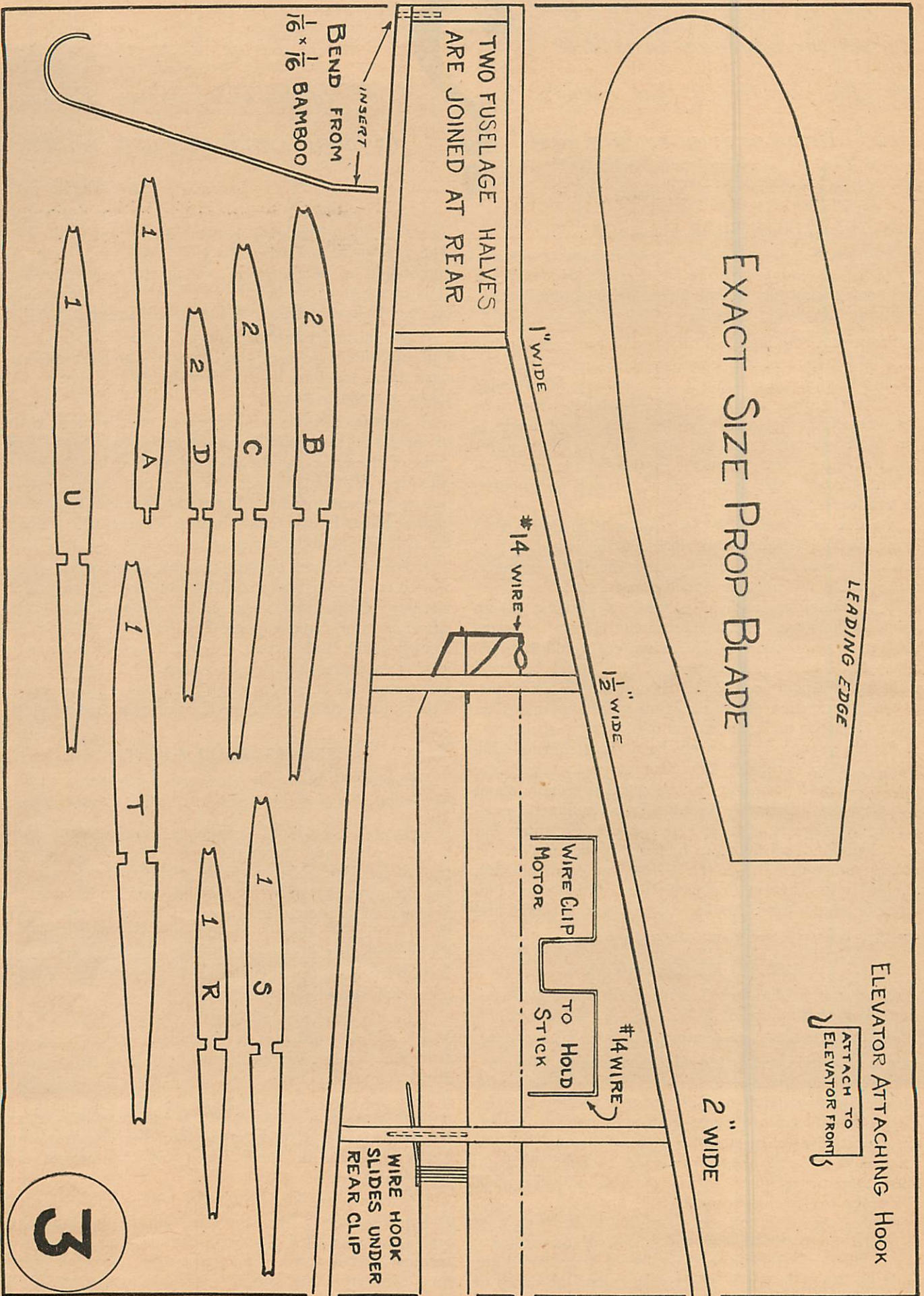
Total weight R. T. F.

3.68 ounces

—G. S. L.









*Have you a question on model building or flying that bothers you? Bring us your problem and*



*we'll answer it in the interest of readers everywhere. Replies by mail require return postage.*

### TRIANGULAR FUSELAGE

*Question: Is a triangular-shaped fuselage cross section good designing practice for a model airplane? If it is used, should the flat side be on top or bottom? J. J., Brandon, Manitoba, Canada.*

**Answer:** A fuselage with triangular cross section has the disadvantage of not closely resembling a large airplane. Though not absolutely essential, appearance adds an extra thrill to the flight if the model has the same lines as a big airplane. Another unpleasant angle is that the small cross-sectional area of a triangle requires that the width and depth of the fuselage at the maximum point be considerably greater than a square, rectangular, or oval cross section would be.

A point in favor is the ease of construction. Two longerons can be pinned in shape on the workbench to form one side of the fuselage and the third longeron added while this section is still pinned flat.

If a triangular fuselage is used, a pleasing set-up would be to have the flat side on the bottom. Fastening the wing to the fuselage, however, would be difficult with such an arrangement. This could be overcome by making the fuselage rectangular in cross section at the position where the wing is fastened and then taper the front and the rear into triangular shapes.

As far as aerodynamic efficiency is concerned, the fuselage shape probably does not seriously affect the flight of a model airplane, whose speed is usually about 8 miles per hour. A beautifully streamlined, oval-shaped fuselage is attractive and offers less drag, but it is doubtful if the increase in flight is measurable. It is even more doubtful if the added trouble in building an oval cross section is worthwhile. Triangular, rectangular, and square fuselages are easier to build and perform practically as well.

### BUILT-UP MOTOR STICKS

*Question: Would you describe in detail the construction of a built-up motor stick? T. N., Visalia, Calif.*

**Answer:** The reason a built-up stick is used in preference to a solid one is the additional strength it offers to the twist and pull of the rubber motor. That is, for sticks of equal weight, the built-up stick will be stronger.

The easiest way to make a built-up stick is to cement a strip of balsa to the top of a piece of channeled balsa. Channeled balsa is usually referred to as a U-beam. Any company selling a variety of sizes of balsa wood is certain to have U-beams.

If you have a bench saw you can make your own U-beams by cutting away the inside of an ordinary motor stick. Merely raise the table of your saw outfit until the depth of cut is slightly less than the depth of the balsa piece. Then run the piece over the top of

the saw, cutting the walls of the U-beam down to  $3/32$ ". The cap strip for the U-beam is the same thickness, and should be wide enough to completely cover the top. It is attached with liberal portions of cement, since the cement itself contributes to the stick's strength.

A second and more difficult way of making a square built-up stick is to use four pieces of flat balsa and cement them together in the same fashion as you would make a wooden box.

A built-up stick is usually given one or more coats of banana oil to protect it against rubber lubricant. The ends of the stick can be plugged with balsa blocks to provide a firm fastening for the rear hook and the front nosing. Square sticks can be strengthened by adding balsa bulkheads every few inches. These will prevent the walls from collapsing.

Motor sticks can be built in still other ways. One way is to moisten sheet balsa and form it around a circular object such as a  $1/8$ "-diameter dowel. The dowel is later removed, and the resulting stick is extremely light and strong. Another variation of this idea is to make the stick of sufficient size so the rubber motor can be run through the center. This makes a particularly clean job in single tractors or twin pushers.

### GETTING GOOD FLIGHTS

*Question: Would you please tell me the secret of getting good flights out of models? J. M., Mystic, Conn.*

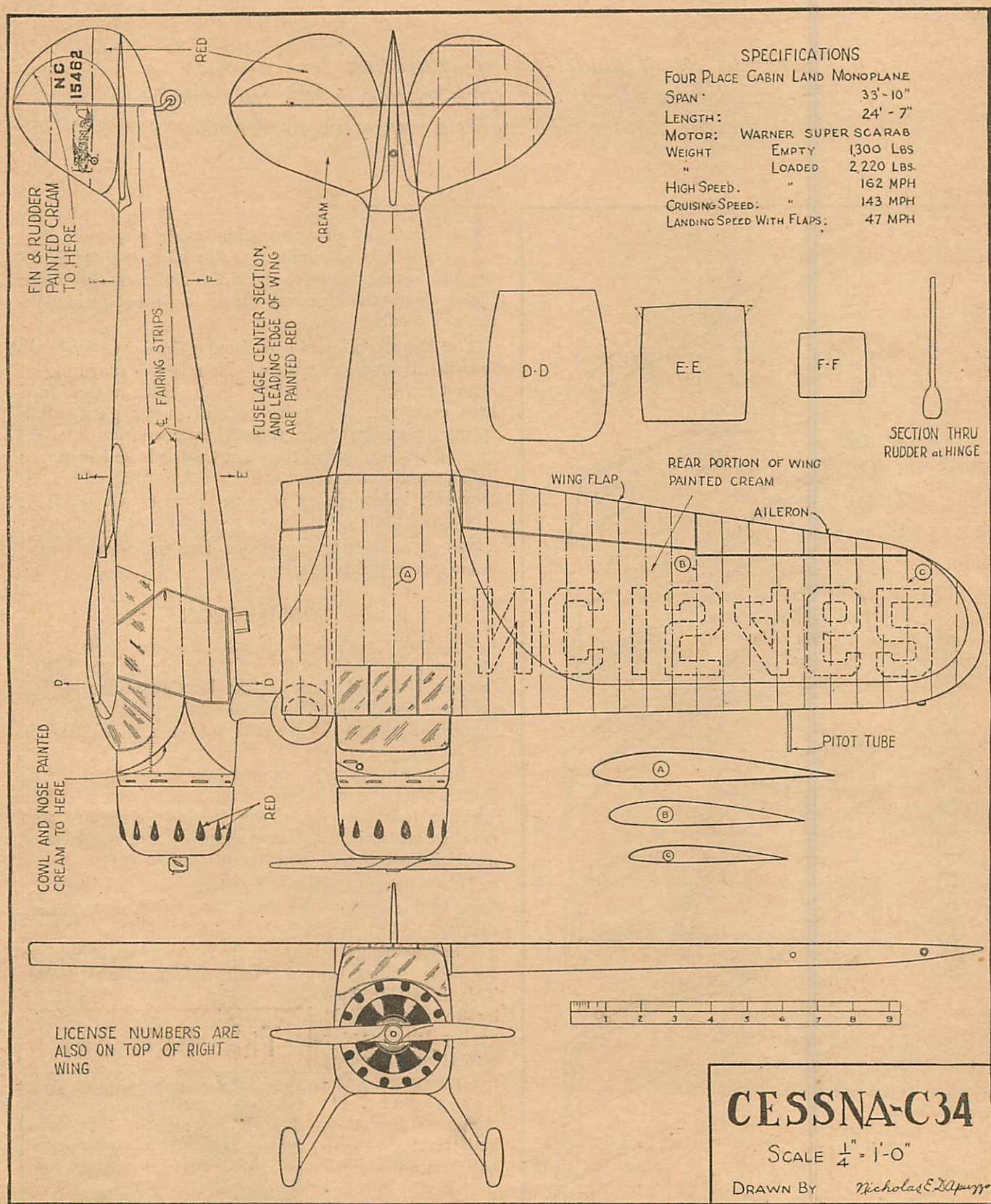
**Answer:** First build a model of sound design. Follow the plans and instructions carefully. Take advantage of the years of experience of the writer by closely following his plan of attack. Build your models rugged. If you're a beginner, this is especially important, since the model must absorb considerable punishment before the embryo flier finally gets it adjusted. If your model is heavier than the specifications of the plans, merely add a few strands of rubber.

Take the finished model to the flying field and fly it. Work with it until you get it flying. Warp the wing, twist the rudder, change the elevator setting, or make any other adjustments, but stay with the model until it flies. It's not uncommon for experts to spend three or four hours at a stretch working with a model. Don't let rough landings discourage you. Few models come out of crashes with damages that can't be repaired in a half hour or less.

If a lengthy session of flying convinces you the model is hopeless, check the wing and tail settings carefully, and make sure they jibe with the original plans. Remember that if you add enough rubber the model must go somewhere. And this isn't a bad thing to do to models that fail to respond to ordinary adjustments.



# The Most Efficient Plane



## SPECIFICATIONS

FOUR PLACE CABIN LAND MONOPLANE	
SPAN:	33'-10"
LENGTH:	24'-7"
MOTOR: WARNER SUPER SCARAB	
WEIGHT	EMPTY 1,300 LBS.
"	LOADED 2,220 LBS.
HIGH SPEED:	" 162 MPH
CRUISING SPEED:	" 143 MPH
LANDING SPEED WITH FLAPS: 47 MPH	

SECTION THRU  
RUDDER at HINGE

LICENSE NUMBERS ARE  
ALSO ON TOP OF RIGHT  
WING

# CESSNA-C34

SCALE  $\frac{1}{4}'' = 1'-0''$

DRAWN BY *Nicholas E. Lapuzzo*

Winner among five popular planes in two ATC or governmental Approved Type Certificate contests that weighed speed, landing, take-off, economy, course time and equipment, the 145



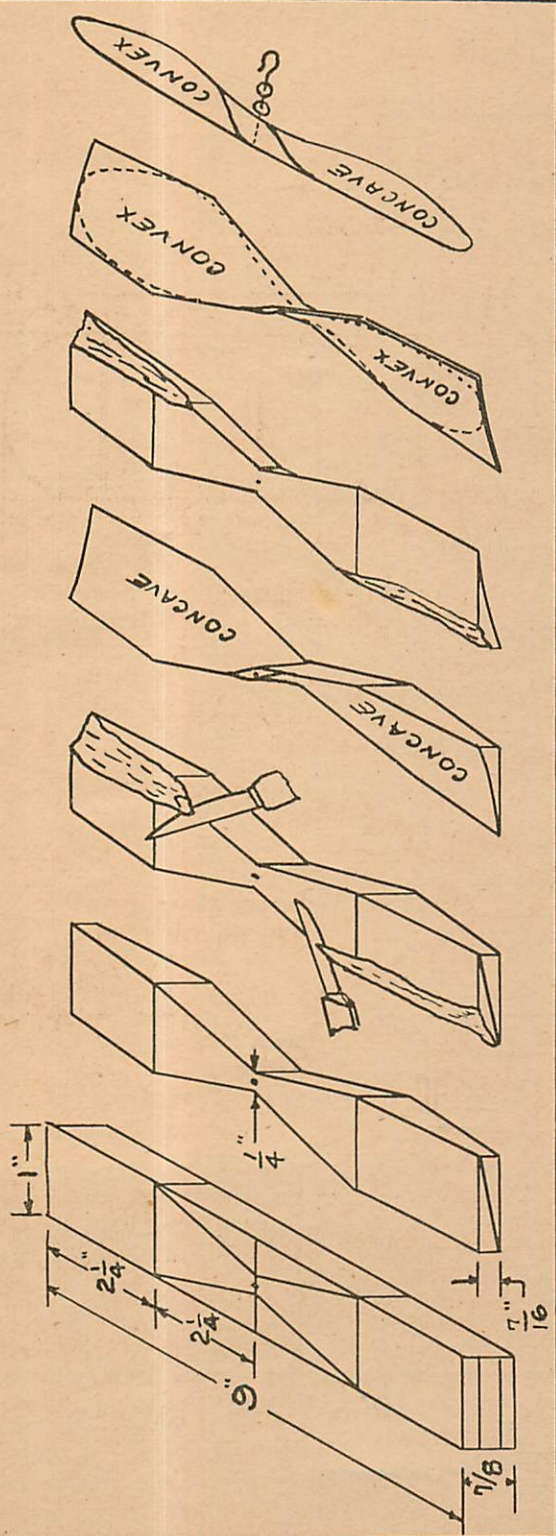
h. p. C-34 is called "the world's most efficient airplane." It makes a fine ship for private flier and model builder. At left is the Cessna emblem, and there's a photograph on page 33.



# From the Ground Up

*There's a lot of model-flying education concealed in this simple rise-off-ground stick tractor. It's just the thing for the novice who wants a sure-fire performer.*

## PROPELLER CARVING



THE BUZZER gives you more flying fun for the least amount of work of any model airplane. Construction is so simple you can build it some morning and have it ready to fly in the afternoon. And the flights should average between 45 and 60 seconds without any trouble.

The Buzzer belongs to a famous family of models—the stick tractors, or pullers. Its relatives range in size from a few inches up to 4 or 5 feet. Stick tractors have been equipped with every sort of power plant—clock springs, compressed air, rubber bands, and gasoline motors. Modifications of the stick tractor have been taken indoors and refined to such an extent that at present they rule indoor flying without threat of a competitor.

For the beginner the use of a motor stick instead of a built-up fuselage is reassuring. The single-surface wing is another attractive feature.

## CONSTRUCTION

The motor stick is a convenient place to start construction. Sand the saw marks out of a piece of balsa  $\frac{1}{4} \times \frac{3}{8} \times 19\frac{1}{2}$ " and mark off the location of the landing gear and rear hook as indicated on the plan. The hook, shaped as shown, is inserted into the stick 2" from the end.

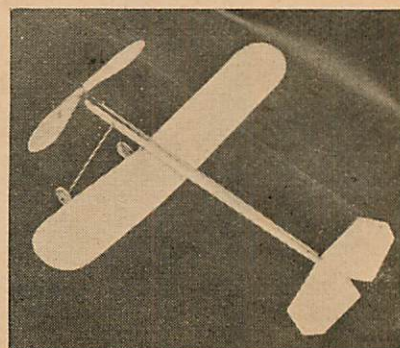
The bearing which supports the propeller is made from a flat strip of dural metal, or a flattened brad in which a hole the size of the propeller shaft has been punched or drilled. Thrust bearings are available at model shops; they're usually two for 5 cents.

This bearing is cemented and thread-wrapped to the front of the stick so that the hole is about  $\frac{3}{8}$ " above the top.

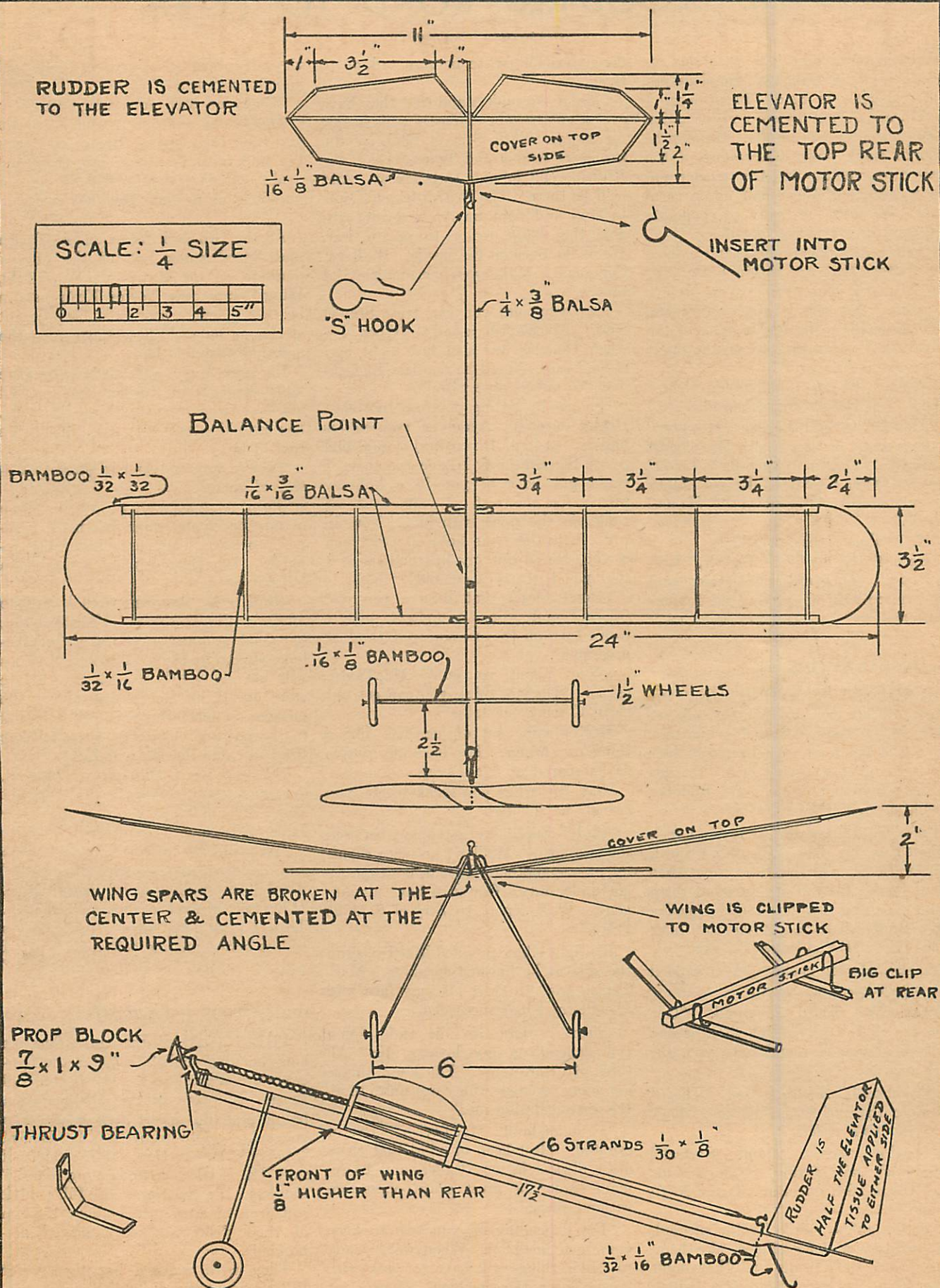
The landing gear is made from one piece of bamboo 13" long. First bend it in the center to a V shape. This is easily done by heating an old screw driver or chisel and bending the moistened bamboo around it. About  $\frac{1}{2}$ " from each end, bend the bamboo into an axle for the wheel. This end is then rounded with a knife and the wheel slipped on it. The wheel is held in place by a few drops

(Turn to page 95)

## The BUZZER









# THE BLOOD-RED ROAD TO PETRA

(Continued from page 16)

Barnes in our plight because of his interest in young Douglas. He does not know Douglas is dead. From what I have heard of him he is a man of action—and one who gets results. He may be able to track down the source of the theft of our planes and the murder and disappearance of those half dozen caravans. We must be ready to coöperate with him in every way possible.

"And, gentlemen, we must track down the traitors that are within our midst. Check all of your men. Keep an eye on them. No one is above suspicion. I do not wish to have this wing of the Royal Air Force a disgrace to the finest air corps in the world!"

"When," Group Commander Hector asked, "will Barnes arrive here?"

"To-night, sometime," Kestrel replied. "I have been in touch with the airport at Bagdad, after checking back on his route as far as Calcutta. He will follow the regular air route over the Hamad Desert."

"He is alone?" Hector asked.

"He is flying his Silver Lancer," Kestrel said. "Hassfurth, Gleason, and Sanders are with him, flying the famous Shorters."

## III—PREPARATIONS

GROUP COMMANDER HECTOR threw off his belt and tunic and sat down in an easy-chair in his quarters. He was a big man with iron-gray hair and a round, inscrutable face. He sat, now, as immobile as a stone Buddha, staring straight ahead of him.

He called, "Come in," as a low knock sounded on his door. He didn't speak to MacTavish and Sneed as they came in the door. Instead, he stared at them as he had been staring straight ahead a few minutes before. Even the huge MacTavish fidgeted under his gaze.

Finally, Hector spoke. "You carried out my orders?" he asked.

"Yes, sir," Sneed answered. "Our men are on the way. But there is one thing I wanted to mention to you, sir. The men are frightened."

"Frightened!" Hector roared. "They'll be more than frightened if they don't carry out your orders."

"They're nervous about Kestrel," MacTavish said gruffly. "They know what the British government can do to a man."

"You're a fine pair," Hector sneered. He pointed a long finger at them. "Drum into their heads that they don't have to be nervous about the British unless they go yellow and talk. Get it through their heads they're in this thing now. There isn't any turning back. I'd drive it into their heads if it wasn't

dangerous for me to be seen talking to them.

"Make 'em understand that they have everything to gain. None of us is in this for glory. With Serj el Said on the throne of Arabia and Trans-Jordan, the British won't be able to touch us. And he'll be there. The British haven't time to stop and fight an Arab revolt with half the world ready to go to war. We're the ones on the inside. We'll get the cream. Make your men understand that."

"Are you sure you can trust Serj el Said?" MacTavish asked. "When I—when Douglas was shot last night Serj el Said said, 'You'll be one less Englishman for me to cope with.'"

"So you're getting nervous, too, eh?" Hector sneered. Again he pointed his finger. "Listen! I have Serj el Said tied to me the same way I have you tied. I could put both of you in a military prison for the rest of your lives. I could do the same with him. You, in turn, have the same hold on your men if you carried out my instructions as I told you to carry them out."

"Don't forget that I have you just where I want you. And don't think I won't turn on the pressure if I think it necessary."

"What about yourself?" MacTavish asked. "Do you think you can get out clean if some one talks?"

Hector came out of his chair like a thing on springs. His face was purple as he roared at MacTavish.

"Say 'Sir' when you speak to me, you swine!" he shouted.

"Sh-h!" Sneed said, stepping between the two men. "We'll get no place shouting at one another. I think it's time we got under way. Our men have already gone. We'll report to Serj el Said at Petra."

His right elbow prodded MacTavish in the side as he finished speaking. MacTavish tried to twist his ugly face into a smile, and half succeeded.

"Sneed is right, sir," he said. "You can depend on my loyalty, sir. All three of us are tense. You know things are going to crack wide open quite soon. It's getting inside me."

"I understand, MacTavish," Hector grunted. "But keep in mind that there must always be one leader, and to remain leader he must crush opposition without mercy."

"I'm depending on you two to keep your men lined up. When we're ready to strike, things will have to work with the precision of a machine. There can't be any slips. I'm tying up the loose ends now so that there won't be any slips. A lot depends on your success to-night. You mustn't fail. You'll have

the advantage of a surprise attack and superior numbers.

"Carry on with your assignment!"

MacTavish and Sneed saluted smartly and took their leave. Hector threw his big hulk into the same easy-chair and again stared straight ahead of him, as immobile as a stone Buddha.

AS the two dark forms of MacTavish and Sneed slunk out of the officers' quarters on the Royal Air Force field, Wing Commander Norton Kestrel sat in his own quarters, staring at his adjutant as though he could not believe what the man had just told him.

His sunken eyes and lined cheeks gave mute evidence of the fact that he had not had sleep for over thirty-six hours. His twitching face was pale beneath its coat of tan.

"You're sure of this, Creighton?" Kestrel whispered.

"Positive," Creighton answered. "Two of our Beersheba spies just made a report to me. They are thoroughly reliable. The Bedouins are gathering in tribes."

"But what Moslem would dare to mutilate the Dushara?" Kestrel asked, his voice stunned. "If the natives believe we did it, the lives of non-Moslems will not be worth a farthing. If we start using an air patrol above the mosque on Jebel Harun it will only add to the natives' conviction that we have tried to enter the Holy of Holies."

"I'll get word through to Amman, Jerusalem, and Mecca," the adjutant said. "The natives will strike when their leader tells them he is ready."

"We will have to evacuate all women and children and double all guards," Kestrel said, pulling at his haggard face. "I'll issue general orders, immediately. Then I must have some sleep. Barnes will be here sometime before morning. I wish to see him the minute he arrives."

## IV—OUT OF THE NIGHT

THE PROPS of the three Shorters and the silver bullet that was the Lancer were ticking over slowly as Bill Barnes came out of the administration building of the airport at Bagdad. The goggled, white-helmeted heads of "Shorty" Hassfurth, Bill's chief of staff, "Red" Gleason, and young "Sandy" Sanders, the youngest of Bill's little squadron of aces, jutted above the rim of their yellow-and-black-and-red amphibians.

They were waiting, impatiently, for Bill to signal the dispatch tower. Luggage, ammunition, emergency equipment in the tails, and fuel had been carefully checked.

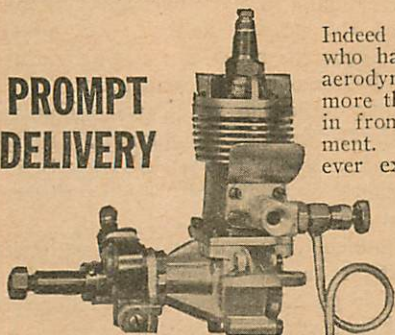
Shorty Hassfurth, that blue-eyed,



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**PROMPT  
DELIVERY**



Everything is in the kit including plug, coil, condenser, tank, ignition wire, cylinder, piston, connecting rod, timer, crankshaft, all screws, nuts, bolts, etc. Every part is fully machined and finished. No oil, gas, batteries or propeller included. Postpaid for only....

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ful motors ever constructed. Has broken records for amazing performance... and just imagine—flies model planes up to 10 ft. wingspread. Also used for boats and stationary use. Easy to start and simple as ABC to assemble—average assembly time is only 45 minutes. So easy only a screw driver is needed.

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**G. H. Q. MODEL AIRPLANE CO.,**  
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broad-faced veteran of a thousand battles in the air, wanted to be on his way to the Royal Air Force field at Ma'an. He wanted to see and talk to James Douglas, the brother of an old War-time pal. He had seen young James a half dozen times in England since his brother had been killed. And once, young Douglas had spent a couple of weeks with him on Barnes Field, Long Island.

A strong bond of friendship had been forged between Douglas, Bill Barnes, and Shorty Hassfurther during those two weeks. They had been horrified, then angry when they learned that Douglas had been cashiered from the Royal Air Force. Now they wanted to get to him to prove that their friendship was something more than empty words.

Bill Barnes' bronzed face became grim and a little tense as he studied the scudding black clouds racing across the sky. A vision of that night two years before when he and young Sandy had been caught by a sand storm over the Syrian Desert flashed through his mind. Then he shook his head angrily and raised his hand above his head. The dispatch tower acknowledged.

The twin Diesels in Red Gleason's Snorter roared. A signal flashed and the big amphibian rolled forward. It streaked down the runway into the wind. The tail came up. The earth faded

away beneath it and the spinning landing wheels described an arc as the bracing members folded and swung up into their wells. Red took the thundering ship upward in tight spirals to level off at five thousand feet. The wind screamed along the streamlined fuselage as Shorty Hassfurther and young Sandy kicked their ships into the wind and joined him.

Bill Barnes' eyes sparkled as they ran over the instrument layout of the Silver Lancer. He felt a surge of pride as he told himself for the thousandth time that he was sitting in the greatest fighting ship in the world.

He touched the elevating and transversing screws of his telescopic machine gun and 37 mm. cannon sight, tested the radio control group and ran an eye over the Stark 1-2-3 flight instrument layout. He pivoted the infra-red-ray telescope—which permitted him to sight along a beam of "black light" through fog clouds or darkness—on its two-hinged supports, to test it.

His whole body was singing as he stuck his booted feet into the rudder stirrups and opened the throttle. He cocked his head to one side as he released his brakes, and listened to the throb of his engines.

He was smiling to himself. He eased the stick back and took the great ship

into the air. The world, he decided at that moment, was a pretty swell place to live in. His trip to China and his business with the Nanking government had been successful. Things were on the up and up. To-morrow they would pick up young Douglas at Ma'an and a few days later they would be back on Barnes Field on Long Island.

The yellow wheel-gear light and the green floating-gear light flashed as the amphibian gear folded completely into the fuselage and wings.

Bill threw his radio key and spoke to his men.

"Be sure your running lights are O. K.," he said. "Watch out for the air currents over the desert. They're tricky. We'll cruise at two hundred and fifty. Shorty, you take the point of a V with Red on the right and Sandy on the left. I'll be a couple of hundred feet above and behind you. Keep plenty of distance; you'll need it. Signing off."

"Say, Bill!" young Sandy broke in, breathlessly. "Do you suppose I could pick up a good Arabian horse when we get to Ma'an?"

"How're you going to get him home, kid?" Bill asked, grinning.

"He's going to let Douglas take his ship and swim the horse across the Atlantic," Shorty Hassfurther offered.

"Naw," Red Gleason interrupted.



"He's going to get a jumper and jump him across the Atlantic. Or, maybe, get that magic carpet some one used to fly around on."

"All right, smart guys," Sandy said, heatedly. "No one asked you what you thought."

"We just like to be helpful," Shorty said. "You know, do our daily good deed. Why don't you buy a camel instead. It—"

"Nuts!" Sandy said and threw his radio key.

The air was causing their compass needles to jiggle in crazy fashion as they passed above that flat, arid stretch of northern Arabia. From each dial on their instrument panels came a pale, phosphorescent glow. Their gyro- and earth-inductor compasses, and turn-and-bank-indicators were going mad as the hot, upward drafts of air bounced them around.

As the fury of the wind increased they had to clench their teeth and use every bit of concentration at their command to keep on their course.

The sturdy ships dropped into pocket after pocket, slapping them against their safety straps. Every moment was a fight; every twist and lurch and drop had to be compensated for.

Their ships would nose upward, suddenly, like an ocean liner riding a heavy sea, only to slide down again on the other side.

Then a sand storm came roaring at them like a giant monster. Bill checked his bearings while he tried to keep control of the Lancer, threw his radio key and gave his position to his men. The world became a yellow-and-black hell, with sand seeping through the locked overhead hatches of the four planes.

"We'd better get some altitude," Bill gasped into his microphone. "We may be able to get above this. Get up to fifteen thousand and hold the same course."

"You ought to be down on the ground on your favorite Arab steed, kid," Shorty panted into his microphone.

"Don't worry about me, you Pennsylvania kraut," Sandy gasped. "We'll be lucky if you don't crack up your Snorter." He flipped his radio key and began to feel his way even more cautiously. He was using every sense, relying more on his inherent touch and skill than on his instruments. He was crouching forward over the stick. His shoulders ached from being banged against the cowl and the rubber crash pad in front of him.

Suddenly, it seemed that a giant hand came out of the air from above to slap him toward the earth. He nursed the ship to an even keel, his eyes anxiously scanning his instrument board. He drew the stick back and talked to the Snorter. Terrific blasts of air and sand were beating against the windshield. His hands

were clammy with perspiration. His whole body was wet. He threw his radio switch as a ruby light gleamed on his radio panel.

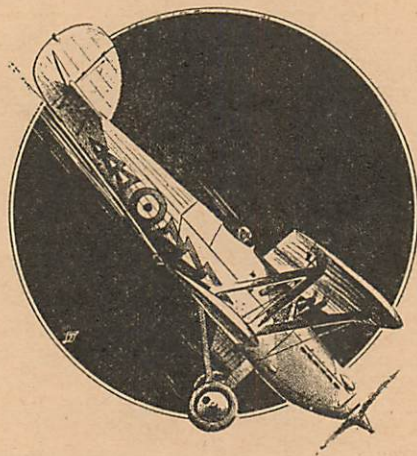
"Check in, all of you." Bill's voice came over the air.

They gave Bill their positions and all said they could not see one another's navigation lights.

"Hold 'em as you are," Bill said. "Try to keep on your course. We ought to be out of this soon. Signing off."

He pulled the Lancer out of a flat spin and tried to peer earthward—abysmal darkness, the swirl of sand around his running lights on his wing tips. He pulled the parachute lever and watched the flare take a dizzy course earthward. The whole world was a thing of swirling sand.

Far out in front of Sandy and Red, Shorty Hassfurth jerked the stick of his Snorter back into his stomach to bring it out of a dive. It was being buffeted about like a leaf in a gale. His body ached from being thrown against the cowl. His stomach ached from being slapped against his safety strap. His heart was pounding from exertion. Sand had crept through his hatch to settle in his eyes, his mouth, even down his neck. He shook his fist at the weather and cursed it as only he could curse at such a time. He nursed the ship back into level flight, only to have it picked up and slammed down another four hundred feet. The storm raged



A renegade Super-Fury.

and roared without a let-up. He wondered how long his Snorter could take such a buffeting. Then it occurred to him that he didn't care much. He was getting so tired that nothing mattered.

Off to the right, Red Gleason was fighting with a laughing tenacity that was characteristic of him. He whipped his ship out of pocket after pocket while he tried to accompany the scream of his motors with his own voice.

The motor, he told himself, was singing bass and the screaming wind that brought that high-pitched whine to his props was singing tenor. He was carry-

ing the baritone, although he couldn't carry a tune. He gave an excellent imitation of two drunken men singing in a bathroom as he studied his compass and checked his course again. His head was ringing like a blacksmith's anvil from the beating he had been taking. He threw his radio key and a roar like the bellow of a bull greeted him.

"No radio, no peace, no ceiling, no nothin'," he said to himself, through clenched teeth, and settled back to the business of taking his Snorter through that storm.

Suddenly, the sand and wind no longer beat at the windowpanes of nonshatterable glass. Bill flipped his radio key and shouted, "Red, Shorty, Sandy!"

The three of them gave the all-clear signal. Bill's breath hissed between his teeth as he exhaled. His eyes swept from his map and chart to the instrument board as he asked them for their positions. He checked them against his own and gave them their course. Ten minutes later they were back in their original positions.

"All right," Bill said to them. "Take it easy. Hold your course. I'm going to break out the infra-red-ray telescope to take us in the rest of the way."

He brought the telescope out of its recess in the instrument panel and threw the switch. He looked into the eyepiece, which was not unlike the old-fashioned parlor stereoscope. Ahead the pitch-black night became as day as the beam of infra-red rays projected themselves artificially into the darkness and the electron telescope enabled him to pick them up.

As he started to adjust the lens, a sharp, staccato noise came out of the night. It brought him straight up in his bucket seat, his eyes wide.

He had heard that noise too many times before not to know what it was. And he knew by the sound of that staccato chatter that the machine guns he heard were not the Brownings set in the engine housing of his Snorters.

He could feel bullets drumming into the wing and tail surfaces of the Silver Lancer; he could feel the big ship tremble under the impact. He pulled the control column of the Lancer back into his stomach as he heard screaming props and thundering motors dive beneath him. As the nose of the Lancer streaked upward, he threw his radio switch and began to chant the call letters of his men. Red Gleason's voice came back to him first. And he could feel the blood in his body turn to ice as he heard Red's voice.

"Bill!" Red gasped. "Bill! They got me. I still have control, but they got me bad through the shoulder. I'm trying to climb."

Bill's hand was a ball of muscle and steel around the control column of the Lancer as he tried to pick thoughts out of his whirling mind.



"Can you make it? You aren't going to faint?" he asked quickly.

"I'll be all right if I can get above 'em," Red said, his voice steadier. "I'm getting hold of myself now. One bullet almost tore my shoulder off. The pain is easing now."

"Turn on your oxygen tank and get up to twenty-five thousand," Bill said. "They're coming back!"

"Bill!" Shorty's voice cut in. "They made a sieve of my Snorter. They are flying without lights. I thought I heard their engines, but I wasn't sure. I was sure when bullets began drumming into me."

"Get up with Red!" Bill barked. "Stay beside him. Keep contact by radio. Leave your navigation lights on. Where's Sandy?"

"I'm riding all right, Bill," Sandy broke in, his boyish voice high-pitched and strained. "They came out of nowhere, Bill. I think there are about six or eight of them. I can hear them climbing. They're trying to get above us."

"You get up with Red, too," Bill said. "I'll try to find them with my telescope. Then I'll join you."

"Look out for a crash, Bill," Shorty said.

"I'll watch it," Bill growled. His whole body was burning with anger now. It had been the most murderously unfair attack that had ever been made on him. His body and mind were seething with rage. He neutralized the controls of the Lancer and cut his engines. He could hear the drone of six or eight engines below him to the north. He kicked his rudder and stuck the nose of the Lancer down. He peered into the eyepiece of the infra-red telescope, as he thought he had the nose of the Lancer on the ships returning to their murderous attack.

As the telescope picked up the eight planes racing upward, Bill gasped and continued to peer with unbelieving eyes. The ships were fast, rugged one-seaters with flat, short wings, lean fuselage, stripped-down undercarriage and mighty power plants. But those things were not what made him gasp. He gasped because he could see the squadron insignia of the Royal Air Force painted on the sides of the fast little ships!

As fire and orange flame jetted from the machine-gun troughs along the engine housing of the eight ships, Bill jerked the control column of the Lancer back into his stomach and stuck the nose upward to escape that hail of lead. He could feel the Lancer tremble from stem to stern as bullets drove into the tail assembly. Then he was away from them. He leveled the Lancer off and began to spiral upward.

His mind was a maelstrom of thought. Why had a portion of a squadron of British planes attacked him? He wasn't

sure, but he believed that the insignia he had seen was the insignia of a squadron stationed at Ma'an.

Then all of that left his mind as he thought of Red Gleason. He flipped his switch and made contact with Red on the radio.

"How are you coming, fella?" he asked him anxiously.

"I'll do, Bill," Red said weakly. "But I'm losing a lot of blood. I'll have to sit down soon."

"Do you think you can make it to Ma'an?" Bill asked. "It's a half hour. It will be dawn by then. We'll stay at twenty-five thousand until just before we're ready to land. It will be safer than landing on the desert, with those ships over us. Do you think you can make it?"

"I'll make it all right," Red said.

"Three hundred miles an hour," Bill ordered. "Keep your radio open and shout if you think you're going to be in trouble, Red."

"O. K.," Red said.

"Bill!" Sandy said excitedly. "I can see those planes streaking off to the west with their running lights on. They tried to get up to us, but began to wallow at about twenty-two thousand feet. Who are they, Bill?"

"They were British army planes," Bill said grimly. "And the pilots wore British uniforms. I can't figure it out."

"Shall I follow them, Bill?" Shorty asked quickly.

For a moment Bill hesitated. Then he spoke with his usual decisiveness. "No," he said. "Let 'em go. They might gang you. And we've got to stick with Red in case he has to land."

## V—EXPLANATIONS

DAWN was creeping out of the east when the Silver Lancer and the three Snorters circled the field at Ma'an twice while they studied the wind sock and the layout of the field.

Five minutes later Bill led the way in. He had set his brakes, killed his engines, and was over the side before the man in the uniform of the Royal Air Force reached his side.

"Oh, Barnes! Mr. Barnes!" the man called as Bill ran toward Red Gleason's Snorter. Bill knew that Red must have fainted, because his twin props were still whirling after he set his brakes and the ship came to a halt. He turned his head and waved a beckoning hand at the man in the light-blue uniform.

Bill's face was white, and the muscles in his cheeks stood out like whipcord as he dived into the front cockpit of Red's Snorter.

Red was curled up over his stick, and his left shoulder was a sodden mass of red. Bill's breath whistled through his nostrils as he slipped the catch on Red's safety strap and lifted him bodily out

of the cockpit and tenderly slipped his feet to Shorty Hassfurth.

The eyes of the man in the sky-blue uniform widened with horror as he saw the blood-saturated body of Red Gleason. But he didn't forget why he had been sent out to greet Bill Barnes.

He saluted and began, "Wing Commander Kestrel sends his compliments to Mr. Barnes and his men, and re—"

"Stow that!" Shorty Hassfurth snapped at him. "We need an ambulance. Hop!"

Kestrel's adjutant stared at Shorty for a fraction of a second. "Right!" he exploded as he swung on his heel and sprinted toward a group of buildings.

Bill Barnes had cut away Red's white overalls and was packing gauze against his horribly mutilated shoulder. Shorty was doing what he could to help, while Sandy looked on with that touch of sadness and horror in his eyes that bespoke his youth.

"Do you think it's very bad, Bill?" he asked.

"Plenty bad," Bill growled. "The bird who did that is going to pay for it. Red's lost a lot of blood, and I don't see how the bone can avoid being shattered."

He glanced up as an ambulance came clanging across the field with two or three men hanging on the back—then back at Red. His hard eyes became misty as he gazed at the calm stillness of Red's white face.

"Guts!" he said, half to himself. "He has what it takes." He knew what pain that last forty-five minutes must have cost Red. He knew how he must have struggled to fight off unconsciousness until he had his ship down safely.

"That," Shorty Hassfurth said, his voice husky, "is something he learned in France when they used to give us orders to bring our ships back. They didn't care if we got shot through the head. That was all right with them. But they needed the ships."

Bill and Shorty lifted the inert form of Red into the ambulance, hung on the back step while it clanged its way across the field to the hospital.

Ten minutes later they saw Red wheeled into the operating room, his face as white as the sheet that covered him.

BILL BARNES' face was a thundercloud as he faced Wing Commander Kestrel across his desk. Both he and Shorty had shaken the commander's hand.

"How did this thing happen, Barnes?" Kestrel asked. "Is he badly hurt?"

"We left Sandy with him," Bill said. "He is still under the ether. We don't know how bad it is. But some one is going to pay for it."

"Could he have shot himself accidentally while he was in the air?" Kestrel





Sandy cut the first man down with his automatic just as the Arab raised a rifle.

asked. "They told me it was a bullet wound."

"It is a bullet wound," Bill said grimly. "It's a wound from a machine-gun bullet fired from a Royal Air Force plane by a man in British uniform!"

"I say!" Kestrel exclaimed. He started to rise from his chair, then sank back again while the color drained from his face.

"A bullet fired from a British plane by a man in British uniform," he said stupidly.

"What about it?" Bill barked. "We were about two hundred miles from Ma'an when eight one-seater biplanes dived on us with all their machine guns jammering. Luckily Gleason was the only one who was hit. The rest of us managed to get out of their line of fire. Hassfurth and Sandy joined Gleason at twenty-five thousand feet. I stayed down to learn who had attacked us."

"Eight one-seater biplanes," Kestrel repeated. He talked like a man under the influence of a strong drug. "How could you tell who they were at night?"

"My Lancer is equipped with an infra-red-ray telescope," Bill said. "I could see them as plainly as I could in the daytime. I saw their uniforms. They were not wearing overalls. And I saw the British cockade and the squadron

insignia. I checked the insignia with a plane on the field a few minutes ago. They are the same."

"Yes," Kestrel said, like a man who is tired beyond endurance, "they are the same. About two hundred miles northwest of here?"

"That's right!" Shorty barked.

Kestrel looked at him for a moment as though he didn't see him. Then a faint smile flickered on his twisted lips.

"I'm sorry this has happened, Barnes,"

he said. "I am more sorry than I can say. Things are happening so fast I can't keep up with them mentally. I must explain to you. I'll try not to bore you. You must be patient. I hope this won't make a difference. I've been hoping since I learned you were coming you would help me, Barnes."

"How did you know I was coming?" Bill asked.

Kestrel's eyes left Bill's and traveled upward to a point on the wall across from him, then shifted back to Bill's face, then to Shorty's. He shook his head sadly as he spoke.

"I learned it from a letter Douglas was writing to you, Barnes. We found it in his rooms in town. He—he—"

"What about Douglas?" Shorty snapped again. "Where is he? We know about his court-martial. Where is he?"

"He's dead," Kestrel said. "He was murdered night before last!"

"Murdered!" Shorty said slowly. His own face was white now, and he was thinking about the parents of young James Douglas. He was thinking about the tragic death of James' older brother during the War. Thoughts rushed through his mind. He tried to speak and found that he couldn't.

Kestrel's eyes softened as he saw the tragedy written on Shorty's hard face. He put up a hand and spoke softly.

"Let me tell you about things," he said. "I'll lay all the cards on the table. You'll understand if you let me tell you the whole story. It can't be told in halves. You wouldn't understand if I told you that way."

Bill and Shorty sat spellbound while Kestrel unfolded the whole weird story. At times Kestrel stopped as they glanced at one another incredulously.

He told them of the unrest of the natives and the attempt to mutilate the sacred Dushara. He told them of the theft of eight British planes and the cashing of young Douglas. He told them all he knew up to the time he had gone to bed the night before.

"Those planes that attacked you," he said, "were the ones that were stolen. It is as I thought. Some one is work-



ing from the inside. They knew you were coming. They sent out those ships to stop you. But who sent them? And from where did they come? Those two things, gentlemen, are the things that confront us. If we can find out those things we will learn who murdered your friend.

"I admit now I was a fool to listen to the charges against him. He was not guilty, and he was determined to prove it to us. The things he learned cost him his life. What were they?"

"If I had not been such a fool he would be alive to tell us. One of your own men has been dangerously wounded through no fault of his own. It seems that you are drawn into this thing without being able to help it. The long arm of the man behind it reached all the way to China to enmesh you in a fiendish plot that may cost thousands of lives. I need your aid. I beg you to work with me. By working together we can each satisfy our own interests."

"We're in, all right," Bill said. "And we're going to stay. Have no fear about that. We want to know who murdered Douglas. And if Gleason doesn't pull through—"

He stopped, unable to go on.

"What about Douglas?" Shorty asked. "Will he be sent home?"

"I have cabled his parents," Kestrel said. "I will do what his parents wish."

"I'll take care of that," Shorty said abruptly. "They are friends of mine, too."

## VI—PETRA'S STRONGHOLD

BILL and Sandy paced nervously up and down the anteroom of the hospital. Shorty Hassfurth, whose anxiety was even greater than theirs about his best friend and War-time pal, sat reading a newspaper and mentally cursing his nerves.

An interne had told them that they would not be permitted to see Red that day. He was so heavily doped, he said, he would not be able to recognize any one.

But they were waiting to get a report from the doctors who had worked on his shoulder in the operating room. They knew it was very possible that his left arm might be amputated.

Major McCardell, in command of the medical unit, made a report to them. He was an elderly man with a long and naturally dour face. Bill's heart fell to his boots when he made his appearance and Bill got a glance at his face.

"I'm glad to be able to tell you," he said, "that it isn't as bad as it looked at first. He will not lose his arm and we will be able to build up the bone very satisfactorily. It will always be a little stiff, but he will not be a cripple. He is doing very well considering the shock and frightful loss of blood. We

will have to keep him extremely quiet for a few days. It is possible we may need a blood transfusion or two."

"That's where I come in," Shorty said gruffly. "My blood has been tested for him. They used my blood for him once before."

"That's a relief," McCardell said. "We may need you, Hassfurth."

"Wing Commander Kestrel has given us quarters on the field," Bill said. "Will you send an orderly to us as soon as we can see Gleason?"

"I will," McCardell nodded. "And I'll keep you informed about any developments. Don't worry about him; that won't do any good."

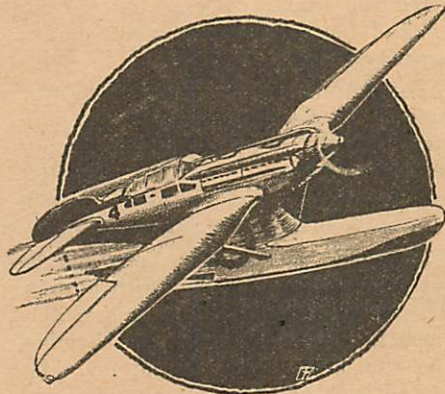
"O. K." Bill smiled. "We know you're doing your best."

Bill reported to Wing Commander Kestrel before he took the Silver Lancer into the air a half hour later.

"I'm going to look the land over," he said to Kestrel. "I may see something that will give me an idea."

"Some one has got to get an idea pretty quick, Barnes," Kestrel said. "If we can find the place they are hiding those eight planes and where they took the cargo from those seven caravans, we'll be a long way toward a solution. Even my own men are getting jumpy now. They know that somewhere there are traitors. We are like a house divided. Every one is suspicious of every one else." He wiped his face with a handkerchief, and Bill saw that his face was white and tense, and strained to the breaking point. "You'll want to go through Douglas' things with Hassfurth?"

"When I come back," Bill answered shortly. "Hassfurth will remain here



One of Bill's Snorters.

on the field. Sanders is going with me."

Bill whipped the Silver Lancer into the air in a manner that had the grease monkeys and mechanics on the field wide-eyed. As he spiraled upward, they stood in little groups hardly able to believe what they saw.

At five thousand feet Bill leveled off and looked over the side as Sandy's voice came over the intercockpit phone.

"Say, Bill," Sandy said, "I wonder where a fellow would go to buy a horse?"

Bill didn't answer him. He was searching the boulder-strewn desert below with his eyes. Here and there he could see the tents of the nomad Bedouins with their camels grazing near by.

"How much do you think a good Arabian horse would cost?" Sandy persisted.

"How the deuce do I know?" Bill growled. "Why don't you get yourself a harem instead?"

"Not for me," Sandy said emphatically. "I'd rather have a horse any day than a lot of women!"

"All right, all right," Bill said. "Now shut up. I didn't come up here to talk about horses. Keep your eyes on your altimeter. I'm going to cut north over the Dead Sea."

They raced the length of the Dead Sea into the Jordan Valley before Bill banked the silver ship around and came back over the precipitous cliffs on the eastern shore. Black basalt from volcanic eruptions blended with the bright red of the sandstone cliffs. Where wind and rain had chiseled away portions of the cliffs, great columns stood erect with black crowns on their heads, which faded into red, until, at the base, the bright-blue waters of the Dead Sea lapped at their feet.

The narrow chasm, through which the Wadi-el Mojib flowed into the Dead Sea, flashed below their wings, and here and there they saw bright-red patches where the fertile land had been newly plowed. Scattered along the wadies were camps of Bedouin goat-hair tents.

Gliding down to a thousand feet as they entered another valley, they could see the terraced gardens and orchards below El Kerak.

Then they were back over the vast expanse of desert plateau that was the northernmost extremity of the Syrian Desert. The tan-and-yellow desert was bare of trees or color, except where a wadi cut its surface. To the east the desert rolled away interminably, and to the west a low range of hills towered into the air.

Bill stuck the nose of the Lancer up, and just cleared the tops of the scrub-oak thicket on the westerly range with his altimeter at five thousand feet.

They both gasped in amazement as they sped between the dazzlingly colorful twin ranges where Petra nestled. To the west stretched the deep expanse of the Araba, blue-tinted, remote and forbidding. The yellow, tan and ivory sandstone changed to vivid red as they flew between the two ranges of fascinating shapes and color.

"That is Petra, kid," Bill said, pointing. "Kestrel gave me a map. The large building in ruins used to be the castle of Pharaoh's daughter, and the hill above it is El Habis, the Acropolis Hill.

"Over there on the left is El Khubdhah and El Der. The river below us is the



Wadi es Siyagh. It's the only outlet from Petra, except Es Siq, where Douglas was murdered two nights ago. But it's impassable to caravans."

"How did that caravan get out of Petra?" Sandy asked.

"It didn't," Bill said grimly. "It's in here some place. That highest peak is Jebel Harun. The building on the top with the white dome is the tomb of Aaron, and the place where the Dushara is kept. Some one tried to get in there the other night and mutilate the Dushara. The natives, according to Kestrel, are half mad because of it."

"That great flat mountain over there is Umm el Biyara, Petra's most ancient stronghold. It tells in the Bible how David wanted to storm the Edomite stronghold in his day. There used to be a single path cut in the side of it so that men could get to the top. But erosion has worn it away."

"We could almost land on there, couldn't we, Bill?" Sandy asked.

"Almost is right," Bill said. He flew lower and inspected the great, flat surface. "It might be done, but I don't want to do it. It was impregnable in its day, and still is, except from the air. The little mountain beside it is El Habis. That's an unfinished tomb. The rock-cut *couloir* was the only way to the top of Umm el Biyara. After the men had taken their women and children and elders to the top they could close off the path with a gate. They had cisterns on the top—you can still see them—to catch and hold water."

"Gosh, Bill," Sandy said. "You know a lot, don't you?"

Bill swung around in his seat and looked at Sandy suspiciously. But Sandy was serious.

"You aren't trying to kid me, are you?" Bill asked.

"No! Gosh, no, Bill. I'm really interested."

The air had become bumpy now above the crags and caverns of Petra. Bill yanked the stick back and zoomed the big ship upward.

"The best way to get into that place is on a horse, Bill," Sandy said.

"That's the way we'll come next time," Bill answered. "I'm going to circle this place now. Those caravans and those eight ships have to be some place. But-ton up your lips. I'm going to open the Lancer up wide and cover as much territory as I can."

## VII—STRANDED

THE RED limestone hills surrounding Petra gave way to the great barren wastes of the desert as Bill opened the throttles of the Lancer and circled westward. Here and there among the boulder-strewn stretches of desert west of Ma'an they could see Arab encampments with horses grazing where there seemed to be no vegetation.

As the ruins of an old Arab citadel flashed beneath their wings, Bill stuck the nose of the Lancer down and circled back. No living thing moved within the crumbling walls. Outside, heat danced from the sun-scorched steppe as the sun crept higher into the heavens.

Twice they saw large bands of roving Bedouins astride sturdy Arab horses. Flying low, they saw the fierce nomads of the desert unsling their rifles and felt the drum of their bullets as they pounded through the metal skin of the Lancer. As they nosed upward the tribesmen shook lances and yataghans at them until they were mere specks on the desert.

"Take her for a few minutes, kid," Bill said to Sandy. "There is something screwy about our fuel tanks. I told 'em to check 'em when we landed this morning. We may have picked up a couple of punctures last night."

Sandy held the Lancer at three hundred miles an hour while Bill checked the fuel lines and tanks. He checked and rechecked his instruments to find their position.

"We're almost two hundred miles from Ma'an, Bill," Sandy said. "And she isn't pulling the way she ought to. I just adjusted the props and it didn't do any good."

"Stick the nose on Ma'an, kid," Bill said. His eyes were worried as he scanned the instrument panel. "Give her some more juice."

Sandy opened the throttles another notch, and the air-speed indicator crept up to four hundred miles an hour. Then he leaned over and inspected the extension handles of the two .50-caliber machine guns at his right and left and fingered the trigger cables. The circular dials of the automatic counters showed capacity filling.

For fifteen minutes Sandy held the nose of the Lancer pointed at the horizon, and Ma'an. Perspiration dripped down his face as the sun became hotter and hotter. He half closed his eyes to protect them from the intense glare.

Suddenly his eyes flew open and he sat up in his bucket seat with a start. The far-away roar of airplane motors came faintly to his ears. He thumbed the sun, but could see nothing. He looked back and up on both sides, and still could see nothing. He saw that Bill was bent over so that any sound would be drowned by the roar of the twin Diesels in the Lancer. He bent his head and cocked it to the right, then to the left.

It sounded as though the planes were coming toward him from his starboard side. He scanned the air above and below the starboard wing. The sound was certainly growing louder and coming closer. He decided he had better speak to Bill. He hesitated another minute while he listened.

And while he listened it happened!

Two formations of three fast, rugged, one-seaters were diving out of a wisp of fleecy clouds a thousand feet overhead, their mighty power plants roaring at high-pitched crescendo as they dived.

Sandy gasped in horror and shouted Bill's name three times in the inter-cockpit phone. White streamers of lace floated through the air as machine guns began to yammer their song of death.

As Sandy jammed the control column forward into a vertical dive, Bill grabbed at the controls and yanked the throttle wide.

"Break out that swivel gun!" he roared as the Lancer plummeted toward the desert at terrific speed. "Don't miss when I come back up in a loop!"

Sandy broke it out and pushed back the sliding hatch. He ran the gun across the track while he nearly choked with excitement. His freckled face was dripping with perspiration. He held the palms of his hands against his head for a moment to lessen the pressure as the Lancer continued to plunge earthward.

The two V formations continued their dive, following the Silver Lancer toward the desert. Bill's mouth was a firm, hard line across his face as he glanced back and up. He held the stick forward until the Lancer was almost at terminal velocity. Then he swung the nose up with the touch of a master. Machine-gun bullets drummed into the tail assembly as the Lancer came up and over on its back.

Bill centered the controls and rolled right side up as the six light-blue ships dived under him. He could see the cockade of the Royal Air Force and the same squadron insignia he had seen on the ships that had attacked them the night before.

Opening the throttle of the Lancer wide, he stuck the nose up in an abrupt climbing turn until he almost stalled. He kicked his rudders and rolled to the right. He was back on his original course with the nose of the Lancer pointed toward Ma'an.

He cut his throttles while he studied the six blue ships. The men piloting them wore helmets, goggles and overalls, and he saw, as they came out of their dives in a precise formation, that they could fly.

A thousand thoughts raced through Bill's mind as he watched them spiral upward and return to the attack. He knew he was justified in returning their fire. Yet he hesitated. He knew he could open the throttles of the Lancer and run away from them. He could land safely at Ma'an, but he would still know nothing about their base.

He could climb to a ceiling they could not reach and follow them to their base, but he was worried about his fuel supply. If his tanks had been punctured the night before and he was forced to



land, he and Sandy would be at their mercy.

Then one of the blue ships was on his tail again. He heard the *tat-tat-tat* of its machine guns, followed by the fire of another. He could feel the bullets lashing through the Lancer's tail assembly and creep forward. He pulled the stick back and sent the Lancer skyward in a desperate zoom.

"All right, kid," Bill shouted into the telephone. "Let's dish it out!"

He heard Sandy's swivel gun chatter as the six rugged biplanes closed in on them from every side. He gunned the Lancer and pulled away. The light-blue ships tried desperately to stay on his tail.

"Now, kid!" he roared. "We'll take it to 'em!"

He whipped upward in a chandelle and dived head-on at the six rugged one-seaters. He dived with his two .50-caliber guns yammering. But his speed was too great for accurate fire. The blue ships dived and zoomed and skidded to get out of his mad path.

A blue ship came under his sights for that fraction of a second that is enough. His finger fastened down hard on his gun trips. He raked the blue ship with a withering fire. The pilot's head jerked upward, then slumped forward on his chest as it became a mask of blood. The plane slipped off to the right and began a fluttering descent to the desert, until the nose fell and the tail began to spin.

Bill gunned his engine again and came over in a normal loop on the tail of another ship. His line of tracer smoke curled above the head of the pilot. His bullets crashed into the fuselage and crept forward into the engine block. Little wisps of smoke rose along the engine housing. Then orange flame raced out and back into the face of the pilot.

As Bill zoomed upward he heard Sandy's swivel gun chattering again. He glanced back over his shoulder, and saw that Sandy's eyes were gleaming like balls of fire in a face that was streaked with black.

Then the air seemed to be filled with flashing, slashing blue planes. They darted about the Lancer like wasps about an enemy who has disturbed their nest. They were everywhere, charging in from all angles, trying to get the Lancer in the vortex of their fire.

Bill whipped the Lancer through the air with the speed and precision of an automaton. He knew that the Lancer was taking a terrific pounding, and he knew that one bullet in the reserve tank on which he was running might be fatal. But he was determined to fight it out now. He was determined to fight until he had the knowledge he wanted. And that meant he must drive off those four planes so that he could land beside the pilot who had bailed out of his burning plane.

As another blue plane came under his sights his finger clamped down on the trip of his 37 mm. cannon. A half dozen roaring barks sounded above the din of throbbing motors and yammering machine guns.

What had been a sturdy biplane became a great cloud of black smoke, stabbed with streaks of saffron and crimson. Ribbons of bright orange shot out of it as it broke in all directions. The three ships behind it zoomed upward to get out of the path of the flying debris. Wings and fuselage hurtled through the air as the shells of the 37 mm. gun struck the engine block and detonated. The engine dropped from the black cloud and raced toward the desert. A gust of wind struck the black cloud of smoke and tore it apart. All that was left of the biplane and its pilot were bits of cloth and metal falling earthward.

"That ought to teach 'em something!" Sandy gasped.

But Bill was too busy avoiding the six streams of death that were aimed at him to answer. He grimly counted three in his mind as he came up in an outside loop and dived. Again his fingers fastened down on his machine-gun trips. The pilot of the ship that was under his sights tried to stand up and walk off into space. Or so it seemed. But he would never try to walk again. His body had been made into a sieve, from which his life's blood poured out into the cockpit as the ship plunged toward the silent, endless desert.


It was then that the other two biplanes decided that discretion was the better part of valor. They stuck the noses of their ships down and opened their throttles wide as they saw the fourth of their comrades go to his death. Their faces were white and frightened as they glanced back and up over their shoulders.

Bill wiped the perspiration out of his eyes as he watched them go. For an instant he had an almost overwhelming desire to follow them and tear their ships to pieces with his bullets. They had tried to gang him, thinking their superior numbers would give them an advantage he could not overcome.

The blood pumped through his body like liquid fire as he watched them go. They were the murderers of young Douglas. And they had tried to murder him. He debated whether or not it was his duty to go after them. Then he decided against it. If he could pick up the man he had seen bail out of his burning ship he would take him back to Kestrel, and Kestrel would make him talk.

He took his eyes off the fast-disappearing ships and scanned his instrument panel. The blood in his body, which had been boiling with rage a moment before, seemed to freeze.

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His fuel gauge showed zero as his engines began to spit and sputter! He idled them out and tried to hold his altitude while he studied the barren wastes of sand below them.

"Gosh, Bill," Sandy's voice came to his ears. "We'll never get out of here."

"Shut up!" Bill answered as he threw his radio key and began to chant Shorty's call letters into the microphone.

But Shorty's voice did not answer. No sound came back to Bill but the faint crackle of static. He twirled the volume, wave-length control, and the master tuning control to get the radio station of the Royal Air Force field at Ma'an.

As an answering voice came back he spoke his name once. Then all was silence. He stared at his radio controls and twirled them while he continued to chant the field's call letters into the microphone. But no voice answered except Sandy's.

"It's dead, Bill," he said as Bill threw his telephone switch.

"Get out some glasses," Bill said to him. "See if you can locate Ma'an. I can't see it because of the mountains to the east. Perhaps you can find it with the glasses. I'm trying to stretch out our altitude, but we're almost out of it."

"I can see where it is, approximately," Sandy said in a moment. "But it's a long way from here. What do you suppose is wrong with the radio?"

"Something shot away," Bill said curtly. The cold hand of fear clutched at his heart as he gazed at the interminable sea of sandy hillocks that stretched on and on, forever.

He knew that unless one of Kestrel's men sighted them in that vast expanse of sand it would be their last resting place. A man might fight his way through to water and civilization, but his chances would be small.

He threw a switch and watched his instrument panel until his wheel-landing-gear light and float-landing-gear light burned. Then he flattened the Lancer out until his wheels were just kissing the sand. They struck the irregular surface at eighty miles an hour, with flaps set well down. The engines gave their last sputtering gasp as Bill threw on his wheel brakes and cut his switches.

Suddenly he sat bolt upright in his bucket seat and probed the air above him. Then he tore out his radio headset and shouted at Sandy.

"Get your gun ready, kid!" he said. "Those two planes are coming back. They must have seen us banking down and came back to find out what was the matter." He went over the side of the Lancer with a bound, saying, "I'll get the submachine gun and the rifle out of the emergency locker. Be ready; they'll come shooting."

They came shooting! They came roaring down like two attack ships with all

four of their machine guns yammering and their engines wailing in protest.

But they had not counted on the flexible gun in the rear cockpit of the Lancer. They had expected to find their two victims helpless.

Nor could they shoot with the accuracy young Sandy displayed. After that first terrific onslaught they zoomed upward as Sandy's .30-caliber gun sent burst after burst into them.

"Gosh, Bill," Sandy said after that first attack, "if we could only use the cannon!"

"Take this Thompson gun," Bill said grimly. "I'll handle your gun. They'll be back in a minute."

But they didn't come back. Bill watched the two circling ships, waiting for one of them to rock his ship slightly and extend an arm upward, meaning to attack.

Instead, the leader of the two ships rocked his plane violently and "peeled off" toward the south, indicating that he was going out of action. The other one followed close on his tail. They had had enough of the accurate shooting of Bill Barnes and Sandy.

"They'll probably come back with reinforcements," Bill said. He ran his tongue across his dry lips and was startled as he caught himself doing it. He knew that the terrible hands of desert thirst were flicking him. He knew that unless one of Kestrel's men located them they would never be able to get out of there alive.

But he kept those thoughts to himself as he looked at Sandy. He knew that it would be useless to tap the radiators for water because of the chemical mixed with it. It would make them both deathly sick. He thought about two French airmen who had been forced down in the Sahara. They had kept themselves alive by scooping the dew off their wings in the morning and putting it in a container.

That, and a thousand other things, flashed through Bill's mind in those first terrible minutes. Then he got hold of himself and grinned at Sandy.

"We'll have to get under the ship, kid," he said, as though this was something that happened to them every day. "We can take advantage of the shade. We won't get so thirsty. Kestrel and Shorty will have men out looking for us in no time."

"I'd like to get hold of that grease monkey who said our fuel was O. K.," Sandy said.

"Perhaps," Bill said slowly, "he told us that with a purpose."

## VIII—TRUE HORSEMANSHIP

THE NEXT FEW HOURS were burned into their brains indelibly by the desert sun. When it seemed that they could stand no more, the sun turned on

its most scorching rays. At midday they lay panting below the float of the Lancer, moving every few minutes to stay within its shade. Their lips were beginning to crack and their tongues swell into things that felt like huge, dry sponges.

Bill tried to tinker with the radio. But each time he thought he had mended the defect and threw the switch, no crackle of static came to his ears.

"Gosh, Bill," Sandy said at two o'clock, "do you suppose they'll look for us? I—I—"

"Sure, they will," Bill said hastily. He gazed at Sandy's burning eyes and cracked lips and turned his head away to hide the thing that came into his own eyes. "They're probably scouring the countryside now. They may not pick us up until morning. But they'll find us. It gets cool out here at night. We'll be able to get water then by scraping moisture off the wings. Keep your chin up, kid. We've been in tighter spots than this one."

"Oh, I'm all right," Sandy said, trying to laugh. But it wasn't much of a laugh. It was more like the back of a consumptive. "We—we'll be laughing about how thirsty we were in a few hours."

"That's right, kid," Bill said. But he knew it wasn't right as he anxiously scanned the sky. He knew it would be a long time before they laughed about that day—if they ever laughed again.

In the late afternoon Bill broke out some chocolate from the emergency equipment in the tail locker of the Lancer. And he jotted down in his memory to the effect that if they ever did get out, in the future the emergency equipment would include a certain amount of water.

The sun was poised, ready to plunge into the sea of sand to the west when Sandy let out that first startled exclamation and began to shout at Bill, and point.

Bill followed the direction in which he was pointing, and his eyes narrowed after their first moment of astonishment. Between two hillocks of sand they could see a half dozen mounted men. They wore the bright-colored mantle and head cloths of the desert nomad, and Bill could see that they were armed to the teeth with lances, rifles, shotguns and yataghans. Then they were gone from view.

"Wait a minute, kid," he said. "Stop yelling! They may not be so friendly. Remember, they took shots at us before."

"I'd do anything for some water, Bill," Sandy said desperately.

"If they're unfriendly you don't want to fall into their hands," Bill answered sharply. "Kestrel said the natives were ready to revolt. It may be a tribe on their way to join others in the revolt.





Bill brought the Lancer around and stuck the nose down toward the little knot of men.



Bedouins are notorious for their methods of torture. Get into the rear cockpit of the Lancer. I'll get in the front. If they come toward us in a friendly fashion, stay in the cockpit and have your gun ready. If they come shooting, let 'em have it."

As twilight settled upon them, the desert became a place of exquisite color for that brief period between daylight and dark. Then the day's fierce heat began to radiate away through the clear, dry air, and the chill of night crept upon them. In an hour's time the moon was high overhead, making the night nearly as light as day.

Suddenly Bill sat up in the front cockpit and threw the switch on the infra-red-ray telescope. He had seen what he thought were moving forms on the crest of the hillock ahead. He took one look through the telescope, then spoke to Sandy.

"They're coming, kid!" he said. "There are forty or fifty of them all around us. I can cover the front with my machine guns. You'll have to take care of the rest. They'll charge on horseback. Use your—"

That was as far as he got when that horde of wild tribesmen came charging over the hillocks of sand from every side, their robes flapping out behind them, their guns spouting fire and death, their horses driven half crazy by their high-pitched screams.

Bill's finger came down on the gun trips of the two .50-caliber guns in the nose of the Lancer as that first mad wave reached the crest of the hillock. His guns cut a path through the charging tribesmen before they began their charge. As they tore down the side of hillock, out of range, he snatched the Thompson gun from the deck and swung it in an arc.

Behind him, Sandy ran the .30-caliber gun over its track with the swift precision of a trained gunner. Horses and men fell in screaming heaps as his bullets tore into them.

The desert night became a place of horror as the deadly fire of the two machine guns cut down the charging zealots. Yet, on they came, shooting from the saddle, screaming their chant of hate and war.

When they were within twenty yards of the Lancer the thin line wavered. Horses and men piled up in struggling, howling masses. The unwounded men behind them could not advance. For an instant they hung there, returning the machine-gun fire with poorly placed shots from their rifles.

Then they broke and went streaming back over the hillocks, with half their number dead or dying.

"Take it easy, kid," Bill said. "They'll be back. You'd better get some more ammunition in your gun while you can."

The horrible screams of the wounded

horses and men nearly drowned out his words. An occasional shot pinged into the Lancer from behind the hillocks.

"Gosh, Bill," Sandy said. "I wish they'd go away now. Look at that horse over there. It's a beauty. I could get it if I dared get out."

"You stay where you are, you half-wit," Bill growled. "You don't need a horse; you need a nurse."

Bill's hands were trembling and his whole body ached from loss of sleep and nervous excitement as he checked over the ammunition he had left for the sub-machine gun. He found that he had just enough to stand off another charge such as the last one.

"How about your ammunition, kid?" he asked Sandy.

"Not an awful lot left, Bill. One belt."

Bill shook his head angrily, then peered through the infra-red telescope again. The Arabs had stopped firing now, and he could see no movement beyond the hillock. He debated with himself for five minutes about the course he ought to pursue.

"Listen, kid," he said finally, "can you ride that horse?"

"Ride him!" Sandy answered. "Look at him, Bill. He's still standing there like a statue over the body of his master. You know I can ride him. I learned how to ride horses right after I learned to walk. I—"

"All right," Bill said sharply. "I'm going to give you a chance to ride him. Kestrel or Shorty will never find us here before that gang of bandits out there finds a way to slit our throats. It can't be more than twenty miles to Ma'an. If you can get into the saddle and get through that first line of Arabs you ought to make Ma'an within a couple of hours. An hour after you leave I'll turn on the landing lights of the Lancer to help you find me from the air. Don't let Kestrel send a lot of planes out here to crack up when they try to land."

"Just tell Shorty the situation and come with him. He'll get in some way. You can bring enough fuel with you to get the Lancer out of here. Take an automatic and the rifle with you, and be ready to shoot when you ride over that rim of sand. Then ride!"

"What about you, Bill?"

"I'll be all right, if you get through safely. I have enough ammunition to hold them off for a couple of hours."

"Suppose they charge in the way they did before—from all sides?"

"I'll handle that," Bill said. He knew he didn't have a chance if they started working their way toward him under the cover of darkness. If they charged, mounted, he could stand them off for a time. But if they crept in on him, they could get close enough to use their deadly yataghans.

He believed Sandy could get through if he once got astride the superb white

horse that was only fifty feet away. Those fifty feet would tell the story. The kid would either get through safely or be killed in the saddle—which was better than being tortured.

Bill closed his lips tightly and peered through the telescope again. "All right, kid," he said. "Good luck! Shoot your way through if you have to. Don't let them take you alive."

He found Sandy's hand with his own in the dark.

"I hate to leave you here, Bill," Sandy said anxiously.

"Don't worry about me, kid," Bill laughed. "None of those desert lice have my name on their bullets."

"I'll be seein' you, Bill."

"Right, kid. Go like the devil when you get aboard."

He saw Sandy drop over the side of the Lancer, saw his dim form, bent half double, flash across that fifty feet of sand. He expected to hear a fusillade of rifle shots and see him pitch forward on his face at any moment. Those few seconds brought cold perspiration out on Bill's body and left him weak and trembling. He saw the white horse go up on its hind legs with its front ones pawing the air. He saw Sandy bent over its neck. For an instant they were silhouetted against the sky, a perfect target for enemy bullets.

Then the horse and Sandy became a part of the desert night. He saw them again for an instant as Sandy topped the first hillock, saw them plunge out of sight on the other side.

Shouts and rifle shots floated back to his ears. Then a bedlam of clamor, Arab oaths, and he heard an automatic spit many times—and knew that Sandy was still in his saddle.

As the shots and cries died in the distance, Bill knew that Sandy had got away without being hit.

He leaped for the telescope and then clamped his fingers down on the trigger cables of his two .50-caliber guns as twenty or thirty men came charging over the crest of sand ahead, on foot. His bullets cut two paths through their ranks before they plunged down the side and were out of range. He dived into the rear cockpit of the Lancer and swung the .30-caliber gun to bear on the screaming tribesmen as they came on and on.

His blood ran cold as turbaned heads appeared above the rim of the Lancer. The two automatics in his hands were hot as he fired them point-blank into the desperate, mad faces. Something seared his arm as a dagger slashed through his overall.

WHEN young Sandy went over the side of the Lancer he was not worried about Arab bullets. He was worried about one thing only. That was: whether he could get into the saddle



of that white horse and stay there. He would rather have been shot than to be thrown from the horse's back under Bill's eyes.

He approached the horse with the easy, cautious movements of a true horseman. He spoke soft words to him, words that had no meaning other than to quiet the nerves of the trembling horse. He ran an eye over the snow-white shoulders and hind quarters of the superb creature and thrilled as the horse nuzzled its muzzle into his hand.

Then his foot was in the left stirrup and he swung himself into the saddle. For an instant the horse came up on its hind legs, pawing the air.

Sandy leaned over its neck, calling soft words into its ear. Its forelegs came down; Sandy pressed his knees into its ribs and kicked gently on its flanks.

Sandy learned then why old Arab poets sang songs to their horses. The horse took him over that first hillock with breathless speed. He saw five or ten unmounted Arabs only a few feet away from him. He cut the first one down with his automatic as he raised his rifle to his shoulder. Then he emptied his clip, swung the horse to the right, leaned low over its withers and cried in its ear.

The horse settled down to the task before him with long, swift strides that took Sandy out of sight behind the first hillock before the Arabs could mount their horses. Bullets sang by his ears and kicked up the sand around him. But none of them touched him.

The Arabs who followed him never came close enough to get an effective shot at him after that. His horse took him over the desert sand with the speed of a greyhound and the endurance of a camel.

"Good gosh," Sandy said to himself, "I'm going to take this horse home with me if it costs every cent I can beg and borrow."

He was worried by the pursuing Arabs, and he was worried about Bill's safety. But he wasn't enough worried to keep him from thinking about a name for the horse and the horse's performance.

Sandy didn't try to stop the racing beast as the guard at the gates of the air field threw a challenge at him. He couldn't have stopped him if he had tried.

But he managed to bring him to a halt before the officers' quarters, where he believed he would find Kestrel and Shorty. He brought him up on his haunches, cleared the saddle in one bound, and raced through the doors.

Again he paid no attention to the challenge of the guards as he pounded on the door of Kestrel's rooms. When the door flew open to expose the haggard face of the wing commander, Sandy half staggered, half fell into the room.

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"Where—where," he gasped, "is Shorty?"

"Searching for Barnes," Kestrel snapped. "How did you get here? Where is Barnes? We've scoured the countryside looking for you. I called my men in at dusk, but Hassfurth is still out. He thinks you must have crashed in the mountains around Petra."

"I've got to get Shorty on the radio from my Snorter," Sandy said. "We were attacked by the stolen Royal Air Force planes. We shot four of them down, then ran out of fuel. The two that escaped came back to get us, but we drove them off."

"After dark we were attacked by desert tribesmen. We held them off and I captured a horse and rode to Ma'an. Bill is still out there. I've got to find Shorty. I——" Sandy stopped, gasping.

"I'll order a squadron of my men out immediately," Kestrel snapped. "Was there any danger of another attack on Barnes?"

"He's probably dead now," Sandy said. "I don't see why you couldn't find us. We were down only about twenty miles from Ma'an."

"We went northwest, over the Syrian Desert," Kestrel said. "That was the direction where you were last seen. We didn't worry about you until nearly sundown. Hassfurth thought he ought to stay here until he knew about Gleason."

"What about Gleason?" Sandy barked. "He's all right," Kestrel answered.

"He'll pull through in no time. He has a constitution like a horse."

"An Arab horse," Sandy said, and bounded to his feet. "Bill doesn't want you to send your men out. Shorty and I can get him. We'll take him fuel. Your men are apt to crack up their ships trying to sit down on the irregular sand hillocks."

"Nonsense!" Kestrel barked.

"If you want to do anything," Sandy said as he started toward the door, "take care of my horse!"

Three minutes later he made contact with Shorty by radiophone.

"Listen, Shorty," he said, "Bill is down about twenty miles from Ma'an. He was surrounded by desert Bedouins, armed to the teeth, when I captured a horse and managed to get to Ma'an."

"What's his position?" Shorty snapped.

Sandy gave it to him.

"All right, kid," Shorty said. "I'm going there now. You load some fuel into your Snorter and follow me. You say he'll have his landing lights showing?"

"That's right, Shorty. Be careful going in. Drop a flare. It's a tough place to land. You'd better go in a little away from him, because there are dead horses and men all around the Lancer."

"Right, kid. Hurry! I'm signing off."

With the help of a dozen grease monkeys, Sandy loaded enough fuel into the rear cockpit of his Snorter to bring the Lancer back.

He whipped the Snorter into the air



with a characteristic touch and stuck the nose almost due west. He picked up the landing lights of Bill's Lancer and Shorty's Stormer within a few minutes.

His heart was pounding so hard that he could hardly breathe as he dropped a flare and set his Snorter down within

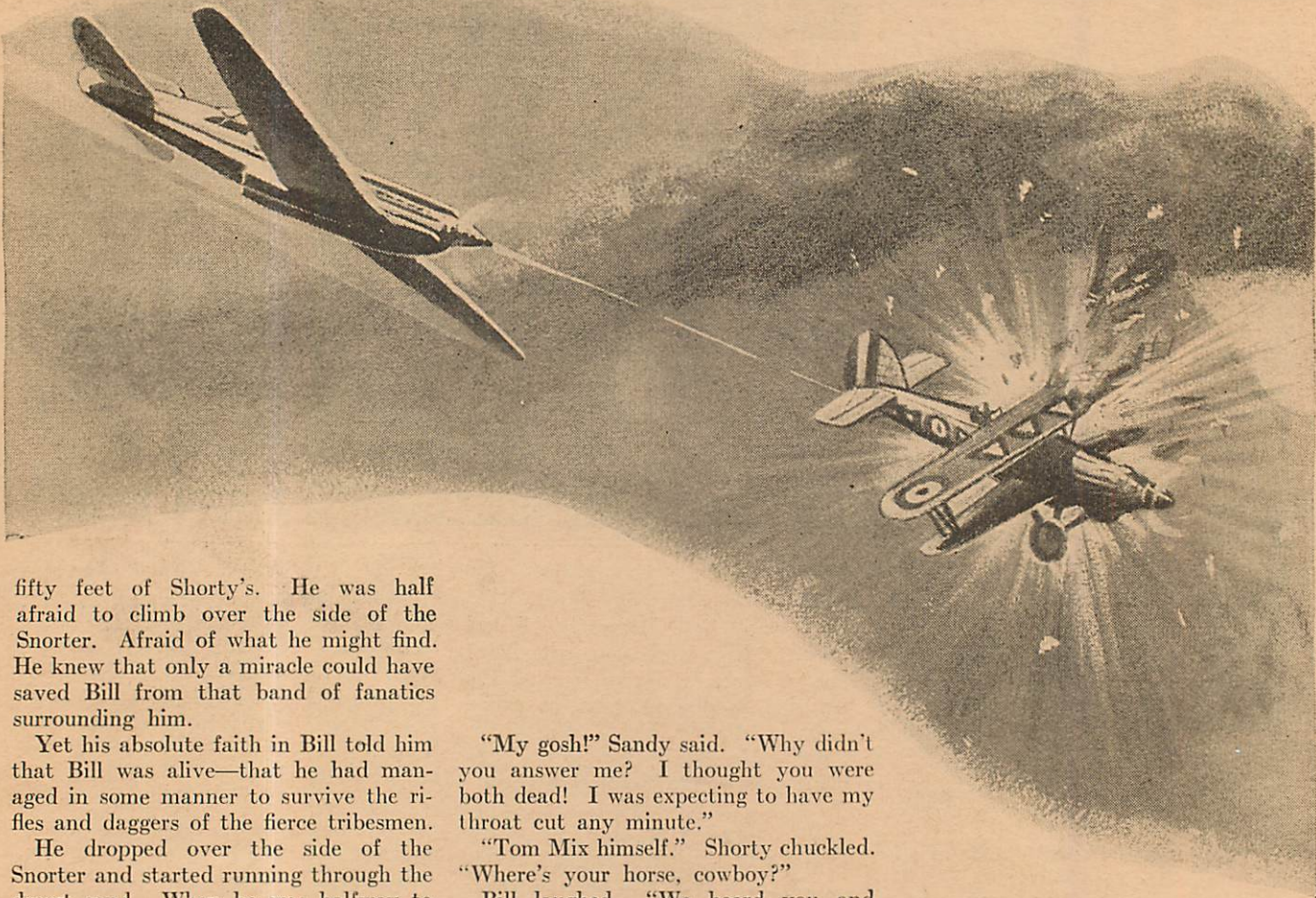
Lancer with pounding feet and heart. He swung up on a step of the Lancer and pulled himself up.

Shorty was bending over Bill, applying antiseptics to a half dozen minor wounds. Sandy's face blazed with anger as Shorty and Bill gazed up at him with the bland expressions of men who are used to such things.

brought him back here. We might have made him talk. I'm sorry I had to shoot down four of your stolen ships, Kestrel. But that leaves your enemy with only four. He can't get very far with them."

"You're wrong, Barnes," Kestrel said wearily. "Ten more of our ships were stolen from under our noses to-day. It must have been part of that group that attacked you."

Bill stared at Kestrel incredulously.



fifty feet of Shorty's. He was half afraid to climb over the side of the Snorter. Afraid of what he might find. He knew that only a miracle could have saved Bill from that band of fanatics surrounding him.

Yet his absolute faith in Bill told him that Bill was alive—that he had managed in some manner to survive the rifles and daggers of the fierce tribesmen.

He dropped over the side of the Snorter and started running through the desert sand. When he was halfway to the Lancer he came across the bodies of a dozen dead Bedouins. They were piled on the rim of a hillock where Bill's bullets had found them as they came over the top. When he could restrain himself no longer he shouted Shorty's name. Then again, and again.

His blood seemed to freeze in his body as no answering call came back to him—only the faint sighing of the desert winds and the swish of the sand beneath his feet.

He drew his automatic from an over-all pocket and slowed his pace. Had they got Shorty, too? Were they waiting for him? Cold chills crept up his spine and seemed to fasten around his heart.

Then the sound of faint voices came to his ears. He stopped and stood motionless. The voices came again, higher, clearer.

He recognized the voice of Bill Barnes.

He shouted again. And this time Bill's voice came back to him. Sandy covered that remaining space to the

"My gosh!" Sandy said. "Why didn't you answer me? I thought you were both dead! I was expecting to have my throat cut any minute."

"Tom Mix himself," Shorty chuckled. "Where's your horse, cowboy?"

Bill laughed. "We heard you and thought that you'd get over here all right," he said. "We didn't hear you shout."

"You're all right, Bill?"

"Just a few dagger scratches," Bill said. "They tried to get me again, and almost succeeded. I cracked a few heads and threw a tear bomb at them. It took the fight out of 'em. They went streaming back across the desert—what was left of 'em—to the place they came from."

## IX—A BIG PROBLEM

BILL BARNES could hardly hold his eyes open as he sat in Kestrel's quarters a half hour later.

"Gleason's all right, you say?" he asked.

"Quite," Kestrel answered. "McCardell says he has a splendid constitution. He'll be as good as new in no time."

"It's too bad I ran out of fuel," Bill said bitterly. "I could have picked up the man who bailed out of his ship and

"Ten more!" Bill gasped. "How could they do it? Who flew them?"

"Let me explain," Kestrel said, mopping his face with a shaking hand. "I understand now why Douglas was framed and then murdered. And why the attack was made on you. Douglas was one of the three flight commanders in the squadron whose planes have disappeared. The other two were named MacTavish and Sneed. They are the two scoundrels who have been working for the enemy inside our lines. They disappeared along with the captain I appointed in Douglas' place to-day."

Bill Barnes got to his feet and paced across the room. When he whirled, he addressed Shorty Hassfurther. "Do you get the set-up?" he asked.

Shorty stared at him for a moment, then slowly shook his head. "It's coming to me," he said.

"MacTavish and Sneed tried to get Douglas to work with them," Kestrel went on. "He wouldn't listen to them.



So they framed him as a common thief so he would be cashiered and out of the way, and another man put in his place who would work with them. They slipped in a bunch of renegade fliers; there are plenty of them out here in the East. They did it right under our very noses. They dressed them in British uniforms and waited for the right time to strike. Our enlisted mechanics took their orders from MacTavish and

"Don't you have some idea who is behind all this?" Bill asked. "Hasn't some native sheik or former ruler made trouble for you?"

"Plenty of them," Kestrel said. "The French have had the same trouble in Syria. The Arabs have been dreaming of one great Arab State for hundreds of years. An Arab State ruled by Arabs, without a mandate."

"But where," Bill asked with as much patience as he could muster, "are their headquarters? Where can they hide those planes right under your nose?"

"And just who disgraced and then murdered Douglas?" Shorty snapped.

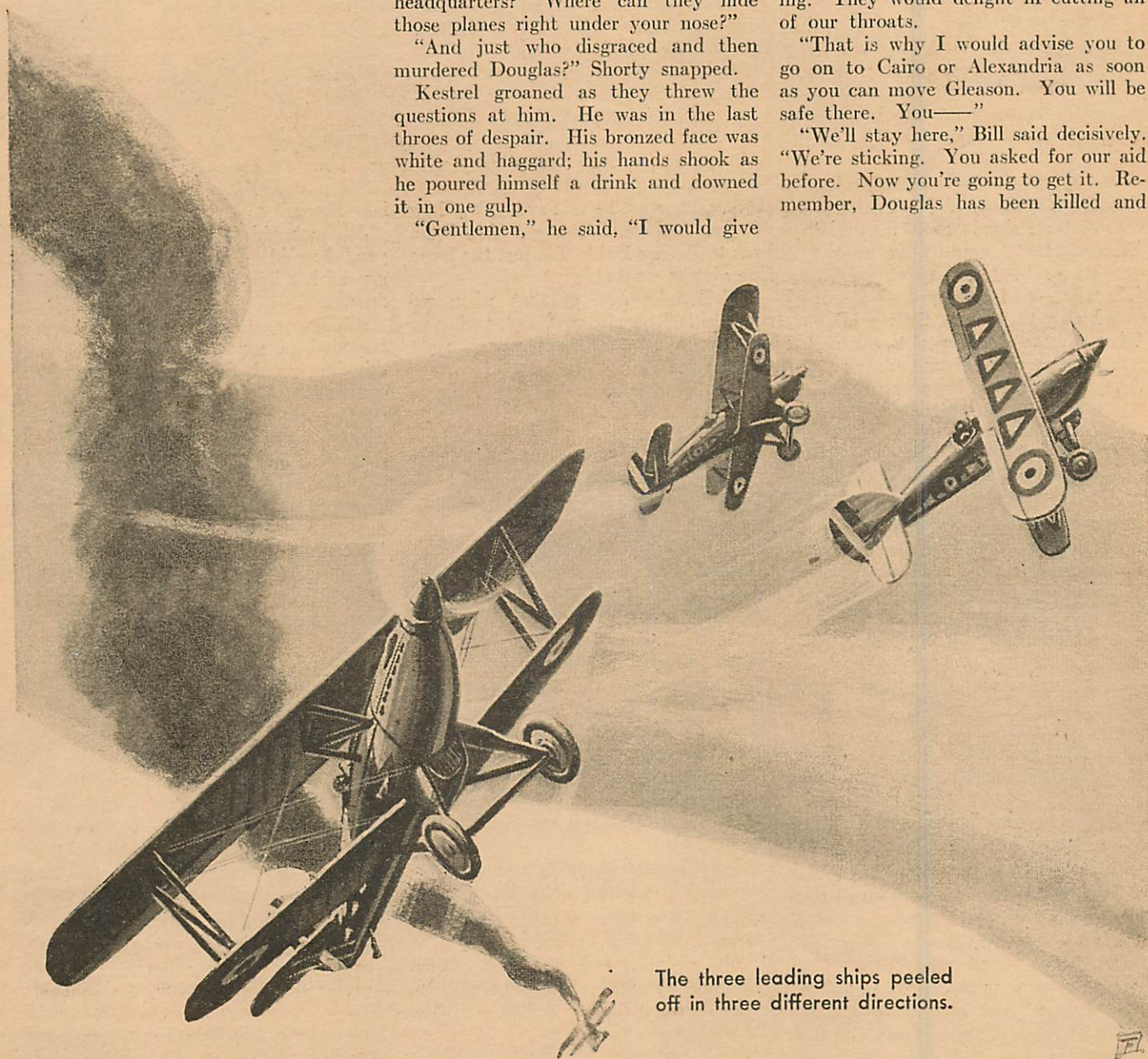
Kestrel groaned as they threw the questions at him. He was in the last throes of despair. His bronzed face was white and haggard; his hands shook as he poured himself a drink and downed it in one gulp.

"Gentlemen," he said, "I would give

units. They are ready to strike in unison when they receive the word. When they do, the slaughter will be frightful. "The desert tribesmen are mad fanatics when they go into action. They lose all control of themselves. Their only desire is to murder, torture, and plunder. They have always believed that the desert belongs to them. That is why they prey on caravans and pilgrimages to Mecca. They believe they are justified in murdering and plundering. They would delight in cutting all of our throats.

"That is why I would advise you to go on to Cairo or Alexandria as soon as you can move Gleason. You will be safe there. You—"

"We'll stay here," Bill said decisively. "We're sticking. You asked for our aid before. Now you're going to get it. Remember, Douglas has been killed and



The three leading ships peeled off in three different directions.

Sneed. They didn't know there was anything amiss until it was too late.

"Douglas must have found out something. That's why he stayed around here. They learned that he was getting on the right track. And—"

"They murdered him!" Shorty said bitterly.

"That's it!" Bill snapped. "But what about the squadron commander? Have you checked on him?"

"I'm doing that now," Kestrel said wearily.

my life to be able to answer those questions. And I've got to find the answer soon or Trans-Jordan is going to flow deep with human blood.

"Whoever is the leader of this rebellion is working with sagacity and craft. Usually different tribes of Arabs will not band together—not even against a common enemy. They prefer to go their own way, fighting their own battles. But now they are being cleverly welded together, if I can believe the reports that are coming to me from our intelligence

one of my men dangerously wounded. That's reason enough for me to see the thing through.

"But now," Bill went on, "I've got to have some sleep. I can't go on until I've had a few hours' rest. You'll let me know if anything develops with Gleason?"

"I'll let you know," Kestrel said.

Shorty followed Bill from the room.

SHORTY HASSFURTHER strode across the landing field at Ma'an shortly



after breakfast the next morning. His face was like a thundercloud.

Bill had told young Sandy to stand by where he could find him—and Sandy had disappeared. Shorty had an idea where he could find him, and why. He swung along a string of buildings at the edge of the field. These were the stables.

In a small corral between two of the buildings he came upon Sandy. He stopped abruptly as he heard a string of words coming from Sandy's lips, and his scowl changed to a grin. He saw that Sandy was talking to the horse he had ridden into Ma'an the night before, and he saw that he was deadly serious about it. He was making emphatic gestures as he recited poetry to the horse. Shorty stifled his laughter and listened.

—“Away! the fevered dream is o'er,  
I could not live a day, and know  
that we should meet no more!  
Who said that I would give thee up?  
Who said that thou wast sold?  
'Tis false—'tis false, my Arab steed!  
I fling them back their gold!  
Thus, thus, I leap upon thy back,  
and scour the distant plains!  
Away! Who overtakes us now shall  
claim thee for his pains!”

With the last words Sandy fastened his hand in the horse's mane and started to swing himself to its back. But Sandy's movements were too quick. They frightened the horse and he went shooting to one side and came down with his legs stiff. At the same instant Sandy went shooting in the other direction and came down on the back of his neck.

Shorty could restrain his laughter no longer. He threw back his head and howled with glee.

“You gave him too much juice when you tried to get off the ground, kid,” he shouted. “You want to be careful or you'll rip out your undercarriage.”

Sandy rolled over on his stomach and looked at the horse, then at Shorty. His face was red and his eyes were spitting fire.

“You hit him with something,” he said to Shorty.

“I didn't hit him with anything,” Shorty denied. “He just doesn't recognize you. You aren't wearing one of those head cloths and mantle.” Shorty's face was grave now. “You've got to dress like an Arab if you expect to ride Arabian horses,” he went on. “They're funny that way. I read an article about it once. They won't let any one ride them if he doesn't wear a head cloth.”

Sandy studied Shorty's face suspiciously as he climbed to his feet. “You sure about that, Shorty?” he asked.

“Absolutely, kid,” Shorty said solemnly. “You want to get one of those gay headdresses and a silk cloak with a leather girdle around it, and a dagger

in the belt. Then your horse will eat out of your hand.”

“I wonder,” Sandy said, “where a fellow could buy them?”

“Oh, almost any place,” Shorty answered. “But right now Bill wants you. We're going over to Douglas' rooms to take a look around, and he wants you along.”

“O. K., Shorty. I'll be right over. I can get the cloak and head cloth when we get back.”

“Yeah. But don't forget it,” Shorty said earnestly. “You can't expect to ride one these horses without 'em.”

Sandy looked at Shorty out of the corners of his eyes again. He was almost sure that Shorty wasn't kidding him. But he wasn't positive. He had had too many such experiences with Shorty in the past to be certain.

“Say, Shorty,” he said suddenly, “how do you suppose I can get this horse back to Barnes Field? It's just the horse I've always wanted.”

“We'll take care of that when we come to it,” Shorty answered, trying to suppress a grin. “Don't worry, we'll find a way.”

#### X—JEZZAR

BILL, Shorty, Sandy and Wing Commander Kestrel spent an hour going over the things in Douglas' room, trying to find some clue to the secret that had been in Douglas' possession.

While they were there, messengers came constantly with dispatches and reports for Kestrel. With each one his expression became more glum and desperate. Finally he blew up.

“I can't see that this is getting us any place. While we poke around here the natives are getting ready to fall on our necks,” he said.

“Sandy and I will look around here a bit longer,” Bill said. “Shorty, you go back with Kestrel and see how Red is coming along.”

Kestrel hesitated, but in a moment he took his leave, followed by Shorty.

When they were gone, Bill turned to Sandy. “Douglas' servant has been hanging around trying to tell me something with his eyes. He was afraid of Kestrel. He's outside the door, I think. Call him in.”

Sandy went out the door and came back in a few minutes with a man who was both frightened and inarticulate. Bill spoke to him both kindly and sternly. The man shook his head and began to jabber in Arabic.

“Take it easy,” Bill said. “Can you speak any English?”

“Few words,” the servant answered. “You want to tell us something?” Bill asked slowly, enunciating each word carefully.

“Me,” the man said, “servant.” He crossed the room and pointed to a picture of Douglas. “Name, Jezzar.”

“Jezzar,” Bill said, smiling. He studied the man's face and tried to gain his confidence by his expression. “You tell me?”

“I know,” Jezzar said, and burst into Arabic, his nervous, slender hands fluttering before his face, his eyes shifting about the room.

Bill held up a hand. “Take it easy,” he said. “Tell me in English.”

“To-night,” Jezzar said. “I take you. Petra. Es Siq, when—” He made motions with his hands.

“He means when the moon is up!” Sandy said brightly.

“At dark?” Bill asked.

“Dark. Es Siq,” Jezzar said. “Ride horse?”

“Tell him,” Sandy said, “we can ride any horse in Arabia.”

“Shut up!” Bill said to him. “Douglas—Petra?”

Jezzar nodded his head. “I show you,” he said. Then he touched his finger to his lips and glided toward the door.

Bill Barnes stood without speaking for a period of several minutes. He was thinking about the slaughter that had occurred in Es Siq a few nights before. He was wondering if the man was to be trusted. At least, they would have to gamble to find out. He counted on the fact that there had been genuine distress and sorrow in the man's eyes when he had pointed to the picture of his dead master.

“All right, kid,” Bill said to Sandy. “That's your job—get me a horse to ride. We'll meet him in Es Siq at dusk.”

“What,” Sandy asked, “do you suppose he is going to show us?”

“Your guess is as good as mine,” Bill answered.

THE DARK, narrow gorge of the Wadi Musa was as silent as a tomb when Bill and Sandy rode into it at dusk that night. The only light that came to them on the dangerous path was a streak of silver moonlight far overhead.

“This,” Bill said, “would be a swell place for an ambush.”

“It's spooky, Bill,” Sandy answered. “It is filled with the ghosts of dead men.”

They both felt their hearts crawl up into their mouths as a white figure on a white horse loomed up in the darkness ahead. Bill's automatic leaped into his hand as he called out softly, “Who is there?”

“Jezzar,” came back to them as softly. “Follow.”

He swung his horse around and led them deeper and deeper into the black chasm.

“Have gun ready,” he said once, dropping back beside them.

The soft sighing of the night wind, heavy with the scent of oleanders, the



creaking of their saddles and the scrunch of their horses' feet on the pebbles of the trail, were the only sounds to break the heavy silence.

As they came out of the mouth of Es Siq, a clearing spread out before them and their first glimpse of El Khazna, in the moonlight, was as unreal as the figment of a dream.

The nine figures carved into the front of the upper story of the temple to an unknown god took on fantastic shapes in the shadows—shapes that seemed menacing and fearful in the absolute silence of the night.

Sandy's breath whistled in his throat as he realized that the slithering shadows that crept along the face were not shadows. They were lizards, iguanas and snakes.

Jezzar, riding on ahead of them, called upon Allah to uphold his horse as it stumbled, then broke into a soft song. To the south a mountain rose out of the valley floor to the great high place of sacrifice.

The dim outline of the Roman amphitheater took shape as they passed out of the Outer Siq, and beyond the ruins of the Palace of the Maiden, grotesque in the moonlight.

To the west rose the dim shape of Jebel ed Der, the Mountain of the Monastery. To the north the top of Jebel Harun, where lights flickered around the tomb of Aaron, the Moslem shrine holding the sacred Dushara.

As Jezzar dropped back beside them once more, he touched his lips with his fingers and ran them across his throat; they knew only too well what he was trying to convey to them. He pointed to the mosque where lights burned, and waved his hand from left to right to signify that there were thousands of men on the mountains around Petra.

Farther on they entered the gorge of Es Siyagh and crept along the base of El Habis, the unfinished tombs of the ancient Edomites. Dark splotches on its sides were sepulchers, and on the top, gleaming dark in the moonlight, were the ruins of a castle.

Beyond El Habis loomed Umm el Biyara, dark and silent and menacing. As Jezzar brought his horse to a halt and pointed a finger toward the ancient stronghold, Sandy's horse came up on its haunches, then plunged toward the great wall of stone that was the base of Umm el Biyara.

"Whoa, you fool!" Sandy shouted as he tried to swing his mount around. But for the moment the horse had the bit between his teeth and showed no inclination to turn around. Then, as the bit cut into its tender mouth it came up on its haunches again and whirled.

As its front feet touched the ground, Sandy described an arc over its head. He struck the ground feet first, and managed to hang on to the reins.

That somersault over the horse's head was all that kept Sandy from being annihilated by that first blast of rifle fire from along the base of Umm el Biyara. The bullets tore over his head and came to a stop in the body of Jezzar, just behind him. One strangling cry came from the lips of Douglas' old servant. Then he rocked backward and rolled off his horse like a bag of meal being dropped from a wagon.

Sharp stabs of orange flame appeared from a dozen places along the base of the ancient stronghold as Bill came charging in on his horse and grabbed at Sandy's reins.

"Mount, kid!" he shouted. "They got Jezzar. He was dead before he hit the ground."

"Hold him, Bill," Sandy panted. He circled to the left of the plunging horse and got one foot in a stirrup. As Bill let go of the reins and emptied his automatic toward the stabs of orange flame, Sandy managed to swing into the saddle.

"Come on!" Bill shouted. "We've got to get out of here the best way we can. I memorized the map Kestrel gave me. We'll follow through the ruins of Petra along the ancient wall to the Outer Siq. I can see white forms coming out of the darkness over there. They'll get us in a few minutes. Are you all right?"

"I'm all right, Bill," Sandy puffed, "if I can make this fool horse behave. He wants to go toward that gunfire."

Bill swung his horse over beside Sandy and grabbed at his reins.

"I thought you could ride any horse in Arabia," Bill grunted as he rode through the ruins, leading Sandy's horse.

"He went nuts, Bill," Sandy said. "I can manage him now. I'll follow right behind you. We'll make better time."

"We'll have to," Bill growled. "If they can signal ahead they'll cut us off in Es Siq and we won't have a chance. We've got to keep ahead of them."

The sharply turning trail that wound between the sandstone walls of Es Siq was the thing that kept them from being slaughtered by the hard-riding Arabs behind them. Their escape became a running fight that lasted throughout that long mile from the ruins of the city to Bab es Siq.

There they reloaded their automatics, took a prone position behind the crumbling gates and fired at random as they heard their pursuers drawing close. In another thirty seconds they were again in their saddles and racing across the desert sand toward the airport at Ma'an.

"Did you have any idea where Jezzar was taking us?" Sandy asked as they swung out of their saddles before the officers' quarters on the airport.

"None," Bill said shortly. "He was about to tell us something when they opened up with their rifle fire. The natives probably have guards all through the city to protect the Dushara. They

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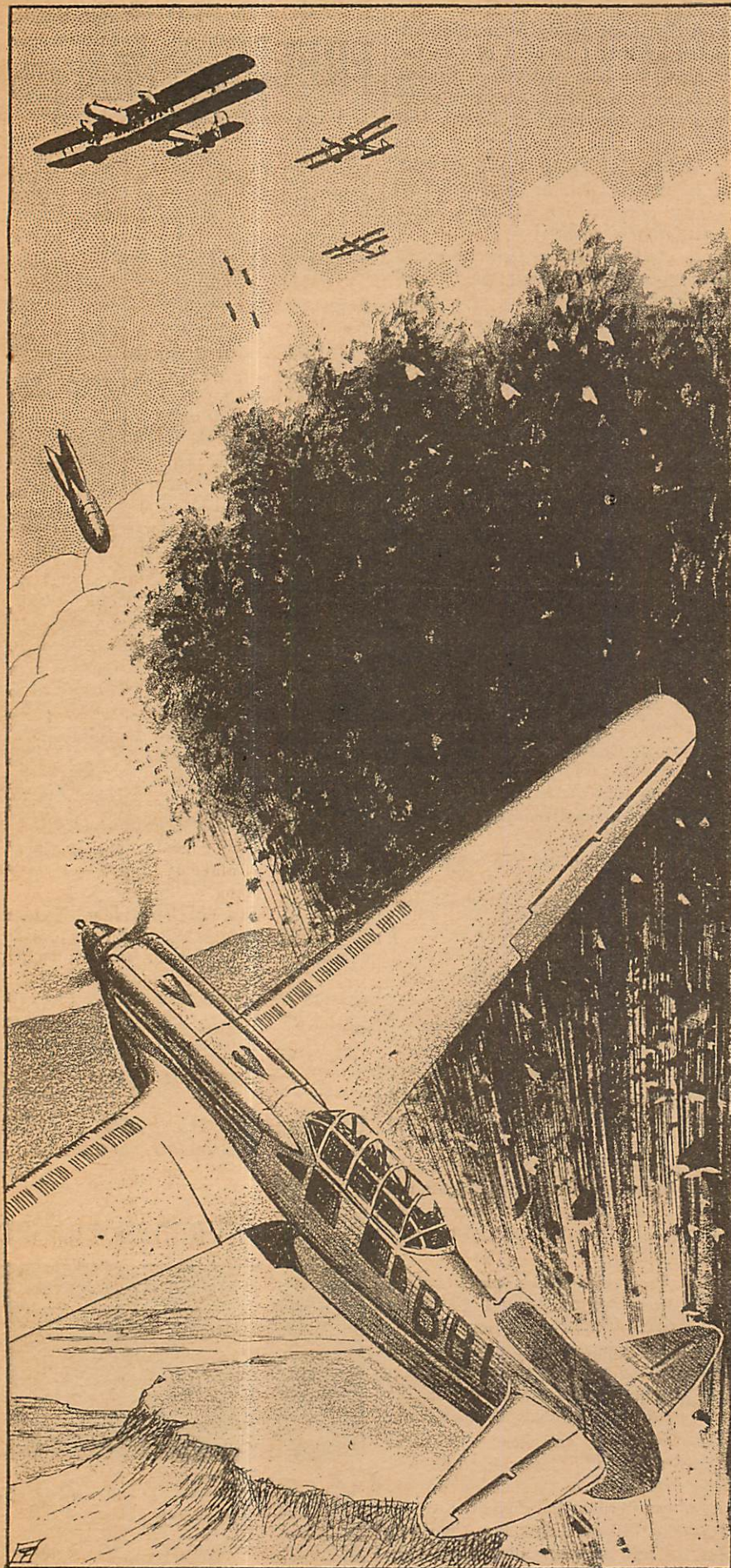


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As Bill spiraled upward, the whole world seemed to explode.

shoot first and ask questions afterward."

"You know, Bill," Sandy said cryptically. "I have a hunch. I——"

"Get yourself some sleep," Bill said gruffly. "That's what you need most. I'll have to make a report to Kestrel."

"But listen, Bill!" Sandy said. "I think——"

"Good night," Bill said, and started toward his quarters.

## XI—SANDY'S HUNCH

IT WAS shortly after dawn the next morning when Sandy stole over to the stables and asked a native groom to saddle his horse.

A few minutes later he was in the saddle and leaning over the neck of his mount, whispering in its ears the way he had seen Western riders do in the movies.

"We'll show 'em, old pal," Sandy said in the horse's ear. "We'll teach 'em to pay some attention to our hunches."

The white horse turned its head and eyed Sandy with anything but a friendly look, and Sandy remembered what Shorty had told him. He had forgotten to wear a head cloth and mantle. And he could see that his horse didn't like it.

"I'll remember before we come out again," Sandy told him as they made their way over that boulder-strewn waste of sand between Ma'an and Bab es Siq.

The sun was playing a symphony on the red walls of Es Siq as Sandy guided the dainty-stepping steed through the winding pass. As Es Siq ended abruptly into a cross gorge that was the Outer Siq, the face of El Khazna gleamed like white marble ahead.

As they stole past the old Roman theater, Sandy checked the ammunition in his automatics and in his extra clips. His heart was pounding now, and he could feel his face burning with excitement.

Taking a westerly course along what was once the main avenue, he passed the remains of a triple triumphal arch from the Roman period. Along the sides of the city were the ruins of hundreds of temples cut into the sides of the stupendous cliffs; its courts, libation basins, and altars where the ancients worshiped all carved from rocks of ocher and all shades of red.

Sandy gazed with silent awe at the crumbling tombs, temples and palaces built on the towering limestone hills above the city. Then his breath quickened as he sighted the ruins of the Crusader castle atop El Habis, and behind it the great flat rock that was Umm el Biyara.

He guided his horse to the place where he believed Jezzard had been murdered the night before. But there was no sign of his body or his horse.

It was there that Sandy let the reins fall loosely on the Arab horse's neck.



The horse raised its head and peered toward the great mountain of stone, then whinnied softly and moved toward it without guidance.

"That's the old pal," Sandy whispered. But he didn't touch the reins. He let the horse have its head and almost held his breath as the horse advanced.

Picking its way carefully and surely, the horse cut around a rough ledge of overhanging rock, went down the side of a ravine and up the other side. At the top it entered what looked like a stone doorway, barely high enough to admit the horse and Sandy on its back.

In a moment the horse came out on a narrow pathway, wide enough to pass along, clinging to the inside. As they came out into the air again Sandy's red face suddenly became white. He saw that they were already fifty or sixty feet above the jagged rocks at the base of the stone mountain. There was not room for the horse to turn around on the rock-cut *couloir*. If its feet slipped they would both be plunged to their death on the rocks below.

If they went on, Sandy believed, the horse would take him to the secret stronghold of the men who had attacked them in the air and on the ground two days before.

For an instant Sandy hesitated. He checked his horse until he came to a halt. Then he clenched his teeth, took one of his automatics out of its holster and said aloud, "All right, baby. Let's go!"

BILL BARNES tried to blink the sleep out of his eyes as he slapped his bare feet down on the floor of his room. He stared at Shorty Hassfurther and saw that he was dressed for flying.

"Say that again," he said to Shorty.

"One of the grooms at the stables told me Sandy had his Arabian steed, as he calls him, saddled at dawn. He left here alone, headed for Petra."

"The nit-wit!" Bill growled as he reached for his clothes. "He tried to tell me last night when he got back about a hunch. I wouldn't listen. He's going to play it alone."

"What is he going to do?" Shorty asked.

"I wish I knew," Bill snapped. "Listen, Shorty. Get the Lancer and your Stormer warmed up. We'll have to go out and look for him if he hasn't had his throat cut already."

"There's hell popping this morning," Shorty said. "I just talked to Kestrel. Rioting in several cities in Trans-Jordan and Palestine. It's only a question of time, he says."

"Yeah," Bill growled, "and that fool kid has to go out and stick his head right into the noose. I think I know what he had in mind. We'll fly over Petra first. Come on, let's go!"

"I'll have the Lancer ready when

you're dressed," Shorty said as he jumped for the door.

"Check the ammunition counters!" Bill shouted after him.

Twenty minutes later they were above the jagged, dazzlingly colorful twin ranges between which the city of Petra lies. They sped down the length of Es Siq at an altitude of only a few hundred feet. Above the Wadi es Siyagh they darted through wisps of clouds until they were near the peak of Jebel Harun. They circled the white dome of the tomb of Aaron and felt rifle bullets drumming into their wings.

As they swung back over the valley of Petra, Bill flipped his radio switch. "Get down a couple of hundred feet," he said to Shorty. "We'll see him now if we're ever going to see him."

He kicked the rudders of the Lancer and stuck the nose down as the flat top of Umm el Biyara took shape to his right. He flew only a hundred feet above it while he studied every detail.

Suddenly his hand tightened on the control column and his face became a shade whiter. Below him he saw a lone figure riding on a white horse. He knew it was Sandy. He shouted into his microphone to Shorty and pointed as a swarm of brown-faced men dressed in the gaudy mantle of the desert Bedouin appeared from nowhere above Sandy.

For one horrible moment Bill saw Sandy's horse rear up and swing its front feet toward the edge of the narrow little path it had been climbing. Then one of the mantle-clad Arabs had it by the bridle. He saw Sandy try to bring his automatic into play while he tried to gain control of the horse. Then he saw the barrel of a rifle crack down on Sandy's head and saw him topple from the saddle.

Bill brought the Lancer around and stuck the nose down toward that little knot of men as they carried the unconscious Sandy toward the mouth of a cave. But he didn't dare clamp down on his gun trips. He cursed between clenched teeth as he zoomed upward and saw the Arabs disappear. He tried to find the path Sandy's horse had been climbing, but it had disappeared. Without some moving object on which the eye could focus the path could not be seen.

Bill knew now that he had been right about Sandy's hunch. Sandy had taken his horse back to the spot where it had balked the night before, when it had tried to go toward the base of Umm el Biyara. The horse had led Sandy to the secret entrance to the top of Umm el Biyara.

But where, Bill asked himself, were the people who were inhabiting the ancient stronghold? How could they hide themselves so completely from sight?

He became aware of Shorty's excited voice in his ear. He said, "I didn't get

what you said, Shorty. I'm trying to figure how we can get in there to get Sandy out."

"That is where those stolen ships are being concealed," Shorty said. "They must have a hangar under the surface with a camouflaged top that makes it look like the regular terrain. It's the only place for them to be. They could land those little fighters on the top."

"You're right, fella!" Bill yelled. "Douglas must have learned about it or suspected it, and they killed him to keep their secret until they are ready to strike."

"Kestrel says they're ready now, Bill," Shorty said quickly.

But Bill wasn't listening to him. He was talking to the radio man on the field at Ma'an.

"I've given the word to Kestrel," Bill said in a moment. "He'll send bombers to help us bomb them out. But we've got to get Sandy out of there before they begin to blow it apart. I'm going to sit the Lancer down on top of the place if I can make it. I think I can. What do you say, fella? Are you coming in after me? It's not an order. Use your own judgment."

"I'll be on your tail, Bill," Shorty answered. "Perhaps you'd better drop a couple of bombs yourself to soften 'em up."

"Let's go!" Bill roared.

He kicked the Lancer around and stuck the nose down as he unfolded his retractable landing gear. He set his flaps well down and cut his engines, but he was still doing a hundred miles an hour as he skimmed the surface of the great flat rock with his landing wheels. At the far end, when it seemed that nothing in the world could keep him from plunging over the side, he kicked his rudders and swung the big ship around.

Shorty fish-tailed in a few feet behind him and brought the slower-landing Snorter to an abrupt halt.

"Sit tight for a moment until we see what happens," Bill said into his microphone.

They didn't have long to wait. The whole top of the stone plateau suddenly swarmed with men. They popped up along one edge and came storming up like a regiment of Sikhs going over the top, their robes streaming out behind them, their faces contorted with hate.

"Swing your ship around and let 'em have it!" Bill shouted into the microphone. At the same time he fastened his fingers down on his own 50-caliber guns. His two fixed guns stuttered out their song of death, to be joined a moment later by the louder roar of his cannon.

But his guns were set too high. His bullets ripped harmlessly over the heads of the charging mob of madmen.

"Bill!" Shorty's voice called in his ear



phones. "They're bringing up one-inch rapid-fire and machine guns. They'll tear us to pieces!"

"O. K., guy," Bill said, and now his voice was calm and steady. "Give your ship the gun. Take a run the length of the top and then give her all she's got when you strike the edge. It's our only chance. We'll have to bomb them out."

How Bill and Shorty ever got through that frightful hail of lead no one will ever know. The charging tribesmen broke before the scream of their propellers and the roar of their engines as Bill and Shorty headed their ships into their midst. But when they broke they dropped to their knees and emptied their rifles into the fleeing ships. From the edge of the plateau came the death rattle of a dozen machine guns and the louder bark of one-inch rifles.

The speed of their ships was the only thing that kept Bill and Shorty from being annihilated before they reached the edge of the plateau. They could feel bullets drumming into the skin of their ships and could feel them trembling like mortally stricken animals under the impact.

But they made the edge, with a prayer on their lips that when they went over the edge their motors would be functioning.

For one awful second the two ships sagged, then the noses settled, the tails lifted, and they began to climb.

"Are you O. K., fella?" Bill asked Shorty.

"O. K., Bill," Shorty answered, "but my ship is a sieve."

"Get some altitude," Bill instructed.

"What about Sandy?" Shorty asked.

"We'll get him," Bill said grimly. "If they hurt that kid I'll—" He stopped. His bronzed face was white and strained as he gazed over the side of the Lancer. As his eyes fastened on the top of Umm el Biyara he gasped.

A dozen of those fast single-seaters belonging to the Royal Air Force were standing in a line on the far end of Umm el Biyara. Their props were turning over, and they were facing into the wind. Men were climbing over the sides into the cockpits.

"They're coming after us, Shorty," Bill said, and there was a ring of real anticipation in his voice.

"Good!" Shorty said. He leaned over the side of the Snorter as the first of the little ships whipped into the air, followed by another and another.

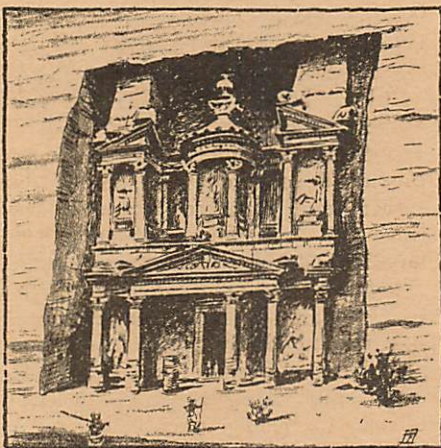
"Stay up where you are," Bill instructed. "Kestrel will send some bombers. He can break up this uprising before it gets really started."

Bill whirled the master tuning control on his radio panel and chanted the call letters of the Ma'an airport into his microphone again. Suddenly he was aware that Shorty was flying in close to him,

trying to signal with his arms and plane because his radio wave length had been tuned out. Bill twirled the wave-length control and barked Shorty's name.

"Look down below, Bill!" Shorty gasped. "They have Sandy spread-eagled out on the top of Umm el Biyara. They must have tuned in our wave length and heard you say you were going to send for bombers. That's their answer."

Bill's heart climbed up into his mouth as he grabbed at a pair of glasses and turned them on the figure stretched out



El Khazna, the rock-hewn temple.

on the ground five thousand feet below. He turned the glasses directly on Sandy's tortured face. Then he took them away as his stomach turned over from horror.

In that one glimpse he had seen that Sandy's face and head were battered and bloody. His arms and legs were spread out and pegged to the ground. His face was a twisted blotch of agony.

Cold perspiration popped out on Bill's face and his hand gripped the control column so tightly it seemed he might rip it from its socket.

"All right, Shorty," he said, trying to keep his voice steady. "Those twelve single-seaters are above us now. They're in four V formations of three planes each. They're swinging back to attack. Remember what they did to Douglas!"

"I'll remember!" Shorty snarled. "We've got to get to Sandy, Bill!"

"We'll get him!" Bill said, so quietly Shorty could hardly hear the words.

## XII—ATTACK

AS the twelve British ships completed their turn they broke the four V formations and formed two stepped-up columns of six planes in a line, each a little above and behind the one in front.

Bill saw the leader rock his wings and knew the instant they were going to dive. He spoke into his microphone softly.

"The column on the left is yours," he said to Shorty. "When they're five hundred feet away, dive under 'em and

then chandelle back to get on their tails. Give 'em hell, fella!"

"Give 'em hell!" Shorty echoed. "One for Douglas, one for Red, and one for Sandy!"

Bill eased the control column back and sent the Lancer up into an abrupt climbing turn until it almost stalled; then he whipped the nose level and down again. For an instant he pushed his throttles all the way open. A gale whined and snarled over the cantilever wings and streamlined body of the Lancer as the silver plane plunged toward the stepped-up column of single-seaters below it.

Bill's fingers clamped down on his gun trips when he was only two hundred feet above and behind that straight column. His bullets tore into the last ship as it came under his telescopic sight. They drew a pencil line down the center of the fuselage until they reached the open cockpit. There they drove into the head of the man whose hand was wrapped around the controls.

He died before he knew what manner of thing had hit him. His ship skidded off to the left and stuck its nose downward. It dived into the earth with its wings folded back, like a gannet diving for a fish.

The next man in line threw one desperate look back over his shoulder and sideslipped his ship out of the way of Bill's deadly fire.

Bill caught the third one from the rear with his .37-mm cannon as he started a barrel roll. A great cloud of black smoke and orange flame took the place of the one-seater as the shells detonated on the engine block. Débris flew in a hundred different directions. There was no indication that a man had been at the controls as the smoke cleared away. He had become a part of the scattered débris.

The three leading ships in the column peeled off in three different directions. Bill saw one of the biplanes whirling toward the earth like a falling leaf as Shorty riddled it with bullets. Then he zoomed the Lancer up underneath one of the three ships that had broken formation.

For a split fraction of a second the lean fuselage came under his sights. His fingers clamped down on the triggers in the stick. His powerful .50-caliber bullets ripped the bottom out of the rugged little fighter. The pilot shot up in his seat as the bullets drove through his body. His arms sprawled over the cowl as the doomed ship fell into a spin.

"They asked for it!" Bill said to himself viciously. There was no mercy in his heart now. He knew these men had murder in their hearts. They had tried to live by violence, and they must die by violence.

He saw that the five remaining planes



of the column Shorty had singled out were forming a Lufberry circle around him. They were trying to tighten it up to get Shorty within the vortex of their concentrated fire. He smiled grimly as he saw Shorty whip his Snorter directly into the guns of one of them. But Shorty's bullets were writing death across the face of the enemy pilot before he could clamp down on his triggers. The plane fluttered out of the fight toward the earth below.

Bill kicked the Lancer around and picked off another of the four ships circling Shorty. He saw Shorty's hand come over his head with his thumbs sticking up.

Within a space of three minutes' time they had shot six of the one-seaters out of the air. The other six were forming in two V formations of three each now. The leader was giving orders with tail wags and hand signals. They were spiraling up, seeming reluctant to return to the attack.

For an instant Bill studied the leader while he flipped his radio key. Then his gaze whipped toward the direction of Ma'an as the drone of twin-motored bombers came to his ears.

His face froze as he saw a route column of six giant bombers speeding toward him. Above the bombers was a squadron of eighteen British planes, identical to the ships he and Shorty had been fighting.

"Shorty!" he screamed into his microphone. "I'm going to land on Umm el Biyara again. You'll have to clear the way for me. Those bombers will go to work on the place. They don't know Sandy is spread-eagled out on the top. Attack those machine guns and ground guns while I land and get him!"

"You'll never get down, Bill!" Shorty shouted. "You can't use your guns. They'll tear you apart!"

"You'll have to hold them off," Bill said. "Rake the south side with your

guns. Get down to fifty feet. It's our only chance. Here I go! Get on my tail!"

Bill sat the Lancer down on the top of Umm el Biyara again in the face of that deadly concentrated fire. But it did not last for long.

Flying almost in the mouth of the machine guns on the ground, Shorty tore their crews to ribbons. Dead men piled up at the mouths of the entrances to the underground caverns. He stilled every gun while Bill brought his ship around and rolled across the plateau toward Sandy.

Then he was over the side in two jumps, tearing at the pegs that held the helpless Sandy.

"You all right, kid?" he asked, his breath coming in quick gasps.

"Just a little dented around the edges, Bill," Sandy managed to grin. "They—they—" His eyes closed as his head lolled back, and Bill knew that he had fainted.

Bill struggled desperately as he saw the big bombers nosing down to drop their horrible eggs. Then he had Sandy over his shoulder. He struggled up the side of the Lancer and dropped Sandy in the rear cockpit.

Half the world exploded beyond the far rim of Umm el Biyara as he gave the engines of the Lancer the gun. He raced the powerful ship across the plateau and dived it off the edge. For one horrible moment he could not bring the nose up. Down and down they plunged. Then his controls caught and he eased the stick back.

As he spiraled upward the whole world seemed to explode. The top of Umm el Biyara became a shambles as the six bombers, in route column, laid their eggs.

Bill leveled off at five thousand feet with Shorty beside him. Far off to the west he saw the eighteen British planes

in pursuit of the six enemy ships. He locked his controls and spoke to Shorty.

"Sandy's out cold," he said.

"Is he badly hurt, Bill?" Shorty asked, his words clipped and anxious.

"He'll do," Bill said. "I'm going to sit down on the airport at Ma'an. Our job is finished."

THAT same evening, Wing Commander Kestrel, Bill Barnes, Shorty and Sandy sat in Kestrel's quarters. Away to the east the desert wind was moaning again. Now and again a camel bellowed a protest at the desert night.

"You've helped break the back of the revolt at the very beginning," Kestrel said. "Serj el Said, the Arab leader, is dead. Four of our men paid the cost for treason, Hector by his own hand. The bribe offered them must have been high. It is hard to admit—but true—that a few scattered men in any country may become traitors. Most of the civilian fliers working for Serj el Said are dead. If we could only bring poor Douglas back I would be satisfied."

They sat silent for a moment, listening to the soft sighing of the wind.

"If there is anything, any way I can show my gratitude to you, Barnes, anything I can do for you, I—"

"Listen," Sandy broke in, trying to grin through his bandages. "There is something you can do for me!"

"Name it, Sandy," Kestrel said.

"Get me an Arabian horse and ship it to Barnes Field," Sandy said eagerly. "You killed mine when you bombed Umm el Biyara."

"That's an order," Kestrel said, "that will be carried out."

"What in the world," Bill asked, "will you do with a horse?"

"Do with him?" Sandy said. "What do you think I'll do with him? I'm going to use him to realize one of the ambitions of my life. I'm going to win the Kentucky Derby!"

## THE DARE-DEVIL COMPLEX

(Continued from page 20)

youngsters get wings and also warnings against the first year of freedom. The danger period, they are urged to remember, is between 200 and 500 hours. Yet those graduates, or at least a large percentage of them, invariably go right out and begin hedge-hopping and looping off the ground, and thrilling the home folks, and doing all the other things that are such a lot of fun. Young civilian pilots do the same thing, as witness the fatal accident figures on illegal acrobatics and low flying.

The lucky among the young pilots are sobered a bit every time an acquaintance kills himself. In the army, especially, where one knows hundreds of pilots, the

young pilot has the queer experience of hearing that Ed and Jack and Joe have killed themselves doing things that he himself has been getting by with. Gradually he adds to the list of pranks he will no longer pull, and thus he and other lucky ones eventually become wiser and older pilots, and usually live on and on.

What has happened, of course, is that these maturing pilots have become sufficiently impressed with the necessity of discipline to discipline themselves. They have learned, in what might be called a "school of hard shocks," that the hedge-hopping pilot is never as safe as he feels.

The only substitute for this costly seasoning of pilots is iron discipline imposed from above. The high safety of flying-school operations is an example of the effect of iron discipline. The remarkable record of the First Provisional Air Division maneuvers in 1931, when 600 planes flew three million or more miles, and most of it in close formation, without a serious accident, is another example. I happened to have been one of the pilots on that occasion, and I can testify that the air discipline was rigid. The safety records of the air lines, every one knows, are due largely to rigid air discipline, systematically maintained.

But in ordinary individual and pri-



vate flying, of which there will be more and more, the problem is squarely up to the pilot.

He must learn that his moods and judgment from moment to moment are not always reliable. For instance, in instrument flying the pilot is taught that he must exercise his intellect and follow the instruments, even though this violates the dictates of his "feel." He is taught that his "feel" is distorted and rendered false by unusual physical forces operating on the balance mechanism in the inner ear.

A pilot should also be taught that in an airplane his "feel," or sensitiveness, to risk is being distorted and rendered false by unusual and subtle psychological forces operating on the discretionary mechanism of the mind. When a young pilot gets bored at 2,000 feet and feels it would be such a little thing to roll or loop, even though he has no parachute—when he begins to feel so superior to danger that he just *knows* he

could get by with a little exciting "contour flying"—he should be forearmed with a knowledge that those feelings are like those false and fatal promptings he makes himself violate under the blind-flying hood. A young pilot in an airplane is always hearing the sweet voices of the Sirens luring him deceptively to destruction.

Flying instructors should repeatedly pound warnings into their students' heads. Young pilots (no matter what their age in years) should be kept constantly aware of how the dare-devil complex will inevitably come. It is a part of the normal human reaction to the experience of flying.

With the return of prosperity and the arrival of the mass-production airplane, there are going to be a lot more inexperienced pilots than experienced ones, at least for a while. And the time will most certainly come when thousands of high-school boys (and girls, too) will learn to fly as a matter of

course. If a lot of them are not to be killed, they must be impressed with this simple fact: airplanes may get safer, but the foolproof airplane will never be built. Technical genius may make engines so dependable and planes so stable that rusty and amateurish pilots will no longer flop in with dead motors from 200 feet or crack up while landing. But pilots will always be able to fly them into power lines, or jerk the wings off on trees.

As long as airplanes leave the ground and human nature remains what it is, the major battle against flying danger will increasingly be fought in the human mind. Pilots must watch for danger in themselves. Rigid self-discipline and constant alertness against the dare-devil complex is the price of future air safety. Veterans know from sad experience that this is true. The flying student of the present and future must be effectively taught its truth, or suffer the consequences.

## HEADLINES

(Continued from page 32)

the girl struggling to get back to the canoe. She went under once. So I flew over to a float along the shore and almost skimmed the water. When I got near the float all the girls on it ran. I waved out the window at them and pointed toward the canoe. But they were all hiding. When I zoomed up they came out but they didn't do anything about the girl who was drowning. I went down again and tried to signal to them. They all ran and hid again. I skimmed above the girl out in the center and saw that she had managed to get hold of the canoe. So I went on my way.

"After we got into Chicago some one phoned and wanted to thank me for what I had done. They explained that none of the girls on the float had any clothes on. That's why they hid. I—"

"But that isn't the way the newspapers had it," Martha cut in. "They didn't say anything about the drowning girl. They said you spent the afternoon circling above a bunch of nude bathing beauties."

"They lie!" Steve shouted. "They got hold of it some way and tried to make a funny story of it."

"Well," Martha said, "you don't have to speak to me that way because you're angry at the newspapermen."

"I'm not angry at you!" Steve shouted angrily. "I was trying to save the girl's life. I—"

"You're still shouting at me," Martha said. "When you have cooled off call me again."

Steve stared at the mouthpiece for a moment after he heard the receiver

click. When he hung up the receiver his face was white and he was saying things under his breath that he certainly wouldn't have wanted Martha to hear.

When he telephoned Martha an hour later a maid told him she was not in. The same thing happened a half dozen times during his two-day lay-over in New York.

At the end of those two days he resolved that he would never again try to help any one.

"They can drown, they can freeze, they can burn to death for all of me," he snarled to himself. "If you help 'em what does it get you? Trouble!"

He knew that it wasn't Martha's fault he couldn't get her on the telephone. He knew she was probably being guarded so closely she couldn't even write him a letter.

Then a half hour before he started for Newark and his leg to Chicago he had a note from her.

DEAR STEVE:

I'm heart-broken about not being able to see you or even talk to you on the telephone. But you know how mother acts. I can't make her listen to reason. She and father are going away in a couple of days. When you come back from your next trip they will be gone. Then I can see you. You mustn't blame mother and father too much. They're just so old-fashioned they can't help it.

MARTHA.

Steve felt a little better after he read that note. He resolved that when he

got back he would not only see Martha, but would marry her while he had a chance.

The trip to Chicago was like all the trips to Chicago. During most of it Steve sat back in his seat and glowered at the instrument panel while Red Johnson did the work. That was the advantage of being the pilot.

"All dames are alike!" Steve said suddenly. The remark so startled Red Johnson, who had the controls, that he jammed the wheel to starboard. The sudden change in course brought a quick squeal of frightened protest from the old lady in Seat Four.

"Keep on your course, freshman!" Steve snarled.

Red laughed. Then he made little clucking noises with his tongue.

"What's the matter, did her old man kick you downstairs?" he asked. Steve gave him a withering glance.

"Why don't you get yourself another girl?" Red laughed.

"It's not her fault," Steve said. "It's her father and mother. They're so old-fashioned they think only bank robbers get their names in the papers."

"Or chorus girls," Red said, grinning. "Listen, I knew a fellow once who had the same thing you have—girl trouble. Her parents thought this friend of mine was a no-good."

"Well?" Steve snapped.

"He fixed it so they didn't bother him any more."

"Yeah, what did he do?"

"He shot the parents. Both of 'em," Red said, still grinning.

"Funny guy, eh?" Steve sneered.



"Not funny, just practical," Red laughed. "Here comes the 'goat head' in." He cut his gun, lowered his landing wheels, circled once and glided down into the wind.

AFTER a day's lay-over, Steve and Red started on their return trip to Newark. An hour out of Chicago, Red pushed back his earphones and said, "They say we're going to get some soupy weather."

"We've had it before," Steve answered. "Mebbe we better get upstairs."

In another fifteen minutes fog came rolling in toward them, fog that cut them off completely from the rest of the world. Steve checked his instruments and took his bearings with an eye constantly on his bank-and-turn indicator and his inclinometer.

"What do they say about our ceiling?" he asked Red.

"About five at Newark," Red answered.

The fog licked at the coated window glass as great drops of rain began to splatter against them. Steve cursed and told Red his opinion of such weather. He had the wheel now, and he was feeling his way cautiously, depending as much on inborn instinct and perception as on his instruments. An air pocket slapped them down seven hundred feet with a bang that made the whole ship vibrate.

The stewardess stuck her head in the door and said, "The old lady in Number Four wants to know if you can't be more careful."

"Tell her, sure," Steve said. "Tell her it's all just in fun."

The hostess grinned and disappeared.

Another downward current of air cost them another five hundred feet. Steve worked quietly and calmly to regain balance, his eyes glued to the instrument board.

Hail began to beat on the windows and rattle off the metal sides of the ship. Then the fog and the rain increased.

"I'm going to stick her nose down and see if we can't get out of this," Steve said.

As darkness settled around them they cut through a rift in the cloud bank at five thousand feet. The lights of a village flashed beneath their wings and Steve checked the town on his map.

Far ahead came a brilliant flash that cut high into the black heavens. Then repeated. Every ten seconds the two-million-candlepower beacon blinked into the darkness. After the regular flash came the rapid dot-dash signal that gave the number of the beacon.

Steve stuck the nose of the big ship on the beacon ahead and settled back in his seat. They had left the rain and fog behind them now.

In an hour the city of Toledo spread

out below them, sparkling like a million jewels set in a coronation crown.

"We're right on the button," Steve said to Red as he threw the wheel to him. He leaned close against the window and gazed downward into the blackness beyond Toledo. Far off to the east, ten miles away, he could see the chain-like lights of the Blue Diamond Express hurtling through the night on its run from Cleveland to Toledo.

"The Blue Diamond is right on the button, also," he said, half to himself. Every night on his eastern hop Steve checked his own time and position against the time and position of the crack New York Central train.

Suddenly, as Steve's eyes swept the darkness below him, his breath hissed through his teeth. He flattened his face against the glass as the thing that had caught his eye disappeared beneath the belly of the plane. Then he was shouting orders at Red Johnson.

"Quick," he said, "give me the controls! Get the goat head at Cleveland and tell him the trestle bridge across the Sandusky is afire. Tell him the Blue Diamond is heading for it at sixty an hour. The Blue Diamond may have a wireless telephone. They've got less than ten minutes to work. Hurry!"

Red Johnson didn't ask any questions. An expression of mild surprise flashed on his face as Steve first grabbed at the controls. After that he was all attention. He pushed the button on his transmitter and began to chant as Steve stuck the nose of the big ship downward.

"Trip Number Five. Trip Number Five Calling Station WEAZ—WEAZ," he called.

"WEAZ. This is Station WEAZ. Calling Trip Number Five. Go ahead!"

"Get this fast," Red chanted, his voice steady. He relayed the information Steve had just given him. The goat head at Cleveland took the information as quietly as Red had given it to him. In two minutes he was back on the air telling Red that the Blue Diamond carried no telephone.

"You get it?" Red asked Steve.

Steve nodded his head. He was down only a thousand feet above the burning trestle now. They could see the flames shooting high into the heavens as a stiff breeze fanned them. The passengers in the big ship had their faces glued against the windows.

"Can you see the Blue Diamond?" Steve asked Red. Red leaned forward and peered into the night ahead.

"Five miles away and coming like a bat out of hell!" he said as calmly as he could.

Steve nodded again and banked the big ship around. He pressed a button that brought the stewardess running.

"Tell the passengers there is a train headed for that bridge," Steve said. "Tell 'em we've got to stop it. The en-

gineer is out of sight of the trestle until he is almost on top of it. He won't have time to set his brakes and stop after he sees it. We're going down low to stop him. Tell them not to be nervous, but to fasten their safety belts."

The stewardess nodded and closed the door to the bridge behind her. Steve saw horror and fright written on the faces of the passengers as she told her little story.

He was taking the plane down so that it was only a hundred feet above the crackling flames now. He could see that the bridge was almost burned away in places. He knew that thundering engine would go through the bridge as though it was match wood. He stuck the nose of his ship on a straight line with the railroad tracks away from the bridge. Red Johnson's knuckles were white, he was holding his radio transmitter so tightly. He was talking to the goat head at Cleveland, keeping him informed of Steve's movements.

A thousand feet away from the trestle Steve nodded to Red and said, "Hold her just here and hold her steady!"

His hand reached for the parachute-flare release. He worked it once, twice. The two flares took a dizzy course earthward, swerved away from the tracks in a gust of wind, then were carried back to land directly in the center of the tracks. The whole earth became one horrible white sphere.

Steve eased the nose of the big ship up. A mile away he could see the lights of the racing train. He held his breath for a matter of thirty seconds while he watched the snorting iron monster racing to its doom.

Then the blurred lights of the train became more distinct and Steve knew that the engineer had been blinded by the two flares and was setting his brakes. His breath hissed through his lips as he exhaled and looked at Red Johnson's tense face. Red grinned and shook his head.

"That does it," he said. "That was neat going, fellah."

"Yeah," Steve said bitterly. "And to-morrow morning the newspapers will have it and all you yaps will be callin' me Headline Harkins again. I don't know what the hell is the matter with me. Why can't I mind my own business?"

"Just a Boy Scout at heart," Red said. "We better turn on the juice. We're goin' to be late gettin' into Cleveland."

FIVE HOURS LATER Steve climbed wearily out of the pilot's seat of the big transport. His face was drawn and lined, and his eyes were red spots in his white face. He dragged himself up the ramp and growled at a couple of newspapermen who were waiting there to get his story.



"Talk to Red," he said to them. "I don't know nothin' about it. I wasn't there. I was out for a walk."

He went into the pilot's quarters and listened to the usual kidding. He wondered if it was too late to take a chance on getting Martha on the telephone. After she saw the papers in the morning it would be too late. She wouldn't ever speak to him again. Then he was electrified by a shout from the inner office.

"Hey, Harkins," a voice shouted. "A twist wants to talk to you on the telephone."

When Steve lifted the receiver off the hook his hand was shaking. He scowled and cursed under his breath. Then he heard Martha's voice in his ear.

"Yeah," Steve said after she spoke. "You sound as though you'd been running up a hill."

"Steve!" Martha half screamed. "I think it's the most wonderful thing you ever did. So do mother and father."

"What are you talking about?" Steve asked suspiciously. "Have you seen the papers?"

"Yes," Martha said. "I sent out for all of them."

"What does your mother think about —" Steve began.

"She thinks it's wonderful, Steve. I just talked to both of them on the telephone," Martha said breathlessly. "They both said we could forget all the objections they had to our engagement. Isn't that grand, Steve? Isn't —"

"Listen!" Steve shouted. "Have your father and mother seen the papers?"

"Seen the papers?" Martha said, and she was half crying now. "I don't know whether they've seen the papers or not. Anyway, it won't make any difference. Oh! I forgot to tell you, Steve. They were on that train!"

## COYOTE KILLER

(Continued from page 24)

bit into the flesh of his arm. He heard him whisper:

"Nix, Ray. He'll plug you—or send you to the clink. Kirk needs you. Then you've got the six-ten to catch for Washington."

The redhead, ready to scrap at any time he knew he was right, made a masterly and successful effort to control the rage which almost overpowered him. He turned on his heel, stalked to the hangar, leaving the gun-slinging officer hanging onto his revolver butt and looking a little bit silly.

Ray reached the two-place training monoplane, savagely pushed on the trailing edge. Larry manipulated the dolly beneath the tail skid. The ship rolled forward. Other willing hands helped. Outside the hangar, Larry crawled into the cockpit. Ray spun the prop. The motor coughed. While it was warming, Ray told Larry:

"I'm late going after Kirk. Shoot a wire to the Department at Washington, will you? Tell 'em I'm stuck."

Larry crawled from the cockpit.

"What reason'll I give?"

Ray hoisted himself into the little ship.

"Tell 'em anything—tell 'em there's some coyotes down here that I've got to wipe up before I come east."

He gunned the motor, throttled back, gunned it again, released the brakes and bee-lined down the field.

RAY BALMER, with fifteen miles to go to Rio, with his nose away from the afternoon sun, gained a minute and lost altitude down to five hundred feet in a long, shallow dive. He leveled off, peered over the side of the ship, and found his eyes riveted on five milling men. The men were on a white, sandy patch about fifty yards from the Rio City-Fort Hilton Highway. Their car was parked at the side of the road.

There was mystery and suspense in the fast action he saw. First one of the men, evidently in serious trouble with

the others, ran a few feet. His pursuers caught up with him. He turned, fists flailing. One of the attackers sprawled, skidded in the white, sandy clay. Then a second went backward, heels kicking. But they leaped to their feet, closed in, four against one. Ray's sympathies went out to the under dog who was putting up such a battle against overwhelming odds. Involuntarily, he throttled his motor, made a wide, mushing circle with the slow trainer.

"If I could get down and help—" he muttered. He felt the handle of the .45 automatic which he had jammed into a pocket of his breeches.

The mesquite and greasewood clumps were thin here. He banked, just as he saw one of the cowardly attackers whip out something that glistened in the afternoon sun.

"Good Lord!" he gasped. "He's going to kill—"

He saw a thin line of smoke, saw the fighting fool who didn't quit when the cards were stacked, rock and sway. He forgot about Rio City, about Kirk, about his mission as he again saw red, as his rage mounted over the cowardly shooting. He banked sharply, started to come in for a landing, groped for the pistol.

As he cut his throttle, he heard the vicious whine of the wires of a high-powered plane, the sting of a motor five times as powerful as his, and stared fascinated at his wing as little black holes showed in the fabric to the right and left of him. He straightened out, shot his wings vertical with a flip of the ailerons and gave the trainer full gun, knowing that he was hopelessly out-classed. He tensed himself, felt the little plane strain in a stiff bank, felt and sensed the impact of more lead as he looked back and above him, and realized how he had gotten into such a spot.

The bigger plane, a bullet-nosed Alvin biplane which cruised at better than three miles a minute, wheels up, a top-

mounted synchronizer machine gun spurting death at him, was hard on his tail. He knew that he was trapped. He cursed the fact that he had had to crack open the only 'chute he possessed to save himself from *Mister Jonah* a few hours before, but he knew at the same time that curses were futile.

Lead cut around him, crashed into the fuselage behind him, raked the wing. More lead spanged into the motor. It coughed, spluttered and died.

The lethal plane had ridden his tail down out of the sun.

He was cold, calm, as bullets spewed behind him. He knew that somehow the murderous pilot was connected with the four men below. He would not kill them. And Ray had to get down now if he was to survive the withering fire which chilled his backbone. He had to line himself in that last glide so that the metal hail, missing him, would cut into the men on the ground and force the killer to stop shooting.

*B-r-r-i-p-p-b-r-r-i-p-p-b-r-r-i-p-p.*

The pilot behind him was signalling with short blasts of his motor to the men below. They broke suddenly and ran for their car, plunging through greasewood, mesquite and cactus which hid the scene of their revolting crimes from the highway.

Ray, desperate, knowing that he could not rip through the heavy, spiked growth and crash them, nor could he wreck their car, pulled into another sharp bank as lead bit into his tail surfaces, saw a boulder-lined gulley, aimed for it, pulled back his stick and braced himself for the crash.

The undercarriage crunched against the boulders. The little ship nosed up. Ray grabbed at the cowl as he felt his safety belt snap, held himself from being dashed into the rocks. The shock broke his hold, but he had slowed himself so that when he did hit, arms covering face, he was only bruised, shaken.

He was hovering on the fringes of



consciousness as he heard the relentless yammer of the machine gun, the snarling motor, the whining wires of the other ship. Lead slapped the rocks, ricocheted, sang, screamed, droned. He somersaulted to a spot where he was shielded by his own motor and protecting boulders. He whipped out his automatic, drew careful aim, and returned the fire.

He watched in the direction of the road for the four men to appear, but there was no sign of them.

Again and again the big biplane dived at him from angle after angle. He sought new shelter each time. Finally, after making a fresh shift, he was in a position to see the man who had been shot by the cowardly quartette, a bundle of clothing seventy-five yards away in the open. As he looked the victim moved.

The pilot must have detected this, for he sent his ship screaming down at the helpless victim, the machine gun anchored on the top wing blasting viciously through the silvery arc of the propeller. Ray clenched his fists, cursed impotently, as he saw plumes of sand leap around the helpless man. The pit of his stomach writhed at the sight of the kill lust which ruled the pilot.

This business finished, the pilot climbed, banked, dived at Ray again. The catapulting plane had not reached him, however, when the lead stopped kicking up its little geysers. Ray knew the reason. The murderer had emptied his hopper. He blazed at the ship, even though he knew that he had about as much chance of hitting the pilot of the rocketing craft as he had of hitting a soaring eagle with a rock.

The plane pulled out of the dive. Ray noticed that it bore neither letters nor numerals of identification, and that it was painted a dark gray. It leveled off, went into a long climb. Ray lay still until it was just a speck in the distance, swearing.

"The yellow coyote!" he stormed. "Didn't even have guts enough to land and shoot it out like a man!"

Then, blanketing his movements from the road by using the stark gray underbrush, he worked his way to where the car had stood, pistol ready. The car had disappeared.

He doubled back to the spot where the lone, game battler had been dropped. He sighted the twisted body, advanced on it, a horrible realization coming at first slowly, then with full force as he saw the clothing, the shape and size of the body. He ran forward, his breath coming in dry, choking sobs, dropped to his knees as he blurted:

"Kirk! Kirk! For God's sake, speak to me! It's Ray!"

He bent over the shattered chest of his older brother, heard the faint, failing beat of his heart. He cradled his brother's head in his arms. Kirk's eyes

opened. There was the faint glint of recognition. A smile smoothed his pain-tortured features.

"Ray——" The word was barely audible. "I—knew you'd come——"

"Who shot you—what happened?"

"Found out dope—being run by ship—last two—nights. Plane—crosses Rio before moon is up—between here and—Rio City. Gang found out—I knew—trapped me——"

"Who's the pilot?"

"Don't know—he'll fly again—to-night and——"

A shudder ran through Kirk Balmer's body and telegraphed the fatal message to Ray. The younger brother spoke softly, hoping that the other would hear his words.

"I'll get the man who did this, Kirk, old fellow. I'll get him if it takes the rest of my life. I wired the boss in Washington I had to stay and kill coyotes—and that's just what I'm going to do."

Far in the distance, over the silent reaches of the plain, he heard the roar of an automobile motor. He knew he had to work fast.

Ray pulled himself to his feet, ran to the ship, grabbed sections of torn linen, ripped them from the smashed wing. He returned to the body, laid them over it, secured them with rocks. That would keep beasts of prey and the inevitable black crows from desecrating it until he could send Joe Moss, the Fort Hilton undertaker, for the remains.

Then he dashed through the underbrush to the road, reached it as the car he had heard pounded down the sand-clay road two hundred yards away. He ran into the highway waving his arms. The car shot around him. There might not be another for hours. He whipped out his pistol, fired over it. The car skidded, lurched to a halt. Ray ran to it. The white-faced driver stuck out his head.

"Wha-what's the matter?"

Ray ran to the car, pistol drawn.

"Sorry to frighten you like this. I won't harm you," he snapped. "I had to stop you—might not be another car for half an hour, and minutes count. There's been trouble. You're driving me to Fort Hilton as fast as this crate'll roll."

IT WAS DARK when the car bumped alongside the unlighted hangar at Fort Hilton airport. Ray thanked the driver, piled out. He felt a sudden chill, although the night was warm, as he looked at the stained structure, standing eerie and ghostlike in the moonless night. As the car sped away, his mind filled with foreboding, he rounded a corner of the building.

"Where's Larry?" he muttered. Larry usually was there to meet him. Had something happened to the boy? Was

there another horrible message waiting him inside the hangar, he wondered? He slipped his pistol into his right hand. With his left hand he fished out his keys, inserted one into the lock of the small door within the larger door at the front of the building. Then he kicked open the door.

A roar greeted him. He rocked backward as the searing shock of a bullet tearing into his left shoulder threw him off balance. But his quick eyes caught the direction of the orange-red flash of flame and his own gun barked hollowly a split second later. He heard a moan, the thud of a body. Unmindful of his wound, he raced to the light switch, clicked it. Big overhead lamps drove the shadows back.

A lifeless body lay on the dirt floor.

Ray went to it, kicked it over. He saw the man was a Mexican. A bullet had drilled through his heart. Blood soaked his shirt, formed a sticky, dark puddle. He glanced around him, started. The wing was on the little two-place pusher monoplane—the coyote killer!

He barged into the office, grabbed the telephone, called his home.

He heaved a mighty sigh of relief as he heard Larry's voice.

"Brace yourself, kid," he said steadily. "Don't let mom get wise. Kirk's dead. Fifteen miles out of Rio City. A Mex just ambushed me in the hangar. Got me in the shoulder. He's dead. Stall mom. Get in your car. Pick up Doc Bender. Say nothing to anybody. Get the doc out here as fast as you can drive."

By the time Larry, white-faced and shaken, and Doctor Bender, puzzled and uncertain, had arrived, Ray had called the undertaker and given him full instructions as to how to find his brother's body. He also had temporarily stopped the flow of blood which had soaked his shirt.

"Had some trouble finding Doc," Larry said. "He was shooting pool down at Stockton's, and a bunch was there. They think something's up."

Ray turned to Doctor Bender.

"Fix this hole in my shoulder, Doc," he ordered. "It didn't bust anything. It's clean, I think."

While the physician worked, Ray told both men what had happened.

"How come the coyote killer's got the wing on?" he asked Larry.

"I got worried and called Trent over at Rio City. Knew you'd see him if you'd got into town all right. He said Kirk had disappeared about noon, and that you hadn't showed. I got hold of Charlie and Carroll Tate, went up to the station and brought the wing down on the trailer."

"Anybody see you?"

"Don't think so. Leastwise, nobody paid any attention. I came down the side streets with it. The Tates helped



me mount it. I figured I might fly over to Rio myself if you didn't show pretty soon."

"Good thing you didn't go through town. I've got a hunch that if any member of this gang—here or in Rio City—knew we had a ship that would fly, they'd have burned the hangar."

Ray winced as Doctor Bender tightened the bandages.

"Not too snug, Doc," he said. "I'm going to have to use that arm."

"What can you do?" asked Larry. "All we've got is the coyote killer. She's only got forty-five horses in her nose, can't cruise at more than seventy and only carries two hours' gas. You've got to buck an Alvion, cruising at better than one-eighty, equipped with a machine gun. You might as well attack the army with a putty knife. It's sure death."

Ray's lips formed into a thin, grim grin as he motioned toward the tiny two-place pusher.

"You're forgetting a lot of things, kid," Ray replied. "First is that I've been gunning a lot of tricky coyotes in the last two years. I've gotten more than a hundred. There's a twelve-gauge automatic mounted on the sliding swivel in the front cockpit. I can carry twenty gallons of extra gas in the rear cockpit and refuel in the air. Remember how I got 'Old Crusty,' the killer the ranchers were after for six years? I loaded up with beebie shot, flew over the district where he had been hanging out and dodging the boys who had been trying to get him. I cruised overhead until he came out of his hole—and I got him. Those beebies have a lot of force. And they spray."

"And so——"

"The man who killed my brother is in Old Crusty's shoes right now. I know he's coming over the border with a load before moon up. I know approximately where he'll cross. And those babies usually fly at around ten thousand. I'll be higher."

Ray bit off his words and the three men stared at the door of the hangar as it creaked open. A Colt .45 appeared first. It was followed by Sheriff Blakeslee. He stalked into the office. He looked at Ray.

"Gun shot, eh?" he rasped. He looked out into the hangar, saw the dead Mexican. The body stared at the ceiling through sightless eyes.

"You killed him." Blakeslee's look accused Ray. The latter nodded.

"Self-defense," he added. "He ambushed me."

Blakeslee's eyes glinted.

"That's what you say." He stalked forward, passed Larry, looked down at the wounded flier.

"Balmer, you're under arrest—suspicion of homicide."

Something in Ray's throat tightened.

Pin-pricks went over his body. He controlled a desire to spring at the bulky man who stood over him. Then Larry went into action. Ray didn't see what his younger brother hit the sheriff with. But he dropped like a log. Ray leaped to his feet. The bandage was finished now.

"Nice work, Larry!" he whipped. "There's going to be hell to pay for knocking him cold, but in the meantime, I've got to get moving."

Ray looked at both men. Then at the fallen Blakeslee.

"He must be mixed up in this gang some way. I've felt it ever since he half admitted that he'd tipped the Department of Commerce about *Mister Jonah*, hoping to ground it. This move implicates him more. How'd he know we were here?"

"Somebody down at Stockton's pool hall must've tipped him," suggested Doc Bender. "There was a mob in there when Larry found me."

"Maybe so. But I still think he's on the inside. Somebody's been trying to keep us out of the air—wreck our planes. Somebody who knows Kirk and I were using them trying to grab the gang. And Blakeslee nearly had one grounded. Then somebody fixed it to crash, just when we needed it most. Larry, do you think he saw that the coyote killer had a new wing on it?"

"Hardly. I saw him come in. The wall and the door hid it from him."

"Fine! Then, even if he is on the in, he won't have anything to tip the mob about. They'll think I've nothing to fly. They'll go right ahead with the shipment. Here, Doc—Larry! Grab hold. We'll heave him into Doc's car. Doc can drive him home and treat him."

The men carried the unconscious official to the car. Then they returned.

"Help me with the plane," Ray ordered.

Larry, Doc and Ray checked the shotgun, stocked beebie ammunition, filled the gasoline tank, loaded twenty more gallons and a parachute flare in the rear cockpit. Then they turned out the bright hangar lights, opened the big doors and rolled the small monoplane into the open. Larry spun the propeller. The little three-cylinder Szekeley barked, caught. It didn't make much noise with the special muffler Ray had installed to prevent alarming the coyotes.

After a couple of minutes he waved good-by to Doc and Larry.

"I'll be back before dawn," he promised.

He shoved the throttle forward.

Stars glinted like sun-backed holes in a black blanket as Ray, having twice refueled from his extra gasoline supply, cruised at twelve thousand feet, glared out over the sky and land, ever seeking the dope-running biplane. The moon would soon be up. At the rim of the

plain the sky was getting milky. Back and forth Ray went, above the sleeping 'dobe-built Rio City, east to a point above the point where his brother had been wantonly slain, back again to Rio City, his ship whispering along like the cape of an avenging ghost.

Twice, three times, four times, Ray thought he saw patches of stars blink out in procession, which indicated the passage of his quarry. Each time his eyes tricked him.

Then, far in the distance—how far he couldn't guess—he saw the wink of a flashlight pointed on a southward angle. Pointed toward the sky and the border! Ray's blood pounded against his temples as he watched. The light blinked three times—then once—then three times. It was out for a while. Then the signal came again from the far reaches of the mesquite-dotted plain.

He slapped his stick and rudder over, headed in that direction, hoping that his tiny craft could be neither heard nor seen by those on the ground. He knew that he was taking a hundred-to-one chance—even though he had been cocksure in talking to his brother—for the shotgun was effective only up to five hundred feet against coyotes and he could expect only three or four shots at the fleet ship he sought. After that—he shuddered. After that, a machine gun on the nose of a ship traveling three miles a minute would be ripping into the fuselage of the slow coyote killer. After that, there were those human jackals on the ground, signalling with the flashlight, ready to complete any part of the task left undone by the pilot.

Now, if the pilot had caught the signal as he had, he was streaking forward toward it like a homing pigeon. Smugglers came in fast and straight—wanted to get the run over with.

Below and behind him he saw the eerie purple-blue flame of exhaust stacks. His eyes calibrated his speed, the speed of the plunging smuggler, his angle of dive. He shoved the stick forward, took a big gulp of the air which drove into his face, stiffened his body and shot downward like a hell-diver after a fish at the ship which, he guessed, was a thousand feet below him.

Then the quarry was underneath his sights, a black patch against the gray-black plain. It seemed to hurtle up at him.

He squeezed the trigger of the gun. Wind whipped at his face, slapped his shirt. Wires sang, struts sighed, and the motor and propeller screamed like an angry angel. The ship rocked and bumped. The gun blasted. The biplane shot out from under him. He followed with his sight, allowing for the drive of the wind. Second shot. Third. Fourth. Fifth. The breech locked open. The gun was empty. His heart sank, he felt weak all over, and his wound hurt



him as he saw the biplane plunge onward through the night at the signals. He reached into his pocket, pulled out one shell after another, reloaded.

He was sunk! He knew now that, unless something miraculous happened, unless he had hit the plane, death's wings were brushing him.

His speed, the wild momentum of his dive, carried him downward, ever downward, and straight ahead toward the signal light.

If he was going to die, those on the ground were going to pay dearly. Those dirty coyotes who had shot down his brother!

Then, following the exhaust glow of the other plane with his gaze, he saw it scream downward, bank, come after him. Its gun blazed at him. As he swung his reloaded gun up, the ship banked again, streaked for the signal light. He aimed at the light, too.

Ray was over it a second later. Coolly he got the parachute flare, fired it over the side. A moment later the plain blazed into light. Men cowered, darted zigzag like the desert rats they were, scurried for shelter, but not fast enough. As Ray broke down into the light he saw ocherous spats of flame, and knew that they were firing at him.

He was going to sell out dearly—and he could handle the coyote killer. He'd pegged many an animal as it zigzagged along a fence line.

As he dived he counted the points from which the firing was coming.

Four! The four men who had attacked his brother!

His face twisted with cold fury. He leveled off twenty feet above the ground. His beebee-spraying gun barked once. He saw the first man fall. He banked, cut back, picked another patch of spurted flame, blasted. The second man dropped almost as the heel of the shotgun kicked into Ray's shoulder. If he could only wipe out the four before the biplane got on his tail! He waited for that as he picked a third man, saw him stagger a few steps and fall flatly.

His fourth shot roared into the night.

The last rat rocked backward away from his machine gun. The flare went out.

Ray zoomed, throttled his motor back, listened. His heart leaped with joy. He heard the pound of a missing, coughing, spluttering motor off to his right. He banked. The moon was lifting its golden rim over the frayed edges of the low hills of the east. For a second he caught the reflected glint on the top of a streaking plane below him. Then he heard a crash and the rip of metal cowlings.

He dived down over the ship.

He could see nothing but the black wings. No sign of life. He banked once more, slipped low, picked what looked like a clear space in the mesquite, cut his gun, mushed in. The plane pan-



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caked, leveled off, settled again, rolled to a stop.

Pistol in hand, he leaped from the cockpit.

He ran to the side of the wrecked ship, saw that it was not badly torn up. It smelled of gasoline. The liquid had soaked the ground. He knew what had happened then. He hadn't gotten the pilot, but the beebees had riddled the gas tanks. He found footprints in the soft sand. Clutching his pistol, he followed them under the increasing light of the full moon.

He had not far to go. Ahead he saw a figure limned against the light sky. "Halt!" he bellowed.

The figure turned. Fire flashed, a revolver cracked. Ray snapped a shot. He saw the man ahead reel, go down. He advanced cautiously, worked his way over to one side, took advantage of the shelter of mesquite. The fellow was waiting for him. Moonlight glinted on his weapon.

A second shot shattered the stillness. Ray pulled the trigger of his automatic. It had jammed. Wild with rage he hurled it at his enemy, sprang through the air after it, landed on top of the man. The struggle was short. Moonlight fell on the man's face.

"Good Lord!" Ray exclaimed. "Blakeslee!"

Ray bound his prisoner, loaded him into the rear cockpit, where the extra gasoline had been, and taxied up in front of the hangar at Fort Hilton just before dawn, as he had promised. Doc Bender and Larry ran to the ship. Ray, weak and shaking, pulled himself out of the cockpit and in a few minutes had told his story. A telephone call started deputies organizing a posse to go to the scene of carnage. Blakeslee was locked up in his own jail.

Then Larry gave Ray a telegram.

"Come just before you took off," he said.

Ray ripped it open, saw that it was from the director of the Federal Bureau of Investigation, scanned it tiredly.

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He handed it to Larry, who glanced over it grimly.

"Some day! Two airplanes washed out, a bullet in your shoulder, Kirk dead—and now this. What're you going to do?"

"Get some sleep." Ray sagged down on a cot in the hangar he had often used.

WHEN he opened his eyes he saw noon sunlight and felt some one shaking him gently. It was Larry.

"The posse found two men still alive,"

the younger brother said. "They confessed. You wiped out the entire mob. Blakeslee's held for murdering Kirk. He had the plane in an underground hangar on his ranch. He could leave here after you did anytime and beat you to where you were going hands down, because of its speed."

Ray closed his eyes for a moment. He heard Larry say:

"This came."

It was another telegram. It was again

signed by the director of the F. B. I. He read:

HAVE JUST SEEN NEWSPAPERS STOP WHY DIDNT YOU SPECIFY TYPE COYOTES QUESTION IN VIEW CIRCUMSTANCES HAVE REPLACED YOU ON LIST STOP REPORT AS SOON AS YOU HAVE RECOVERED FROM WOUNDS

The redhead smiled.

## THE BIGGEST NATIONAL MEET

(Continued from page 43)

unfortunately landed in a tree and was hopelessly wrecked.

The Texaco Trophy was won by Francis Tlush of Lyndhurst, N. J. His older brother, Charles, built the engine which powered this ship. These brothers have produced many successful gas models during the last two and a half years, and turning in good flights was just in the day's work for them. Unfortunately, the wing on this model was broken when they recovered the model from a tree after the winning flight of 45m 34s.

Most of the gas models showed remarkable gliding ability. After the motors had carried them into the air a few hundred feet, they would soar on for miles, so accurately were they adjusted. One outstanding attempt to cash in on the soaring ability of gas models was the gas job entered by Vernon Boehle of Indianapolis, Ind. This ship's wing-span was 15 feet. It was powered with a Cyclone engine. Unfortunately it was slightly underpowered, and did not get the altitude sufficient to turn in a record flight. Boehle's best time was close to 25 minutes.

Although there was a prize for the best radio-controlled gas model, none appeared to claim it. After the contest the A. C. Spark Plug Company announced an award of \$200 for a radio-controlled ship, so it is a certainty that there will be at least one such model at next year's meet.

On July 2, the third and final day of the contest, the indoor entrants went to the Olympia Auditorium to compete for the two national indoor trophies, while outdoors the Moffett finals were held at the airport. Every one was surprised when Bert Pond, flying a New Zealand entry of Vernon Gray, turned in 44m 14s. The British and U. S. entrants did their best to win for their countries, but the air currents decreed that there was to be only one long flight, and we had to be content with second place and the British with third.

When the Moffett contest had been run off, the last few hours of indoor flying were in full swing. The ceiling of the Olympia was only 90 feet high, and in addition there were several clusters of hanging lights. Many good indoor models met their doom against the lights and steel rafters. By 5 o'clock it was evident that John Haw's stick-model flight of 18m 10s, set up earlier in the day, was going to win. And by 6 o'clock, when the flying ended, John was the winner of the Stout indoor stick-model trophy and a 1,000-mile trip on Central Airlines. Alvie Dague of Tulsa won the indoor event for cabin fuselage models with 16m 17s. With this victory goes one-year possession of the Bloomingdale Trophy and permanent possession of the Detroit Times Trophy.

A fitting climax to three wonderful

days of flying was the banquet on Thursday evening given by the A. C. Spark Plug Company. William B. Stout, designer of the Ford tri-motor transport and at present manufacturing automobiles, was the toastmaster. Stout is a model builder from way back, and the donor of the two national trophies which bear his name. It seemed like old times to have him at the contest. H. S. Walesby, aviation editor of the Detroit Times and contest director for the meet, announced that the meet would be held in Detroit again in 1937 if official sanction could be secured. He said the Times would offer prizes amounting to \$1,000. Indoor flying would be held in the airship dock at Akron, and the contestants would make the trip to Akron by special train and boat. Outdoor flying would be held in Detroit at the same Wayne County Airport, which all contestants agreed is an ideal place.

From the standpoint of the contestants who didn't win high places, the event still packed a thrill that winning last place couldn't entirely erase. Last year's champions practically all failed to repeat. John Stokes, Torrey Capo, Vernon Boehle, Leo Weiss, Kenneth Ernst and myself all tried hard against stiff competition. Fate just didn't seem to be kind to us, so we joined the others in hailing the new champions for 1936.

—G. S. L.

## LAZY TAPERWING

(Continued from page 52)

entirely on the propeller to keep it up. There are no thermal air currents of which the model can take advantage.

The prop is carved in exactly the same way as an outdoor prop, except that a great deal more care must be used. When carving the block, the blades are carved to about 3/32" thick, and sandpaper varying from #2 to #10-0 is used progressively on the blades until the proper thinness is obtained. The blade thickness at the hub

should be only 1/16" and at the tip 1/64". The blade cross section should be an airfoil shape and the depth of the camber about 3/32". A template of the blade shape should be made and the prop cut to conform with this shape. Bend the shaft, insert it in the prop, and cement it.

Keep in mind that the prop must be perfectly balanced. A smoothly turning prop adds greatly to the flying qualities of the model.

### COVERING AND ASSEMBLY

Cover the model with microfilm. (How to make microfilm and cover with it was explained in last month's issue.) After the two halves of the wing have been covered they must be cemented together at the proper dihedral. When the wing is dry, support it level by the tips, put a dot of cement on the end of each clip-stick and touch them to the wing spars at the dihedral point. In this way you will be sure that the clips



will dry perpendicularly. Drop a globule of cement on the leading and trailing edges of the tail at the center rib and put it on the small end of the boom. Then cement the rudder on the center rib and perpendicular to it. Clip the wing to the motor stick, in line up the tail and rudder with the wing, and cement the boom to the motor stick. Do not forget to raise the tail. When the boom is dry, slip two washers on the prop shaft and put the prop in place.

## FLYING

When the model is ready to be flown, make an 18" loop of 5/64" brown rubber and put it in place. Move the wing until its center point is directly over the place where the model balances.

On the first flight the rubber should be wound about 300 turns so that any adjustments can be made. Stalling or diving can be remedied by moving the wing forward or backward. The model should turn in a circle 40 or 50 feet in diameter. If it doesn't, warp the rudder to increase the turn. When you try your flights in a building which is very low, you can increase the rubber length in order to keep the model down.

If this happens to be one of your first ships, you may find it advantageous to use 3/32" flat rubber instead of the

5/64". A lubricated length can take 2,400 turns—enough for 19 minutes, if you are going after records.

## WEIGHTS

Wing	.020 ounces
Motor stick	.017 "
Boom	.002 "
Prop	.017 "
Tail & rudder	.002 "
Total	.058 ounces

## SPECIFICATIONS

Wing area	95 sq. ins.
Tail area	24 sq. ins.
Wing incidence	zero degrees
Elevator incidence	-1 1/2 degrees
Prop pitch	29 ins.
Wash-in in left wing	
Rudder warped to left for turn	

## MATERIALS

(All balsa should be between 4 1/2 to 5 lb. stock.)

1 sheet 1/64"
1 " 1/32"
1 " 1/16"
1x1 1/2x15" prop block
Microfilm solution
Thrust bearing (dural) and washers
1 foot wire .016" diam.
Brown rubber

## FROM THE GROUND UP

(Continued from page 66)

of cement on the end of the axle. This one-piece bamboo landing gear does away with the annoying job of putting wire axles on the ends of the landing-gear struts.

The bamboo is cemented and threaded to the motor stick at a point 2 1/2" from the front. A bamboo or wire tail skid, bent to the shape in the drawing, is inserted in the rear of the motor stick.

## TAIL

You can easily sketch a full-size tail plan from the dimensions given in the drawing. Cover your plan with wax paper and then pin 1/16x1/8" balsa to the outline. Carefully cement together the ends of the pieces—not forgetting the main spar which runs the length of the elevator. The rudder is made over half of the same pattern as the elevator. Put the tail aside to dry; we'll return to it later for covering and assembling.

## WING

The wing spars are 1/16x3/16x22" and are joined by seven bamboo ribs which have been split to approximately 1/32x1/16". After the ribs have been cemented in place on the spars, bend the bamboo wing tips. From my collection of tin cans of varying diameters I was able to pick an old baked-bean can

which was exactly 3 1/2" in diameter. After a few minutes of heating over a gas burner, it was hot enough to bend the bamboo tips. The total operation, outside the actual heating of the can, takes about 10 seconds, and the wing tips are perfect half-circles. And since both of the tips are bent at the same time, the wing is certain to have a nice uniform shape.

Raise each tip of the wing 2" above the center. Break the spars at the center, raise the ends of the wing, and then coat the break with cement. Support the wing in such a position that it will retain its shape throughout the drying operation.

The wing is attached to the motor stick with two wire clips. These clips should fit snugly, yet shouldn't groove the stick. The rear clip should be 1/8" higher than the front clip. Bending them to this size will automatically set the wing at the correct angle. The clips are cemented to the wing spars.

## PROPELLER CARVING

"Everything was going fine until I started to carve the propeller." Those are the famous last words of many a discouraged modeler. The propeller is the toughest job of model building, so grind your teeth and get to work.

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**REGULAR CORD TIRES**

Size	Tires	Size	Tires	Size	Tires
28x4.40-21	\$2.15	30x3.50	\$3.75	33x4.50	\$3.45
28x4.50-20	2.35	30x3.75	3.95	33x4.75	3.65
30x4.50-21	2.40	32x4.00	3.85	34x4.75	3.75
28x4.75-19	2.45	32x4.25	3.95	34x5.00	3.85
28x4.75-20	2.50	32x4.50	4.05	34x5.25	3.95
28x5.00-19	2.55	32x4.75	4.15	34x5.50	4.05
30x5.00-20	2.65	32x5.00	4.25	34x5.75	4.15
28x5.25-18	2.70	32x5.25	4.35	34x6.00	4.25
28x5.25-19	2.75	32x5.50	4.45	34x6.25	4.35
30x5.25-20	2.85	32x5.75	4.55	34x6.50	4.45
31x5.25-21	3.25	32x6.00	4.65	34x6.75	4.55
28x5.50-18	3.35	32x6.25	4.75	34x7.00	4.65
28x5.50-19	3.35	32x6.50	4.85	34x7.25	4.75
30x5.50-19	3.40	32x6.75	4.95	34x7.50	4.85
30x5.50-20	3.40	32x7.00	5.05	34x7.75	4.95
31x5.50-21	3.45	32x7.25	5.15	34x8.00	5.05
32x5.50-22	3.55	32x7.50	5.25	34x8.25	5.15
32x5.50-23	3.65	32x7.75	5.35	34x8.50	5.25
32x5.50-24	3.75	32x8.00	5.45	34x8.75	5.35
32x5.50-25	3.85	32x8.25	5.55	34x9.00	5.45
32x5.50-26	3.95	32x8.50	5.65	34x9.25	5.55
32x5.50-27	4.05	32x8.75	5.75	34x9.50	5.65
32x5.50-28	4.15	32x9.00	5.85	34x9.75	5.75
32x5.50-29	4.25	32x9.25	5.95	34x10.00	5.85
32x5.50-30	4.35	32x9.50	6.05	34x10.25	5.95
32x5.50-31	4.45	32x9.75	6.15	34x10.50	6.05
32x5.50-32	4.55	32x10.00	6.25	34x10.75	6.15
32x5.50-33	4.65	32x10.25	6.35	34x11.00	6.25
32x5.50-34	4.75	32x10.50	6.45	34x11.25	6.35
32x5.50-35	4.85	32x10.75	6.55	34x11.50	6.45
32x5.50-36	4.95	32x11.00	6.65	34x11.75	6.55
32x5.50-37	5.05	32x11.25	6.75	34x12.00	6.65
32x5.50-38	5.15	32x11.50	6.85	34x12.25	6.75
32x5.50-39	5.25	32x11.75	6.95	34x12.50	6.85
32x5.50-40	5.35	32x12.00	7.05	34x12.75	6.95
32x5.50-41	5.45	32x12.25	7.15	34x13.00	7.05
32x5.50-42	5.55	32x12.50	7.25	34x13.25	7.15
32x5.50-43	5.65	32x12.75	7.35	34x13.50	7.25
32x5.50-44	5.75	32x13.00	7.45	34x13.75	7.35
32x5.50-45	5.85	32x13.25	7.55	34x14.00	7.45
32x5.50-46	5.95	32x13.50	7.65	34x14.25	7.55
32x5.50-47	6.05	32x13.75	7.75	34x14.50	7.65
32x5.50-48	6.15	32x14.00	7.85	34x14.75	7.75
32x5.50-49	6.25	32x14.25	7.95	34x15.00	7.85
32x5.50-50	6.35	32x14.50	8.05	34x15.25	7.95
32x5.50-51	6.45	32x14.75	8.15	34x15.50	8.05
32x5.50-52	6.55	32x15.00	8.25	34x15.75	8.15
32x5.50-53	6.65	32x15.25	8.35	34x16.00	8.25
32x5.50-54	6.75	32x15.50	8.45	34x16.25	8.35
32x5.50-55	6.85	32x15.75	8.55	34x16.50	8.45
32x5.50-56	6.95	32x16.00	8.65	34x16.75	8.55
32x5.50-57	7.05	32x16.25	8.75	34x17.00	8.65
32x5.50-58	7.15	32x16.50	8.85	34x17.25	8.75
32x5.50-59	7.25	32x16.75	8.95	34x17.50	8.85
32x5.50-60	7.35	32x17.00	9.05	34x17.75	8.95
32x5.50-61	7.45	32x17.25	9.15	34x18.00	9.05
32x5.50-62	7.55	32x17.50	9.25	34x18.25	9.15
32x5.50-63	7.65	32x17.75	9.35	34x18.50	9.25
32x5.50-64	7.75	32x18.00	9.45	34x18.75	9.35
32x5.50-65	7.85	32x18.25	9.55	34x19.00	9.45
32x5.50-66	7.95	32x18.50	9.65	34x19.25	9.55
32x5.50-67	8.05	32x18.75	9.75	34x19.50	9.65
32x5.50-68	8.15	32x19.00	9.85	34x19.75	9.75
32x5.50-69	8.25	32x19.25	9.95	34x20.00	9.85
32x5.50-70	8.35	32x19.50	10.05	34x20.25	9.95
32x5.50-71	8.45	32x19.75	10.15	34x20.50	10.05
32x5.50-72	8.55	32x20.00	10.25	34x20.75	10.15
32x5.50-73	8.65	32x20.25	10.35	34x21.00	10.25
32x5.50-74	8.75	32x20.50	10.45	34x21.25	10.35
32x5.50-75	8.85	32x20.75	10.55	34x21.50	10.45
32x5.50-76	8.95	32x21.00	10.65	34x21.75	10.55
32x5.50-77	9.05	32x21.25	10.75	34x22.00	10.65
32x5.50-78	9.15	32x21.50	10.85	34x22.25	10.75
32x5.50-79	9.25	32x21.75	10.95	34x22.50	10.85
32x5.50-80	9.35	32x22.00	11.05	34x22.75	10.95
32x5.50-81	9.45	32x22.25	11.15	34x23.00	11.05
32x5.50-82	9.55	32x22.50	11.25	34x23.25	11.15
32x5.50-83	9.65	32x22.75	11.35	34x23.50	11.25
32x5.50-84	9.75	32x23.00	11.45	34x23.75	11.35
32x5.50-85	9.85	32x23.25	11.55	34x24.00	11.45
32x5.50-86	9.95	32x23.50	11.65	34x24.25	11.55
32x5.50-87	10.05	32x23.75	11.75	34x24.50	11.65
32x5.50-88	10.15	32x24.00	11.85	34x24.75	11.75
32x5.50-89	10.25	32x24.25	11.95	34x25.00	11.85
32x5.50-90	10.35	32x24.50	12.05	34x25.25	11.95
32x5.50-91	10.45	32x24.75	12.15	34x25.50	12.05
32x5.50-92	10.55	32x25.00	12.25	34x25.75	12.15
32x5.50-93	10.65	32x25.25	12.35	34x26.00	12.25
32x5.50-94	10.75	32x25.50	12.45	34x26.25	12.35
32x5.50-95	10.85	32x25.75	12.55	34x26.50	12.45
32x5.50-96	10.95	32x26.00	12.65	34x26.75	12.55
32x5.50-97	11.05	32x26.25	12.75	34x27.00	12.65
32x5.50-98	11.15	32x26.50	12.85	34x27.25	12.75
32x5.50-99	11.25	32x26.75	12.95	34x27.50	12.85
32x5.50-100	11.35	32x27.00	13.05	34x27.75	12.95
32x5.50-101	11.45	32x27.25	13.15	34x28.00	13.05
32x5.50-102	11.55	32x27.50	13.25	34x28.25	13.15
32x5.50-103	11.65	32x27.75	13.35	34x28.50	13.25
32x5.50-104	11.75	32x28.00	13.45	34x28.75	13.35
32x5.50-105	11.85	32x28.25	13.55	34x29.00	13.45
32x5.50-106	11.95	32x28.50	13.65	34x29.25	13.55
32x5.50-107	12.05	32x28.75	13.75	34x29.50	13.65
32x5.50-108	12.15	32x29.00	13.85	34x29.75	13.75
32x5.50-109	12.25	32x29.25	13.95	34x30.00	13.85
32x5.50-110	12.35	32x29.50	14.05	34x30.25	13.95
32x5.50-111	12.45	32x29.75	14.15	34x30.50	14.05
32x5.50-112	12.55	32x30.00	14.25	34x30.75	14.15
32x5.50-113	12.65	32x30.25	14.35	34x31.00	14.25
32x5.50-114	12.75	32x30.50	14.45	34x31.25	14.35
32x5.50-115	12.85	32x30.75	14.55	34x31.50	14.45
32x5.50-116	12.95	32x31.00	14.65	34x31.75	14.55
32x5.50-117	13.05	32x31.25	14.75	34x32.00	14.65
32x5.50-118	13.15	32x31.50	14.85	34x32.25	14.75
32x5.50-119	13.25	32x31.75	14.95	34x32.50	14.85
32x5.50-120	13.35	32x32.00	15.05	34x32.75	14.95
32x5.50-121	13.45	32x32.25	15.15	34x33.00	15.05
32x5.50-122	13.55	32x32.50	15.25	34x33.25	15.15
32x5.50-123	13.65	32x32.75	15.35	34x33.50	15.25
32x5.50-124	13.75	32x33.00	15.45	34x33.75	15.35
32x5.50-125	13.85	32x33.25	15.55	34x34.00	15.45



The size of the block is  $\frac{7}{8} \times 1 \times 9$ ". First of all, mark the exact center of the block on both sides. Push a needle halfway through from one side and then remove it and start the hole from the other side. Guide the needle so the holes will meet in the center of the block.

Next lay off the block with pencil and ruler. In this operation, as you did in punching the center hole, make duplicate markings on both faces of the block. Cut out the blank and then carve the blades of the propeller as indicated in the sketch. Once you've visualized what a finished propeller looks like, you'll have an easier job carving one, so inspect other builders' propellers whenever possible. And if you're building models by yourself, digest the drawings and the photos and you'll soon get the idea.

A piano-wire shaft is inserted through the center of the finished propeller. By resting the shaft lightly on your finger tips you can find the heavier blade and sand it off until the prop balances. Next bend the front end of the shaft and cement it to the prop hub. When bending piano wire fittings, don't rely entirely on your pliers to obtain a smooth, rounded shape. Wrap the wire around a circular object such as a dope brush, lead pencil, or nail, and then finish the fitting with the pliers.

Six strands of  $1/30 \times \frac{1}{8}$ " rubber power this model sufficiently for a lively flight. Notice that the rubber is attached to

the rear hook by an "S" hook, which permits you to transfer the motor from the stick to the winder.

### COVERING

A white model is always attractive, but any color is appropriate for the Buzzer. Cover the elevator and wing on the top side, the rudder on either side. Don't dope the tissue with either water or prepared dope, as it will stretch this wing out of shape. A light sprinkling of steam will shrink up all wrinkles.

The rudder is cemented to the top center of the elevator. The elevator in turn is cemented to the top rear of the motor stick.

### FLYING

Clip the wings to the fuselage and we're ready for some fun. By balancing the motor stick on a knife edge, you can readily locate the model's balancing point, which should be about  $1\frac{1}{8}$ " back from the front edge of the wing.

It won't take much twist of the rudder to turn the Buzzer. An even more effective way of turning the model is warping the wing. It probably will be necessary to warp up the front edge of the left wing, to take care of the torque of the propeller, which tends to depress this side.

You can have an interesting and instructive afternoon with the Buzzer by trying out various adjustments. Warp up the rear of the elevator and the model will show a decided climbing ten-

dency. Warping down the elevator will give it just as pronounced a diving inclination. Or you can have the same results by moving the wing forward or backward. The six strands of unlubricated rubber will take 900 turns as a maximum, but for ordinary flying 600 turns will do the work nicely.

### WEIGHTS

Wing	.11 ounces
Elevator and rudder	.07 "
Propeller	.08 "
Motor (6 strands)	.22 "
Motor stick and landing gear	.47 "
Total weight R.T.F.	.95 ounces

### MATERIAL REQUIRED

(Balsa unless otherwise stated)

- 2 pcs.  $1/16 \times 3/16 \times 22$ " for wing spars
- 2 pcs.  $1/16 \times 1/8 \times 24$ " for tail
- 1 pc.  $1/4 \times 3/8 \times 19\frac{1}{2}$ " for motor stick
- 1 pr. of  $1\frac{1}{2}$ " diameter wheels
- 1 strip of bamboo for wing ribs, tips, landing gear
- 10 ft. of  $1/8 \times 1/30$ " black rubber
- 2 ft. of #10 piano wire for shaft, hooks, clips
- 1 dural thrust bearing (wire or flattened-nail bearing will do)
- 1 propeller block  $7/8 \times 1 \times 9$ "
- several copper or brass washers to reduce propeller friction.
- $1/2$  ounce of cement and banana oil
- 1 small sheet of tissue

—G. S. L.

## TOPS IN TRAINERS

(Continued from page 55)

streamlined section. Sand the completed surfaces carefully and cement each piece neatly in position. Using wood filler or other moldable substances, form the fillets as shown on the top and side views.

### WINGS

The wings are cut to their required outline from a soft sheet of  $3/8$ " balsa and tapered toward the tip. Shape them in accordance with the sections given on the plans and sand smooth. Using thickened cement, fasten the completed wings in place and mold the fillets.

### LANDING GEAR AND DETAILS

Cut each landing-gear leg to shape from  $9/32$ " sheet or heavy  $1/4$ " stock. They are streamlined and cut out on the outside only to accommodate the wheels. When completed, sand them carefully, cement in position and mold the flared top fillet.

Cut the wheels from sheet balsa if the required size is not available.

The prop is built of scraps in accordance with the detail on the plan. Mount

it on a pin so that it will be free to revolve.

The enclosure for the crew is built up of light wire frames and cellophane covering.

## CROSS WINDS

B	A	M	B	O	O	C	A	M	B	E	R
N	O	O	N	N	T	E	A	L			
I	O	X	S	E	A	N	R	E			
T	A	R	H	A	T	C	H	R	A	N	
S	N	I	P	E	D	T	O	W	A	R	D
S	N	O	W	M	G	A	G	E			
L	O	G	S	T	A	P	C	E	N	T	
I	N	T	O	R	P	E	D	O	A	A	
T	G	F	I	L	T	H	V	B			
O	U	R	T	E	E	S	I	T			
A	V	I	A	T	E	R	O	T	O	R	S
S	A	L	V	O	I	F	O	L	I	O	
L	E	E	A	T	E	P	A	P			

Answers for August

### PAINTING

Give the entire surface a coat of clear varnish to fill the pores. Dope will do, if necessary. Sand where possible before painting.

As designated on the plan, the fuselage, fillets and landing-gear legs are army blue. The rest of the ship, with the exception of the markings, is yellow. The marking colors are given by the key on the plan. Trim with black.

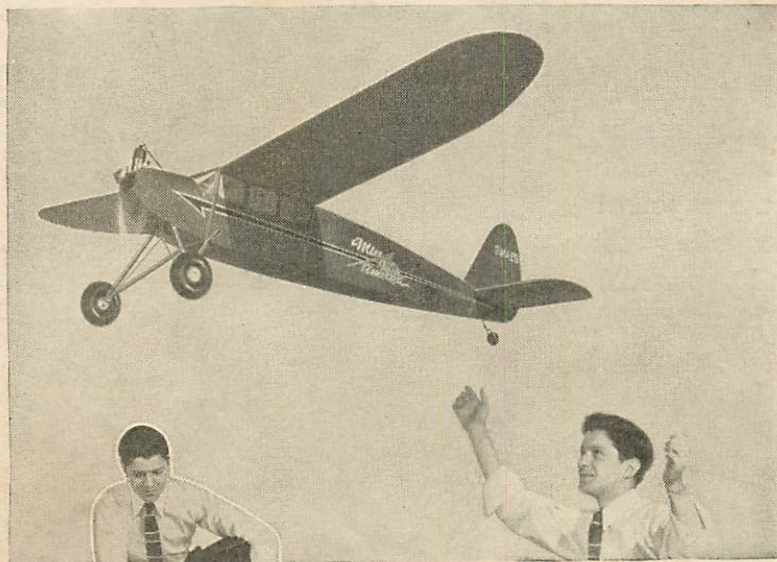
Cement the radio mast in place using #60 thread for an aerial.

### MATERIALS

- 1  $5\frac{5}{8} \times 1\frac{1}{8} \times 1\frac{3}{8}$ " balsa block
- 1  $9 \times 3 \times 2$ " " "
- 1  $1\frac{1}{2} \times 3 \times 9 \times 16$ " " "
- 1  $1/8 \times 2 \times 6$ " balsa sheet
- 1  $1\frac{1}{2} \times 4 \times 1\frac{1}{4}$ " " "
- 1 pr.  $5/8$ " wheels
- 1  $1/4$ " tail wheel
- $1/4$  oz. cement
- wood filler
- paint
- cellophane
- light wire



# NOW SCIENTIFIC BRINGS YOU THE PERFECT GAS MODEL



*Miss America*

★ For outstanding value, here is a gas model that has everything, offered at a price far less than any other on the market. For design, construction and performance, "MISS AMERICA" takes first place everywhere.

★ The "Miss America" is the result of our determination to develop a really superior type of gas model. It has been put into kit form only after many months of experimenting and testing. This is actually a miniature airplane, embodying the same features of design and construction as full scale ships.

★ Among other features of the "Miss America" model are balance tabs on rudder and stabilizer for correct adjustments of flights, and new type battery box which is very light and located in fuselage where batteries may be changed easily.

★ The model is beautifully colored, wings being doped a brilliant red and fuselage blue with black and white trim. It is built to accommodate either the Brown or Cyclone engines (or any reliable motor now on the market) simply by adding or taking out spacers of motor mounts in fuselage. Motors can be mounted into plane in 3 minutes.

★ On test flights the "Miss America" Gas Model has shown a consistent gliding angle of more than 16 to 1 and has kept aloft for over 22 minutes on 1 oz. of fuel.



- ★ 7 FT. WINGSPAN
- ★ WEIGHT 4½ LBS.
- ★ 22 MINUTES ON 1 OZ.
- ★ 18 to 1 GLIDE

COMPLETE KIT  
(less Motor)

**\$7.50**  
Postpaid  
or at Your  
Dealer  
**NOTHING  
ELSE TO BUY**

## Here's What You Get:—

1 PAIR PNEUMATIC RUBBER WHEELS. Two giant full-size detailed plans giving every bit of information needed for building and flying the plane; streamline tail wheel; large amounts of special wood cement, bamboo paper cement, red and blue dopes; complete printed-out wood containing ribs, bulkheads, wing tips, etc., all strip wood of the finest quality accurately cut to size; special covering material; celluloid; rubber; hard wood propeller blank; complete set of hardware such as terminals, knife switch, nuts, bolts, machine and wood screws, heavy landing gear wire, landing gear brackets, brass grommets, aluminum angles for motor mount, sheet aluminum, battery wire, washers, etc.; 1/32" 3-ply birch for covering front of model; strip spruce for parts needing added strength; complete assortment of numerals, lettering, and "Miss America" insignia printed in red and blue on gummed paper; also many more parts too numerous to mention.

Combination Price Including  
**BROWN JR. MOTOR 25.00**  
Post Paid

Value of Kit	7.50	You Save
Brown Jr. Motor	21.50	
<b>Total Value</b>	<b>29.00</b>	
<b>Brown Jr. Motor Alone 21.50 p. p.</b>		<b>4.00</b>

Combination Price Including  
**BABY CYCLONE MOTOR 20.00**  
Post Paid

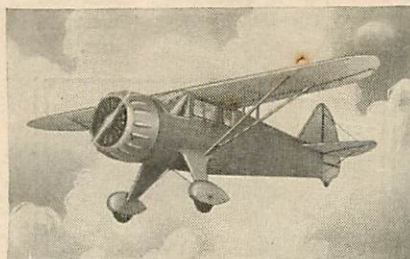
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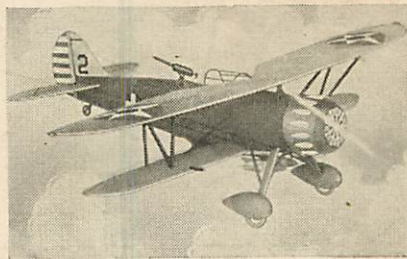
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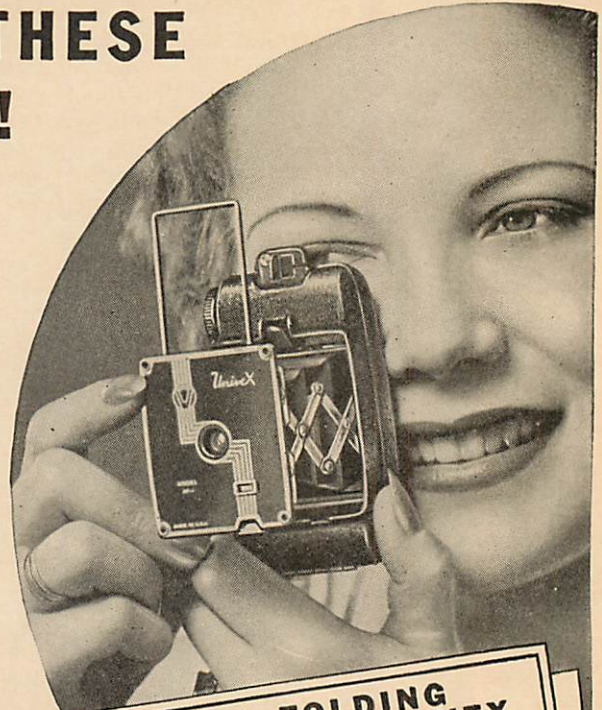
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