

LARGEST CIRCULATION OF ANY AVIATION MAGAZINE

# AIR TRAILS

INSTRUMENT FLYING, page 20.... AVIATION CADETS, page 16

NOVEMBER 1937

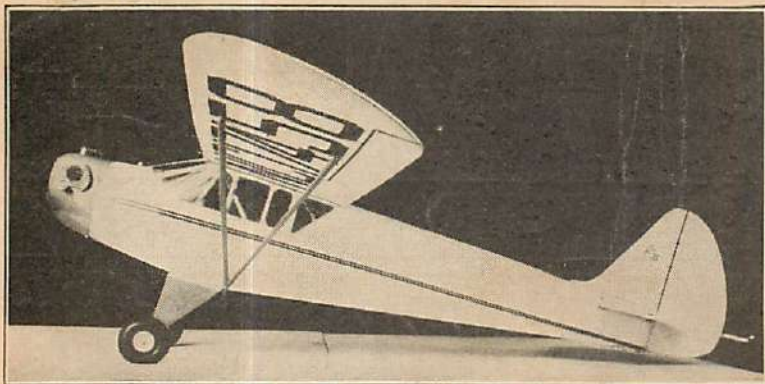


CAN THE CHINESE FLY? - - A Fascinating Article-Page 36  
LIGHT PLANE CLUBS ★ GLIDING AND SOARING  
CHAMPIONSHIP MODELS ★ AVIATION FICTION and FEATURES  
**BILL BARNES**  
AIR NOVEL COMPLETE IN THIS ISSUE



# FAMOUS "TAILOR MADE TAYLOR CUB" GAS MODEL

You'll have to admit **AIRCRAFT** It's a far better kit  
"THE PRODUCT OF SKILLED CRAFTSMEN" NOT HURRIED PIECEWORKERS



COMPLETE WEIGHT READY TO FLY 25 $\frac{1}{2}$  POUNDS

## "AIRCRAFT SPOTWELD"

Clear Quick Drying Cement

Our own special preparation, known the world over for quality and recommended for Gas model work where the strain is very severe. Pint.....60c  
1/2 ".....35c

## COLORED LACQUER

High gloss, quick drying. Red, Yellow, Blue, White, Black, Olive drab, Green, Cream and Silver. Pint.....75c  
1/2 ".....40c

## 'CLEAR DOPE

For sticking tissue to frame, doping surfaces, etc. Pint 50c  
1/2 ".....30c

## WE CARRY THE FOLLOWING MOTORS IN STOCK

Gwinn Mighty Midget Motor Kit.....\$ 9.85  
Gwinn Aero Finished Motor.....\$17.50

Ohlson.....\$18.00  
Baby Cyclone Model D.....\$17.25

Brown Jr.....\$21.50  
No C.O.D. shipments.

**Authentic One-Quarter Inch to the Foot Solid Scale Models**  
**EVERY ONE A CONTEST WINNER**

## EACH KIT CONTAINS

Completely formed shock absorbing landing gear struts. Cut out wing ribs. Formed Dural metal motor mount. 3 $\frac{1}{4}$ " M & M air wheels. Detachable wings for convenient carrying. Adjustable dihedral. Finished cut to shape celluloid windshield, Aluminum for cowlings, Selected straight grain balsa. Spring steel tail skid. Die cut cabin windows and many other exclusive features too numerous to mention. 6 foot wing span.

## PRICE \$5.50

plus 50c for packing & mailing. This is a dry kit, Motors, Cement and Dopes are not included, these articles are fully described below.

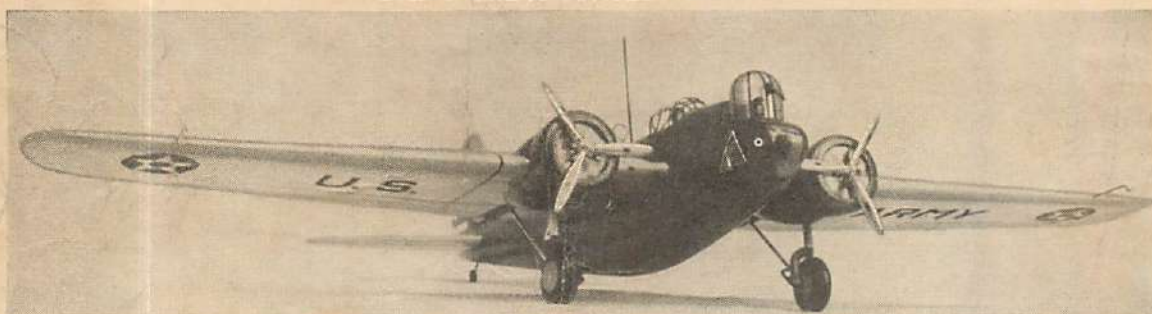
## SEE YOUR DEALER FIRST

And if he cannot supply you write us direct.

## "AIRCRAFT SPECIALS"

The most perfect and fastest selling 10c line ever put out.

M  
A  
R  
T  
I  
N



B  
O  
M  
B  
E  
R

## A PERFECT MODEL OF AMERICA'S MOST BEAUTIFUL BOMBER

The Kit To Build The Model Of This Modern Giant Contains: selected balsa parts cut to outline shape, turned hardwood cowlings and wheels, 3 super-detailed pilot busts, 2 three-bladed Hamilton propellers, a replica aircraft machine gun, a finished transparent gunner's turret, formed to shape, drilled Aluminum landing gear struts, liberal portions of authentic army colored lacquers, wood filler and fillet making material, colored insignia, full-size detailed drawings, etc. \$1.00. Plus 20c packing and postage.



BOEING F4B4, Colored white and yellow \$ .35



NEW MONOCOUPÉ Colored all yellow, red trim \$ .25

## EACH AIRCRAFT KIT CONTAINS

Liberal portions of colored lacquers and cement, finished pine wheels, colored insignia, rigging wires, most difficult parts cut to outline shape, detailed drawings, die cast Propellers and Pilots and many other fine features too numerous to mention.

All War-time kits contain super detailed Machine guns. The following Kits contain detailed Radial Engines and spun metal cowlings, Boeing P 26 A, Boeing F 4B4, Boeing F 4B3, Boeing P 12 E, Boeing P 12 F and Curtiss Goshawk.

In addition to the large Kits illustrated at the top of the page, we carry in stock the following kits, ready for immediate shipment.

### Spad 13

Fokker D 7  
Fokker D 8  
Fokker Tripe  
S. E. 5. Pursuit  
Waco Model "A"  
Nieuport 17 C1  
Sopwith Camel  
New Monocoupe  
Albatross D5  
Curtiss Hawk PGE  
Howard Mulligan

25 Cents Each

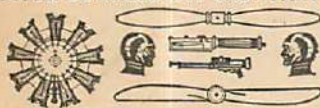
Boeing F4B3  
Boeing F4B4  
Boeing P26A  
Curtiss Goshawk  
Curtiss BF2C1  
Boeing P12E  
Boeing P12F  
Northrup XFT1  
Grumman F2F-1  
Consolidated P30

35 Cents Each

## DE HAVILLAND COMET 50c

For single kits add 10c for packing & postage. For 2 or more kits add 5c for each kit. Personal checks add 10c. No C.O.D.

## EXCLUSIVE AIRCRAFT SUPER DETAILED DIE CAST PARTS



BOEING P26A Colored olive drab and yellow \$ .35

Add 20% to these prices for shipments to Foreign Countries.



MR. MULLIGAN All white, Gold letters \$ .25

NOTE. These are actual photographs of models built from AIRCRAFT kits.  
**AIRCRAFT, 4348 NORTH PULASKI ROAD, DEPT. B. 11, CHICAGO, ILL.**



# "SELDOM SEE AN I. C. S. GRADUATE out of a job—"



"IN ALL THE YEARS I have known of the International Correspondence Schools, I have seldom seen one of your graduates jobless."

A business executive made this statement in a recent letter commenting on the I. C. S. graduates and students in his employ and expressing regrets that it is necessary to reduce his personnel.

"However," he added, "all I. C. S. graduates and students will be retained, for I realize, through experience, their value in my business."

The reason so many I. C. S. men have jobs is because they are *trained men*! A recent investigation into the working conditions of 1000 I. C. S. students revealed only ten unemployed. You, too, can be an I. C. S. man.

Mark the coupon and mail it today! It has been the most important act in the lives of thousands of men. It has started them on careers of success. It will do the same for you. And if you have been postponing action, *act today!*

## INTERNATIONAL CORRESPONDENCE SCHOOLS

BOX 4928-C, SCRANTON, PENNA.

★ Without cost or obligation, please send me a copy of your booklet, "Who Wins and Why," ★  
and full particulars about the subject *before* which I have marked X:

### TECHNICAL AND INDUSTRIAL COURSES

- |  |  |  |  |
|--|--|--|--|
| <input type="checkbox"/> Architect               | <input type="checkbox"/> Welding, Electric and Gas                                   | <input type="checkbox"/> Bridge Engineer                                     | <input type="checkbox"/> Mechanical Engineer                         |
| <input type="checkbox"/> Architectural Draftsman | <input type="checkbox"/> Reading Shop Blueprints                                     | <input type="checkbox"/> Bridge and Building Foreman                         | <input type="checkbox"/> Mechanical Draftsman                        |
| <input type="checkbox"/> Building Estimating     | <input type="checkbox"/> Machinist <input type="checkbox"/> Toolmaker                | <input type="checkbox"/> Highway Engineer                                    | <input type="checkbox"/> Steam Engineer                              |
| <input type="checkbox"/> Contractor and Builder  | <input type="checkbox"/> Patternmaker <input type="checkbox"/> Foundry Practice      | <input type="checkbox"/> Civil Engineer                                      | <input type="checkbox"/> Steam Electric Engineer                     |
| <input type="checkbox"/> Structural Draftsman    | <input type="checkbox"/> Sheet Metal Worker <input type="checkbox"/> Boiler Practice | <input type="checkbox"/> Surveying and Mapping                               | <input type="checkbox"/> Marine Engineer                             |
| <input type="checkbox"/> Structural Engineer     | <input type="checkbox"/> Plumbing <input type="checkbox"/> Steam Fitting             | <input type="checkbox"/> R. R. Locomotives                                   | <input type="checkbox"/> Chemistry <input type="checkbox"/> Pharmacy |
| <input type="checkbox"/> Electrical Engineer     | <input type="checkbox"/> Heating <input type="checkbox"/> Ventilation                | <input type="checkbox"/> R. R. Section Foreman                               | <input type="checkbox"/> Cotton Manufacturing                        |
| <input type="checkbox"/> Electric Lighting       | <input type="checkbox"/> Pipelitter <input type="checkbox"/> Tinsmith                | <input type="checkbox"/> R. R. Signalmen                                     | <input type="checkbox"/> Woolen Manufacturing                        |
| <input type="checkbox"/> Telegraph Engineer      | <input type="checkbox"/> Air Conditioning  | <input type="checkbox"/> Air Brakes <input type="checkbox"/> Train Operation | <input type="checkbox"/> Agriculture                                 |
| <input type="checkbox"/> Telephone Work          | <input type="checkbox"/> Automobile Mechanic   | <input type="checkbox"/> Diesel Engines                                      | <input type="checkbox"/> Fruit Growing                               |
| <input type="checkbox"/> Refrigeration           | <input type="checkbox"/> Coal Mining <input type="checkbox"/> Navigation             | <input type="checkbox"/> Aviation Engines                                    | <input type="checkbox"/> Poultry Farming                             |

### BUSINESS TRAINING COURSES

- |  |  |  |  |
|--|--|--|--|
| <input type="checkbox"/> Business Management   | <input type="checkbox"/> Bookkeeping                             | <input type="checkbox"/> Business Correspondence | <input type="checkbox"/> High School Subjects                                |
| <input type="checkbox"/> Industrial Management | <input type="checkbox"/> Secretarial Work                        | <input type="checkbox"/> Stenography and Typing  | <input type="checkbox"/> College Preparatory                                 |
| <input type="checkbox"/> Traffic Management    | <input type="checkbox"/> Spanish <input type="checkbox"/> French | <input type="checkbox"/> Civil Service           | <input type="checkbox"/> First Year College Subjects                         |
| <input type="checkbox"/> Accountancy           | <input type="checkbox"/> Advertising                             | <input type="checkbox"/> Mail Carrier            | <input type="checkbox"/> Illustrating  |
| <input type="checkbox"/> Cost Accountant       | <input type="checkbox"/> Salesmanship                            | <input type="checkbox"/> Railway Mail Clerk      | <input type="checkbox"/> Cartooning  |
| <input type="checkbox"/> C. P. Accountant      | <input type="checkbox"/> Complete Commercial                     | <input type="checkbox"/> Grade School Subjects   | <input type="checkbox"/> Lettering Show Cards <input type="checkbox"/> Sign- |

### DOMESTIC SCIENCE COURSES

- |   |   |
|---|---|
| <input type="checkbox"/> Professional Dressmaking and Designing                         | <input type="checkbox"/> Tea Room and Cafeteria Management, Catering          |
| <input type="checkbox"/> Home Dressmaking <input type="checkbox"/> Advanced Dressmaking | <input type="checkbox"/> Millinery <input type="checkbox"/> Foods and Cookery |

Name..... Age..... Address.....

City..... State..... Present Position.....

If you reside in Canada, send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada



**Editor**

F. Orlin Tremaine

**Associate Editor**

Clyde Pangborn

**Light Plane Editor**

Gerald H. Smith

**Gliding and Soaring Editor**

Alexis Dawydoff

**Model Editor**

Gordon S. Light

**Art Editor**

W. R. Lawler

**Technical Editor**

Arch Whitehouse

**Department Editor**

William Winter

**Model Board**

Gordon S. Light

Frank Tinsley

William Winter

**New York:**

Advertising Director

Harry Brown

Ass't. Adv. Director

Ralph R. Whittaker

**Chicago:**

Lewis & Noelle

612 N. Michigan Ave.

**Detroit:**

E. M. Lubeck

1415 Parker Ave.

**St. Louis:**

Fred Wright Company

Insurance Exchange Bldg.

**San Francisco:**

Don Harway & Company

155 Montgomery St.

Single Copy, 15 Cents

Yearly Subscription, \$1.50



The entire contents of this magazine are protected by copyright, and must not be reprinted without the publishers' permission.

Monthly publication issued by Street & Smith Publications, Inc., 79-89 Seventh Avenue, New York, N. Y. Artemas Holmes, President; Ormond V. Gould, Vice President and Treasurer; Henry W. Haisson, Vice President; Gerald H. Smith, Secretary; A. Lawrence Holmes, Assistant Secretary. Copyright, 1937, by Street & Smith Publications, Inc., New York. Copyright, 1937, by Street & Smith Publications, Inc., Great Britain. Entered as Second-class Matter, January 11, 1937, at the Post Office at New York, N. Y., under Act of Congress of March 3, 1879. Subscriptions to Cuba, Dom. Republic, Haiti, Spain, Central and South American Countries except The Guianas and British Honduras, \$1.75 per year. To all other foreign countries, including The Guianas and British Honduras, \$2.25 per year.

We do not accept responsibility for the return of unsolicited manuscripts. To facilitate handling, the author should inclose a self-addressed envelope with the requisite postage attached.

**STREET & SMITH  
PUBLICATIONS, INC.**

79 Seventh Avenue  
New York, N. Y.

## CONTENTS

### 4 Articles:

Aviation Cadets and the U. S. Fleet . . . by John R. Hoyt 16  
*The problem of supplying an adequate flight personnel for a growing air force has created new opportunities in naval aviation.*

Instrument Flying . . . by James Smithson 20  
*In which the mysteries of instruments are dispelled. An educational article important to all who contemplate aviation as a vocation.*

Battle Cruiser . . . by Frank Tinsley 24  
*New and greater weapons of offense have necessitated the unorthodox flying cruisers. The Bell Fighter, answer to the superbomber.*

Can The Chinese Fly? . . . by Herbert O. Arnold 36  
*An authoritative article throws new light on a situation of world-wide interest.*

### 10 Features:

This Winged World . . . 4  
*News photos of airplanes, air events, airmen.*

Air Progress . . . 7  
*The current news review of aviation.*

The Flier's Dictionary . . . by C. B. Colby 13  
*The twenty-sixth lesson in the technical terminology of the air.*

What's Your Question? . . . by Clyde Pangborn 18  
*A page of expert information on technical questions for Air Trails readers.*

Split-second Action . . . by Jon L. Blummer 19  
*Aerial adventures that come only once in a lifetime.*

Pictorial History of Man in the Air . . . 23  
*The early days of powered flight.*

Machine Gun Development . . . 35  
*A pictorial lesson in basic principles.*

The Air Trails Gallery . . . 37  
*Photographic studies of new planes.*

The Silver Lancer . . . 64  
*3-view drawings in response to popular request.*

Cross Winds . . . 69  
*The Air Trails Aviation Crossword Puzzle Page.*

### 2 Stories:

Murder At 30,000 . . . by Harold Montanye 10  
*For twenty long years they had been friends—and now they were enemies.*

Wings of the West . . . by George L. Eaton 28  
*The twin props of the Lancer whined and sobbed in protest, as Bill stuck the nose down in a power dive— A New Bill Barnes Air Novel complete in this issue.*

### 3 Departments:

Light Plane Flying Clubs . Conducted by Gerald H. Smith 8  
*A department to make flying possible for every one; new planes, club notes and news.*

Gliding And Soaring . . . Conducted by Alexis Dawydoff 14  
*What the clubs are doing; developments and news from everywhere.*

Air Adventurers Club . . . Conducted by Albert J. Carlson 26  
*An association for the advancement of aviation.*

### 13 Model Building Items:

Model Building Section . . . 38  
*Model contents are listed on a separate page—Page 38.*



# How Jerry Got His Start in AVIATION

HOW'S THAT FOR A LAIRD TRANSPORT MODEL? WHAT HAVE YOU BEEN DOING LATELY, BILL? BUILT ANY MORE MODELS?



NO, JERRY. I DECIDED AVIATION WAS A BUSINESS TO MAKE MONEY IN—NOT TO FOOL AROUND WITH. I'M WORKING AT THE AIRPORT NOW. COME ON OUT.



YOU'RE IN AVIATION NOW? AND A LICENSED PILOT ALREADY? HOW COME?

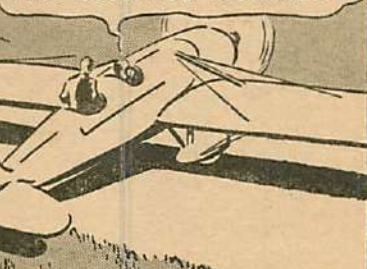


LET'S TAKE A HOP. I'LL TELL YOU WHILE WE WARM UP THE MOTOR.

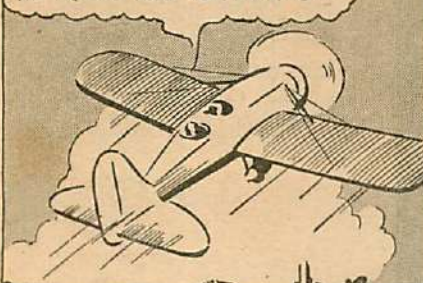
YOU HAD TO GIVE UP YOUR JOB, DIDN'T YOU, TO GET AVIATION TRAINING?



I DID NOT. WALTER HINTON TRAINED ME AT HOME. THEN I GOT A GROUND JOB AT THIS AIRPORT AND GOT MY FLYING INSTRUCTIONS AT A VERY LOW COST. HINTON TELLS YOU ALL ABOUT HOW TO GET INTO AVIATION IN A FREE BOOK HE'S PUBLISHED.



GEE—THIS IS GREAT. I'LL SEND FOR WALTER HINTON'S BOOK TONIGHT AND LEARN HOW HE TRAINS MEN FOR AVIATION.



WHAT A COURSE. HINTON GIVES ME THE DOPE ON MOTORS, AIR PLANE DESIGN—AIRPORT MANAGEMENT—GIVES ME THE GROUND TRAINING FOR MORE THAN FORTY DIFFERENT TYPES OF AVIATION JOBS. AND HE'S HAD MORE THAN EIGHTEEN YEARS EXPERIENCE TRAINING MEN FOR AVIATION. I'M GOING TO START TRAINING RIGHT NOW.



THIS SHIP HANDLES BETTER THAN EVER SINCE YOU'VE BEEN SERVICING IT.



THANKS BILL. HINTON CERTAINLY KNOWS HIS STUFF. I'M TAKING FLYING LESSONS NOW. I'LL SOLO NEXT WEEK.



I'M SO GLAD YOU GOT INTO AVIATION. WITH THAT NEW JOB AS PILOT FOR THE AIRLINE WE CAN GET MARRIED RIGHT AWAY.



AND THERE'S PLENTY MORE AHEAD FOR US IN AVIATION, DEAR. IT CERTAINLY IS THE INDUSTRY FOR AMBITIOUS WIDE-AWAKE MEN.

## MY FAMOUS COURSE

trains you quickly at home in spare time for AVIATION'S OPPORTUNITIES

Many make \$40-\$60-\$75 a week in this fast-growing industry



Walter Hinton: trail blazer, pioneer, explorer, author, instructor, AVIATOR. The first man to pilot a plane across the Atlantic, the famous NC-4, the first to fly from North to South America. The man who was a crack flying instructor for the Navy during the War. Hinton is ready to train you at home in spare time. Send for his Free Book—TODAY.

My up-to-date home study Course gives you the ground work you need to get and keep a real job in this fascinating, fast-growing industry. Many of my graduates, who didn't know a thing about Aviation before they enrolled, are holding down fine jobs right now—in the air and on the ground. Get the facts about my practical training and what it has done for others. Mail coupon now.

### I Teach You QUICKLY—at Home in Your Spare Time

You don't need to give up your present job—don't need to leave home, to get your training in Aviation. I've made it easy for you. I've put my own twenty years of experience—five years of instructing in the Navy—all into my thorough, quickly mastered home study Course.

### No Previous Experience Needed

You don't need a high school education—don't have to know anything about planes or engines to learn the ground work of Aviation with my Course. Everything is clearly explained—illustrated by hundreds of pictures, drawings and charts—simple and easy to understand.

### You Have Many Types of Jobs to Choose From

You have over 40 different types of jobs to choose from once you have the necessary training. You get all the information you need to pass the Government's written examination for Mechanic's or Pilot's Licenses, in a few short months. If you want to learn to fly, I can probably save you more than the cost of my Course at good airports all over the country.

### Aviation is Growing Fast

Don't wait and let the other fellows get ahead of you. Think about your own future. Get the FACTS. Mail the coupon today—right now—while you're thinking about it. I'll send you my big new FREE Book—packed with interesting facts about your opportunities in Aviation. Mail Coupon NOW.

WALTER HINTON, Pres., Dept. A3N  
Aviation Institute of America, Inc.

1115 Connecticut Avenue, Washington, D. C.

### These Men Made Good With My Training

#### COURSE HELPED PASS GOVERNMENT EXAMINATION

"I am a holder of an aeroplane and engine mechanic's license and a private pilot's license. Your Course helped me a great deal to pass the examination." JOHN HALEN-DA, 329 S. Balliet St., Frackville, Pa.

#### RECOMMENDS COURSE TO ALL

"I can honestly recommend your Course to all who are interested in Aviation as worth the time and money spent on it, and much more. I am proud to have been a student of your Institute." A. J. W. Slabber, Darling Road, Malmesburg, Cape Province, South Africa.

#### ACCEPTED FOR ROYAL CANADIAN AIR FORCE

"I sent your letter with an application for enlistment in the Royal Canadian Air Force and I received a letter stating that my application is accepted and I can enlist as soon as there is a vacancy." JOSEPH J. BEISIG, Melville, Sask., Canada.

#### PERFECTLY SATISFIED WITH COURSE

"I am perfectly satisfied that the results obtained to date from your Course have made its cost insignificant. Rest assured that you have a life-long booster for Aviation Institute training." L. W. Archer, P. O. Box 58, Curacao, D. W. I.

### MAIL Today FOR FREE BOOK

Walter Hinton, President, Dept. A3N  
Aviation Institute of America, Inc.,  
1115 Connecticut Avenue, Washington, D. C.

Please send me a Free copy of your book, "Wings of Opportunity." I want to know more about my opportunities in Aviation, and your tested method of home training. This request does not obligate me. (Write clearly.)

Name .....

Address..... Age.....

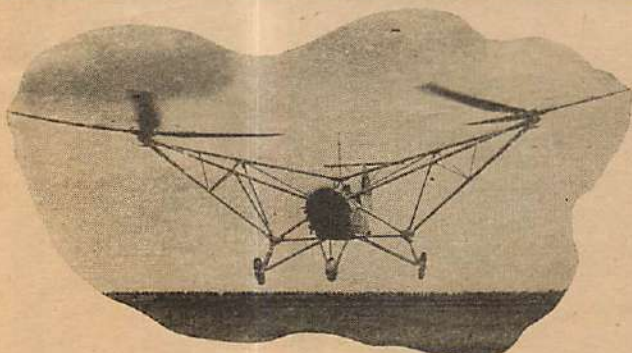
City..... State.....



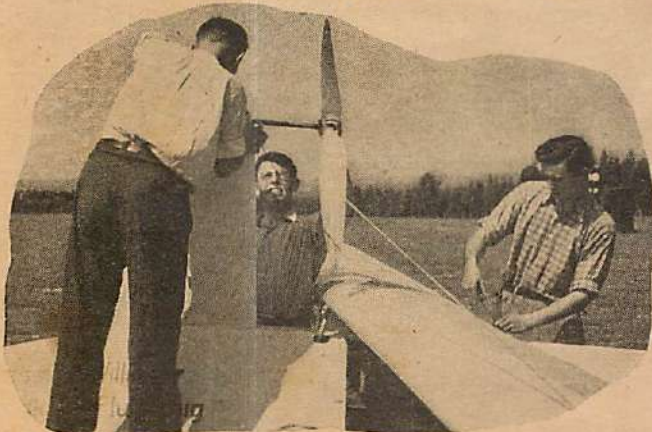
# This Winged World



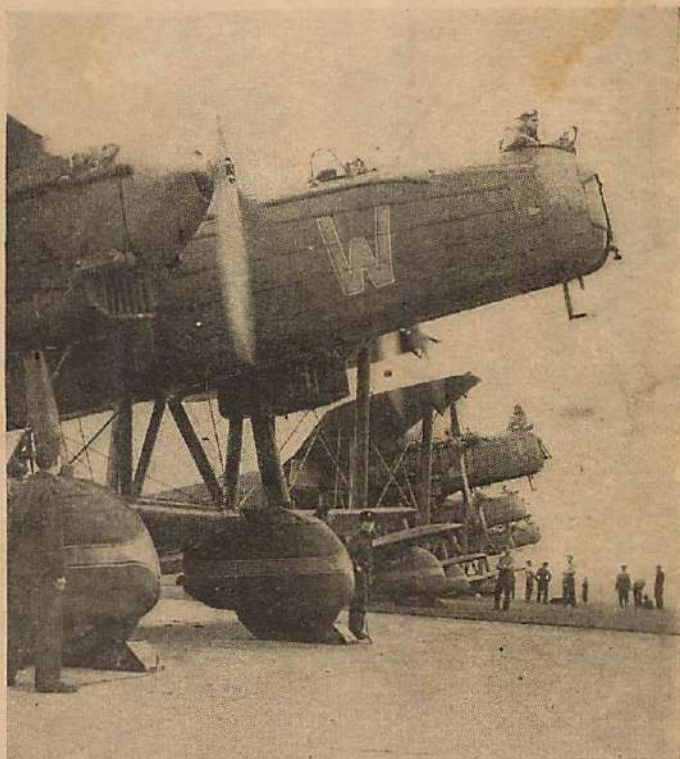
A study in perspective, 3 Avro "Ansons" reconnaissance bombers drone through the English coastal haze. Part of 146 "Redland" planes, they play the defensive rôle in war games, repelling the attacking "Blueland" armada.



Successfully tested abroad, this new helicopter combines normal flight characteristics with vertical ascent and descent advantages.

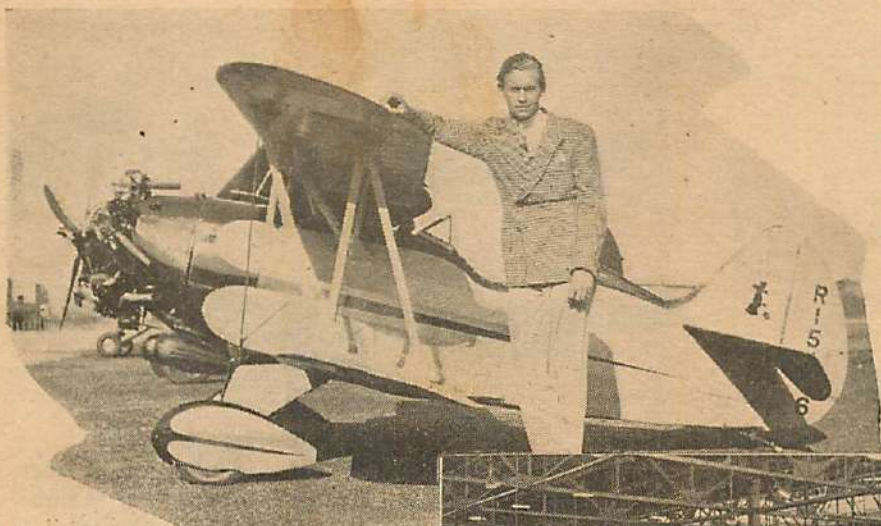


Meter mit Muskelkraft! Which seems to indicate man power to be, by means of pedal arrangements, the propelling force of this German craft.

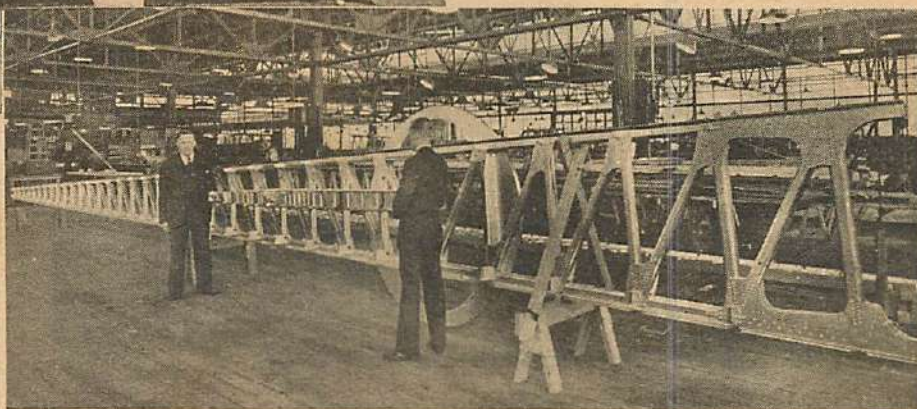


Perched in the towering fuselages of their British Handley Page bombers, the crews prepare for practice raid. The location of the propellers above the heads of the ground force enables the loading of bombs in dark without stopping engines. Reduction in ground time between raids improves the bombing squadron's efficiency.

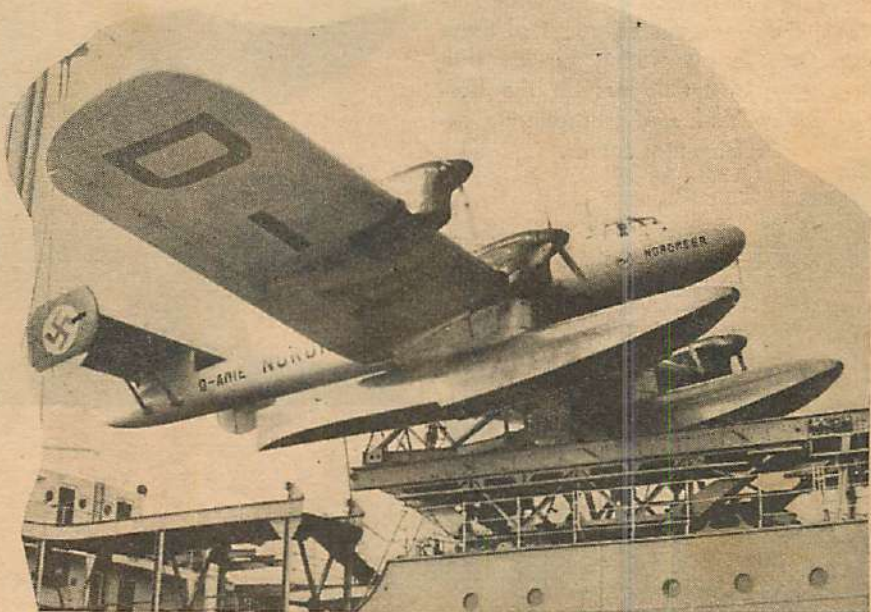




Affectionately dubbed "Snuffy," this diminutive sport plane cruises at 150 m.p.h. The ship is so small that its owner, Lion Gardiner, can lean in comfort on its top wing. For those who are interested the picture was taken at Roosevelt Field, where, on landing, the plane caused a sensation.



Not a bridge girder, but merely a left-wing spar of a new Boeing-built, Pan American Clipper. This giant craft, weighing 82,000 pounds, will carry 72 passengers. In contrast, the men in the foreground are holding a spar of the P-26A fighter, the smallest plane of Boeing manufacture.

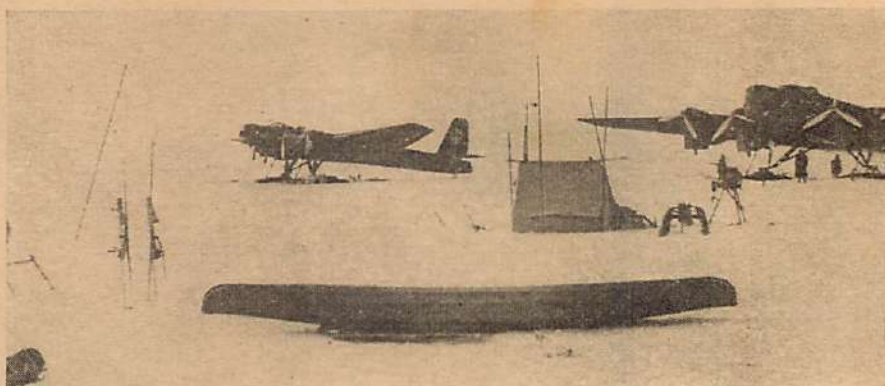


Above: Poised upon the catapult of the mother ship "Schwabenland" is the "Nordmeer," German transatlantic experimental plane. Together with its sister ship, the "Nordwind," this 4-engined, pontooned monster has been plying between the Azores and Port Washington, L. I. This latter port is now the New York terminal for oceanic planes of Great Britain, Germany and the United States.

Left: Flying to work is the newest twentieth-century wonder. New York City has been made accessible to aerial commuters by the installation of turntables and ramps. The proximity of the skyscraper in the background emphasizes the growing dependence of civilization on the modern airplane.



Right: A drifting North Pole ice flow is the strange landing place of Russian transports. Loaded with delicate apparatus to be transported to the otherwise inaccessible North, these planes have been prominent in establishing a polar base of scientific importance.

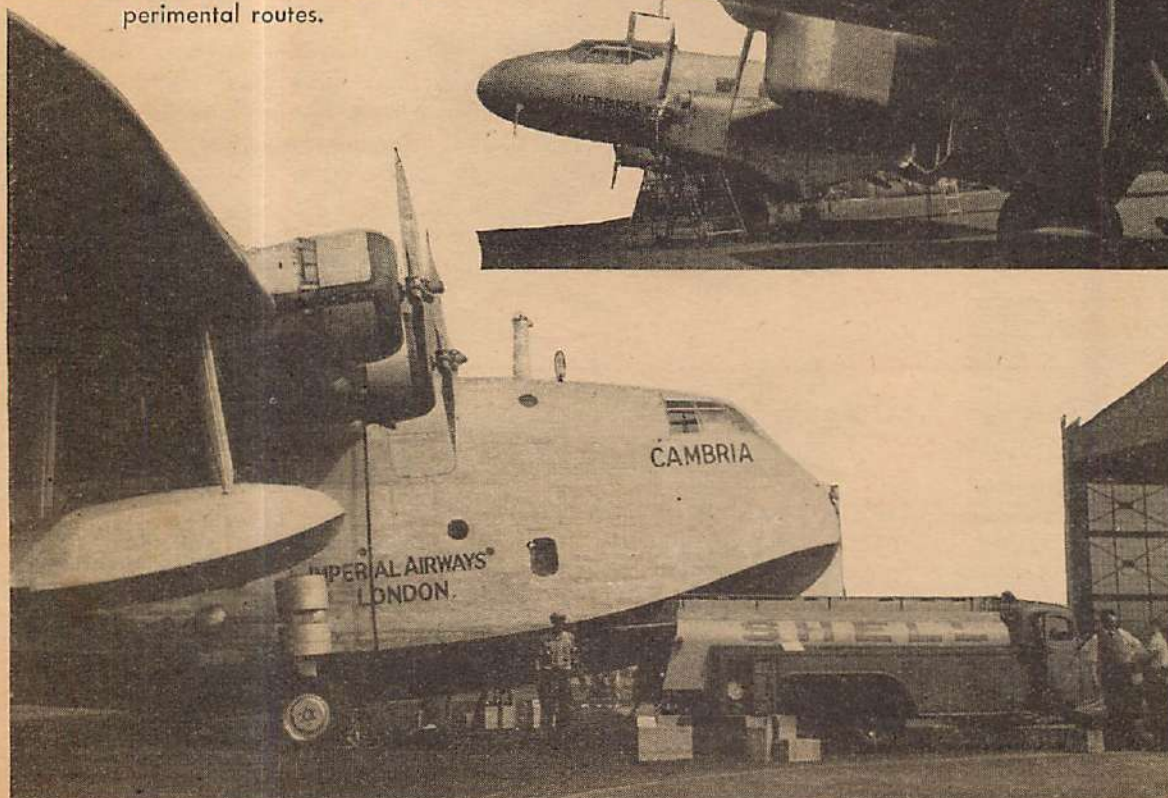
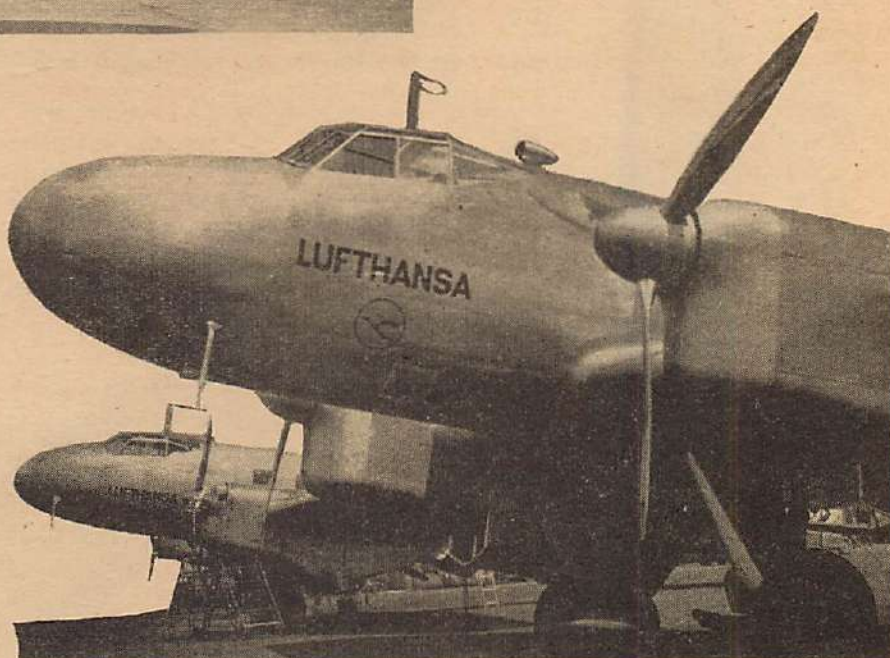


American Douglasses are flown in many far-off lands. These 2 planes, one a flagship of the K. L. M. lines, are taking on passengers at Schipol Airdrome, in Holland. The great Dutch air system, the K. L. M., ranks with our own Pan American.



Right: The finest in German passenger aviation are these Diesel-powered Junkers of the Lufthansa.

Below: The pride of England are the Empire Class flying boats. Although many are in service on Imperial Airways' European routes, some of these ships are in alternating service with Pan American Clippers on the Bermuda-New York and transatlantic experimental routes.





# AIR PROGRESS

## A Summary of Aviation News



The modern bomber, in contrast to the ships of yesteryear, is a swift and efficient messenger of destruction. Ships such as this Boeing are but stepping-stones to the planes of to-morrow.

### TRANSPORT

ALL air lines enjoyed one of the most successful summers in the history of commercial aviation. Even the Southern trips, which lose ground during the hot season, maintained splendid passenger lists. The new New York-to-Bermuda line, being run by Pan American and Imperial Airways, boasted full cabins even during the heat of August, and it is quite possible that extra planes will be put on when the winter travel rush starts.

Not only in the way of passengers did the air lines enjoy bumper rises but, at Newark, express poundage went up 25 per cent while passenger traffic showed an increase of 24 per cent. During the first six months of this year the four trunk lines flying out of Newark carried 2,303,187 pounds of mail, which is a 32 per cent increase over the same six months of a year before.

With winter coming on, all air lines are taking every precaution that they will not have any accidents due to icing conditions or radio failure. All are conducting extensive experiments with various types of anti-static radio loops and direction finders as additional aids to navigation. The Bureau of Air Commerce is installing new radio stations at focal points along the main airways. Particular attention will be paid to the trouble experienced last year at Pittsburgh and other localities, where pilots reported a tendency of the radio beam to swing off course.

The big aircraft show of the year in 1938 will be staged in Chicago, January 28th to February 6th, according to Leighton W. Rogers, president of the Aeronautical Chamber of Commerce. The show will be held in the International Amphitheater, under the management of the National Air Show, Inc., which is being backed by a number of prominent Chicago businessmen. Last year's success indicates an even larger affair for 1937.

Albert E. Hagenberger, noted pilot, who, with Lieutenant Maitland, was the first to fly from California to Hawaii about ten years ago, has been awarded a patent for a new-type sextant, which will greatly facilitate aerial navigation over long sea hops. Andrew W. Kinsley, of Dayton, Ohio, assisted Hagenberger in the perfection of this new instrument, which permits almost automatic "shooting of the sun."

A new de-icing device, suitable for civilian and private planes, has been approved by Secretary of Commerce Roper. The device will be fitted on the leading edges of wings and tail surfaces and inflated with a rubber tube, through which compressed air is forced at intervals. This improved de-icer uses fabric reinforcements in the rubber strips to minimize the possibility of tears, which was the bane of the former types used.

The airliner of 1947 will be a 6-motored flying-wing job carrying 100 passengers in cabins set in the wings, according to (Turn to page 25)

### 30 Years Ago

Henri Deutsch de la Meurthe, noted French patron of aeronautics came forward and placed his dirigible *Ville de Paris* at the disposal of the French War Ministry after the loss of the military dirigible *La Patrie*. The *Ville de Paris* was unlike the Lebaudy types having stabilizing planes above the car. French cartoonists lampooned Monsieur Deutsch as an aerial huntsman shooting wild game from the air, but years later his name was to be used as sponsor of the most important air race held in France.

Captain Charles D. F. Chandler and J. C. McCoy won the Lahm Cup, a feature of the St. Louis Aero Club air meet, with a flight of four hundred and seventy-five miles. They landed on a slag heap in the middle of the West Virginia coal regions, after remaining in the air nearly two days.

A Frenchman named Vuia startled the inhabitants of Paris with a curious bird-winged monoplane built on a tricycle landing gear, which he attempted to fly by using leg power. There is no record of actual flight, however.

Lincoln Beachy defeated Roy Knabenshue in a dirigible race held at the St. Louis Aero Park, and Captain Horace B. Wild startled the city of Chicago with a spectacular and daring flight over the city in his "Sky Buggy." Wild was one of Captain Tom Baldwin's early pupils.



Conducted by  
Gerald H. Smith

# LIGHT PLANE

*The combination of the flying-club plan and safe, dependable light planes is fast converting possibilities to actualities.*

Left: The Rose Parakeet, single place, baby biplane with the Continental 40 h.p. motor, looks and performs like a larger ship.

Above: The Fairchild 22 deserves mention because of its success during the depression years.

*Send me the news about your club, its flights, new pilots, everything—or about your own plane if you have one; also pictures if you have them. Do it now!*  
—G. H. S.

OF the total number of airplanes manufactured in the first quarter of 1937, 57 per cent were light planes in the low-priced class.

Companies manufacturing light planes are being swamped with orders and, as a result, production facilities are being expanded in plant after plant in the United States. 1937 will see light planes established as a very important part of aviation. The popular acceptance of these planes as a safe, dependable vehicle is assured.

The Taylor-Young Airplane Co. has expanded its plant production to make possible a daily output of 8 planes! On August 17th this company delivered its 200th plane to John Livingstone, famous racing and stunt pilot.

The Porterfield Aircraft Corp. of Kansas City, Missouri, has occupied its new factory which contains 55,000 square feet of floor space and makes possible a rapid and progressive production schedule.

The plane which will become as common as the automobile is here at last, and the public is reaching out toward the idea of getting pilots' licenses not only for the purpose of entering commercial aviation, but for the same reason that they got a driver's license for an automobile.

The formation of clubs is bound to be a definite part of this movement, because of the fact that in its early stages instruction is a matter of vital necessity and because a member of a club may proceed with his flying at a small fraction of the cost that would be involved in purchasing his own private plane. You and I and every one is able to own 1/20th of a plane, and each of us will find that 1/20th of that plane's time is sufficient until we are ready to fly as we now drive around the country.

High-performance records are being set day after day in light planes.

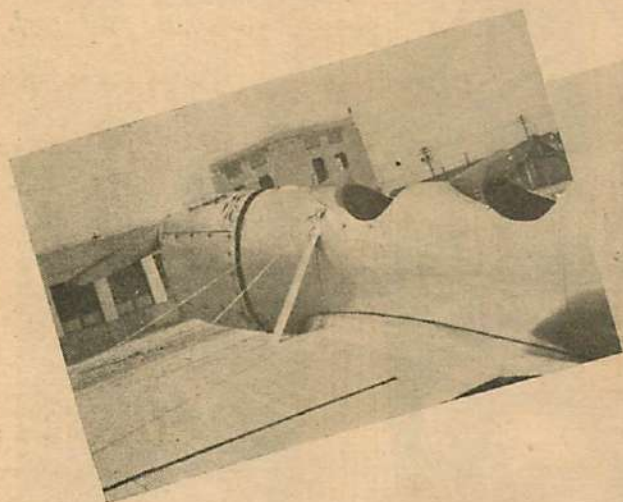
Donald Hood delivered a Taylorcraft from Alliance, Ohio, to Boston, Massachusetts. The trip occupied exactly 7 hours and the fuel consumption was only 18 gallons of gasoline.

Norman Doerr, 25-year-old flying instructor at the Sky Harbor Airport, in North Chicago, recently set a new endurance record of 24 hours aloft in a Taylor "Cub." This performance alone is worthy of attracting the attention of many people who have not previously been interested in light planes.

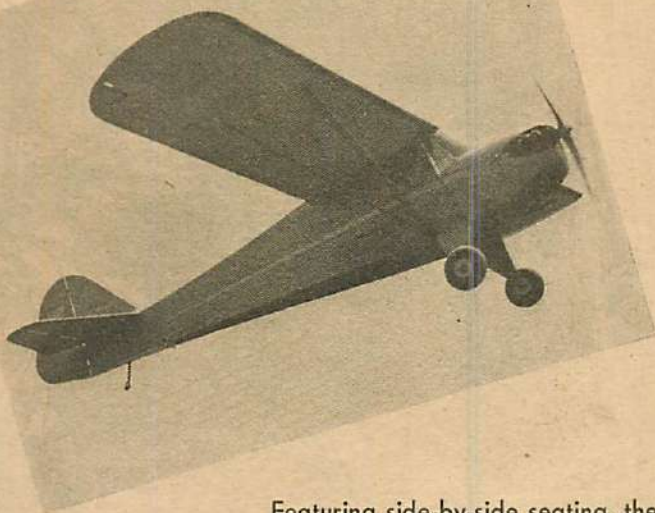
Fred Valentin of Marion, Illinois, recently flew a "Cub" from Bradford, Pennsylvania, to his home in Marion, a distance of 680 miles, in 10 hours. His trip was made under extremely poor flying conditions. The fuel consumption was 30.5 gallons of gasoline and 3



# FLYING CLUBS



In a higher-cost bracket, the Ryan S-T affords the ultimate in performance. It is available with various models of the Menasco engines.



Featuring side-by-side seating, the Continental-powered Taylor-Young is reaching new heights of popularity.

quarts of oil. The total cost of the trip was \$9.11, or  $1\frac{1}{3}\phi$  per mile.

The Everel Propeller Corp. has received formal government approval of their new single-bladed propeller and will immediately launch into an extensive production of the new propeller. As finally perfected, this propeller tends to increase in take-off speed and climb of more than 25 per cent, plus an increase of approximately 20 per cent in gasoline mileage.

It seems to free the plane from vibration and to reduce the gyroscopic action. This should tend to lengthen the life of both planes and motors.

The Rose Aeroplane & Motor Co. is increasing its production of the Rose Parrakeet to keep up with the popular demand. This ship was granted a NC license in 1935 and has turned in many excellent performances with its 40 horse power, Continental motor.

In the small, light-plane group, although in the higher-priced class, is the open cockpit Ryan S-T, produced by the Ryan Aeronautical Co. in San Diego, California.

This ship has many outstanding qualities as a training and sport plane. It is a low-wing monoplane with metal fuselage and very trim lines, with its treadle-type landing gear with pants. It turns in an exceptionally high quality of flying performance. Flying a stock model S-T, "Tex" Rankin captured at St. Louis the 1937 International Aerobatic Championship. The competition included world-renowned stunt specialists flying costly equipment.

## CLUB NEWS

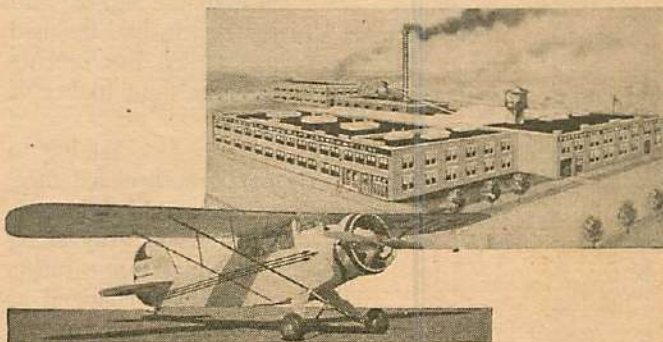
THE 20 members of the Wright Aeronautical Flying Club at Paterson, New Jersey, have purchased a Taylor-Young plane. Arrangements were made on a carefully calculated, businesslike basis. Allowing for all costs incident to the purchase and operation of the plane, each member paid \$80 to the lump fund.

Flying time is charged at the rate of \$2 an hour. This is a practical operating plan, adjusted to the immediate local conditions and typical of what any new club can do if the members are serious about getting under way.

The flying club of the Sperry Gyroscope Co. in Brooklyn, New York, has also purchased a Taylorcraft under a plan similar to that mentioned above. Thus two organizations have put their plans into practice.

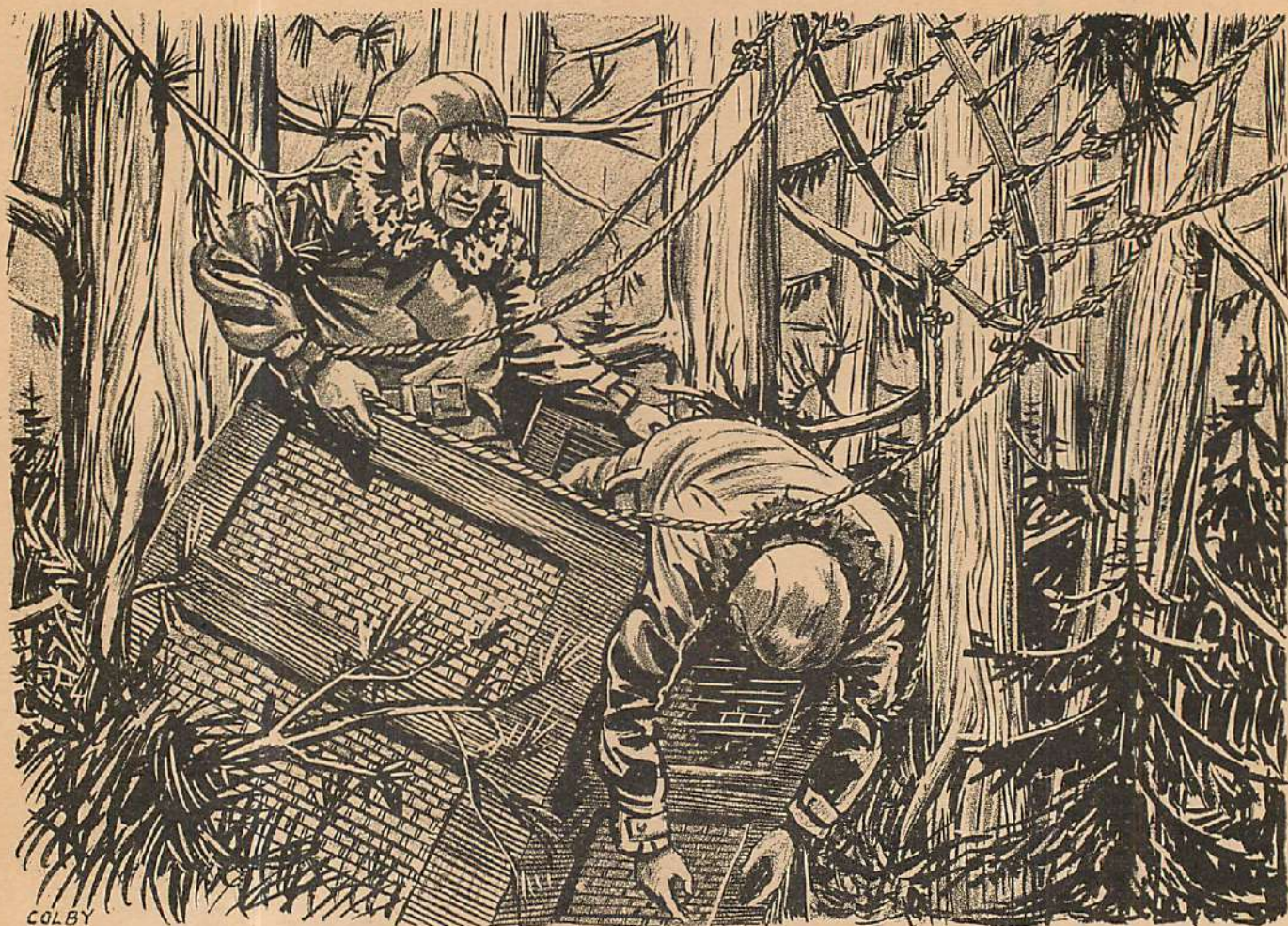
The Airhoppers Gliding and Soaring Club of Astoria, Long Island, has expanded its activities to include the operation of a Taylor-Young plane. The exceptional training gained by all members of the Airhoppers organization fits them unusually well for the added activities of a power-plane department.

An unusual experiment in student flying was recently conducted by the Akron University Cloudhoppers. Taking off at 5:24 a. m., official sunrise, and flying until 7:24 p. m., official sunset, the members (Turn to page 81)



The new Porterfield plant at Kansas City, Missouri, and the Model 90. A plant such as this is a testimonial to light-plane progress.





He hung half in and half out, as the rigging caught in the branches—

# Murder at 30,000

*They were a perfect team: what one lacked the other had; what one forgot the other remembered.*

By  
Harold Montanye

CHARLIE MARTIN'S strong, leathery hands were trembling as he adjusted the rubber elastic closers and seals of grease on the gas valve of the tugging free balloon. He glanced down through the rigging and saw that his racing partner, Varney Beach, had finished with his inspection of their oxygen tanks, instruments and automatic ballast releases within the light basket of the racer.

He was sitting on the edge of the basket, talking to one of the racing officials. His pleasant, bronzed face, with its clipped black mustache, was wrinkled in animated laughter as he talked. The touch of gray along his temples added to his dashing, debonair appearance.

The expression in Charlie Martin's eyes changed as he watched him. It changed from concern and concentration over the job he was doing to one of hatred and jealousy. He could hardly control his hands as he inspected the last elastic closer and swung himself out of the rigging. His eyes swept over the field of vari-colored

spherical bags that were swaying gently back and forth on their moorings, straining at their leashes like whippets before a race. The men who stood beside them were the crack balloon pilots of the world awaiting the final words of the starters in this largest of International balloon races.

The careful, phlegmatic Martin and the temperamental, quick-witted Beach were conceded to be the finest civilian balloon pilots within the United States. Together they had won a dozen International trophies in the twenty years they had been racing. They were a perfect team. What one lacked the other one had. What one forgot the other remembered.

For twenty long years they had been friends. And now they were enemies.

They had both been twenty years old when they reported for active duty in United States Naval Aviation at the Receiving Ship at Massachusetts Institute of Technology. They had both been assigned to lighter-than-air



craft and had fought the eight weeks' battle of Boston Tech in the same company of Flight 20. They had helped each other weather the storm of aerial navigation, machine gunning, aerial bombing, seamanship, meteorology, theory of ballooning, aerial observation, wireless and aerial engines.

Charlie Martin had been cadet captain of his company and had spent long, hot afternoons on the drill ground training his men. Varney Beach had been a file closer. He had appeared for the roll call before drill each day and after the roll call was over—and while Charlie was bawling, "Right by squads—ss! M-a-a-arch!"—Varney dropped quietly out of ranks as the company rounded the recreation building, and went up to his bunk and got a snooze.

That was the difference between them.

After Boston Tech they spent two months at Wingfoot Lake, outside Akron, Ohio, where the large rubber company had loaned their own private balloon and blimp field to the navy for a Naval Training Station in lighter-than-air craft.

When the Armistice came along and they were discharged from active service they had both sought employment with the Marathon Rubber Company. Marathon was up to its neck developing Marathon Airships, Balloons and Accessories. During the next fifteen years they worked themselves into executive positions with Marathon and became the crack balloon racing team of the world.

Then Charlie Martin fell in love with the vivacious, brown-eyed daughter of one of Marathon's officials. Every one thought she was in love with Varney Beach. But she married Charlie. Some people thought it was because Varney never asked her to marry him that she married Charlie, his inseparable friend.

Charlie was not a little flustered when he told Varney that Beatrice, "Bee" for short, Claiborne was going to marry him. He stammered over it a good bit because he thought Varney was in love with Bee.

"I hope you don't mind, Varney," he finished. "She's a swell girl and she says she loves me."

"Mind?" Varney said. "Listen, guy, I'm delighted. A ball and chain is the best thing in the world for you."

"It would be a good thing for you, too," Charlie said, flushing.

"I'm not the marrying kind," Varney said. "My middle name is love-'em-and-leave-'em."

"You'll be gettin' married with a shotgun at your back if you aren't careful," Charlie retorted.

"I'm careful," Varney said, flashing his white teeth. "So are you. We wouldn't be alive if we weren't."

Charlie and Varney still remained inseparable. Varney had the run of their house and there was always a place set for him at the Martins' table. It went along like that for five years, until Bee had reached the lovely age of thirty. She was a beautiful and desirable woman. And while Charlie seemed to grow older by the day Varney seemed to grow younger.

Bee was thirty and Charlie and Varney were forty when it happened. It was in the fall and Varney had driven his car East for a week's vacation.

The day he arrived back in Akron he went directly to Charlie's home. He was standing at a front window with an arm halfway around Bee's shoulders when Charlie came in. Charlie wouldn't have thought anything about that, although he had often been a little jealous of Varney. But there was something else that Charlie couldn't miss. He didn't notice it at first because Varney and Bee had their backs to the light as they greeted him.

But a few minutes later he saw it. He saw Bee's lipstick smeared all over Varney's lips and the blood froze in his body. He stared at it while Varney talked to Bee. Then he got up and left the room until he could get control of himself.

He never said anything to either of them about it. But he became a different man from that day on. They both noticed it but they couldn't put their finger on what was wrong with him. He watched them and spied on them constantly. At one time he thought he was wrong and he almost spoke to Varney about it so he could straighten things out in his mind and get a little peace.

But jealousy is a frightful thing. It keeps eating deeper

and deeper into the core until it has destroyed reason. Because he couldn't catch them, he hated Varney the more. He knew that Varney was cleverer than he and he thought Varney was constantly laughing at him. That was what hurt as much as anything. His pride.

He considered killing both of them, then decided against it because he still loved Beatrice. He made up his mind that Varney must pay for his theft.

When they decided to use oxygen equipment in their balloon in the International Balloon Race he thought of a way he

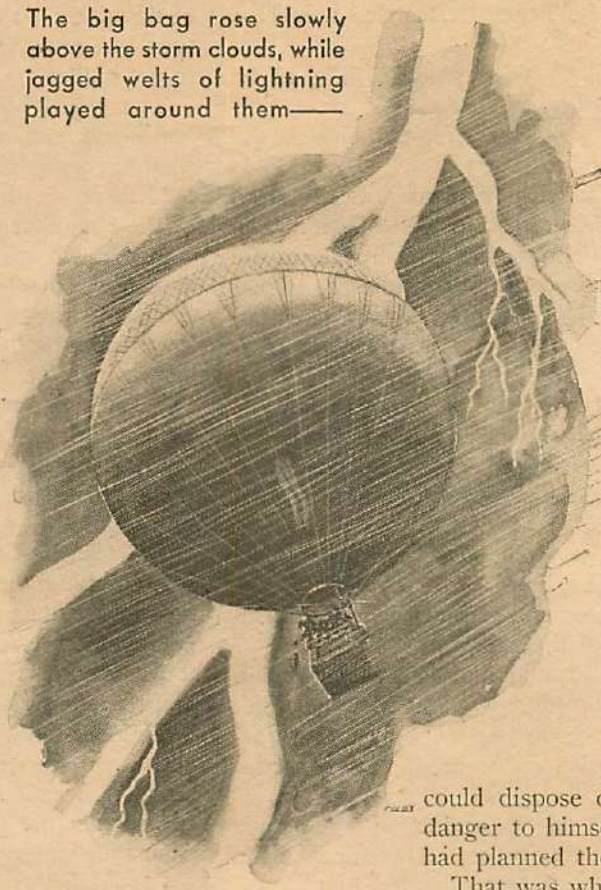
could dispose of Varney without any danger to himself. He was certain he had planned the perfect crime.

That was why his hands were trembling while he worked on the gas valve

just before the race. He knew that before another day passed, Varney Beach would be dead and he would have his wife back again. The plan he had worked out was a simple one. Its very simplicity insured its success and there would be no finger of suspicion pointed at him. He had made Varney Beach believe that the idea that would bring about Varney's death was his own.

He had suggested to Varney that during the International race they try to take their balloon up to twenty or thirty thousand feet, in the substratosphere, to take ad-

The big bag rose slowly above the storm clouds, while jagged welts of lightning played around them—





vantage of the strong constant wind that blew there. He pointed out that the westerly wind would carry them inland and there would be no danger of picking up a current that would carry them two or three hundred miles out over the Atlantic.

Varney had weighed the idea and had investigated carrying oxygen tanks and wearing leather suits to control the air pressure. In the end he agreed that it was a fine idea and had adopted it as his own. That was what Martin wanted.

He knew how simple it would be to merely turn the petcock on Varney's oxygen tank when they were above twenty-five thousand feet. He knew too that Varney would soon lose consciousness and if he, Martin, continued to let out ballast, his false friend would die before they started their downward descent. He would be wearing heavy fur-lined gloves, so there would be no fingerprints on the petcock. The whole thing would be easy enough to explain. He would simply explain that Varney had gone unconscious and had not recovered. He would turn the oxygen on again before they reached the ground.

He wished there was some way he could let Varney know that he was going to kill him and why before he died. But he discarded any thought of that. With Varney out of the way he believed Beatrice would be happy with him again.

"Are we all set, fellah?" Varney asked him as he climbed down out of the rigging.

"She's ready to ride," Charlie said, nodding to the official.

A half hour later the big bag rose majestically from the ground as the crew released its mooring lines. The earth faded away below them as the little bubble in the curved slot of their statoscope raced to the right. Great white tufts of cumulus clouds drifted slowly down to meet them as they bounced upward at nearly seven hundred feet a minute.

At four thousand feet the silver bag began to slow its ascent, and Charlie Martin pulled a knob that released a full sack of sand. The sensitive bag shot upward again and Varney Beach clucked his tongue against the roof of his mouth.

"Take it easy, fellah, or we'll burst our seams," he said without looking at Charlie.

"You watch the altimeter and the gas valve," Martin retorted. "I'll take care of the ballast!"

Varney Beach turned around and looked at Martin expecting to see a smile on his lips. But Martin wasn't smiling. Instead, he was snarling. He returned Varney's gaze with a vicious glance. Amazed, Varney turned back to his maps.

"What," he asked himself, "is wrong with the guy? He never spoke to me like that before. I wonder if I did something before we took off that offended him."

"Listen, Charlie," he said in a moment, as lightly as he could, "did I do something to offend you? I'm sorry if I did."

Martin didn't answer. He was studying the statoscope and pretended not to hear. The big bag added another five thousand feet to its altitude while he dumped sand, a little at a time now.

They were at ten thousand feet when a gale such as they had never encountered before, picked them up. It swept them upstairs into the clouds so fast they could do nothing to help themselves.

"We've got to get out of this current," Varney shouted above the shriek of the gale through their rigging. The wind was whipping the basket back and forth beneath the bag like the pendulum on a grandfather's clock. "It's eastward," he went on, "and will take us to Europe if we don't get out of it!"

Charlie Martin nodded his head and released more ballast. They shot out of the vault in which they were racing and into an upper stratum of more clouds.

Suddenly, the whole world seemed to explode into bits ahead of them and great jagged bolts of yellow streaked through clouds that were blacker than the ocean at night. The air was getting cooler and cooler as they dribbled out more sand. The bag rose slowly until it was level with the storm clouds, then began to rise above them while jagged welts of lightning played around them and the artillery of the heavens nearly deafened them. It was as though they were locked in a battleship gun turret with the big guns roaring constantly.

They both knew what one spark of electricity would do to the hydrogen in the big silver bag and they worked frantically to get above the storm.

"Let go a full bag!" Varney screamed at Charlie Martin above the terrific salvos of thunder. A current had caught them that was taking them right into the heart of the storm. Perspiration cascaded down their faces as they threw out special emergency equipment in an effort to get higher.

The world became a madhouse of flashing electricity and heavy guns all about them. Rain beat in their faces so that they could hardly read their instruments. They held their breaths as each tongue of lightning licked out of the clouds at them.

A moment later they were caught in the tail of another ascending current of air and the big bag bounced through the last of the storm clouds into the bright sunlight. Below them a battle to the death raged in the skies. Above, all was peace and quiet.

"That's something I've never seen before," Varney Beach said, and there was awe in his voice.

"And maybe you'll never see it again," Charlie Martin answered in a voice that caused Varney to stare at him again.

But Charlie Martin was reading the altimeter, and he was thinking that after they had another five thousand feet under them they would have to use their oxygen equipment. The bag was rising more slowly now, but it was rising steadily, due to the warm rays of the sun and the expansion of the hydrogen.

Suddenly, the little bubble in the statoscope began to slip down the curved slot until it was registering "descend." Martin dribbled out more sand as the cold began to contract the gas and seep through the heavy underwear they were wearing.

"We'd better get into our leather suits and oxygen masks," Varney said. "I'm getting the jitters."

The world had suddenly changed for both of them. At twenty thousand feet a peculiar depression had taken possession of them. The blue sky overhead had become gray and drab, and to lift their arms was an effort. Yet they knew that as soon as they had four or five deep breaths of oxygen the world would brighten again.

They slipped into heavy woolen suits and over them put on a thick suit of leather heavily padded with down and feathers. Fur-lined gloves, fleece-lined mocasins over their boots, a leather head (Turn to page 83)

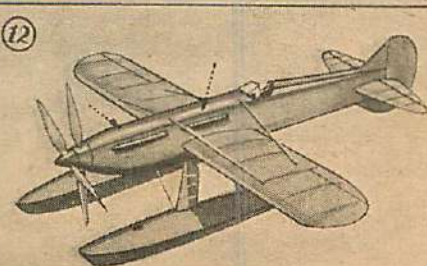
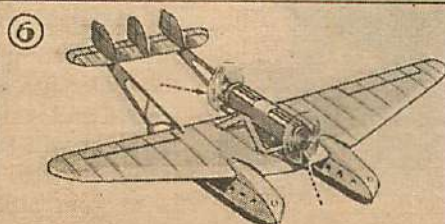
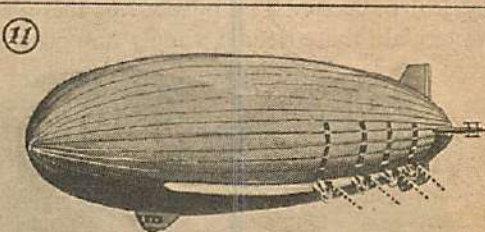
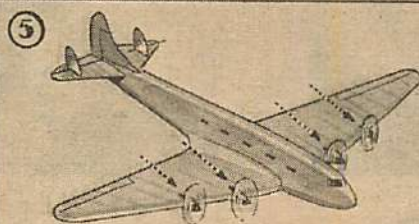
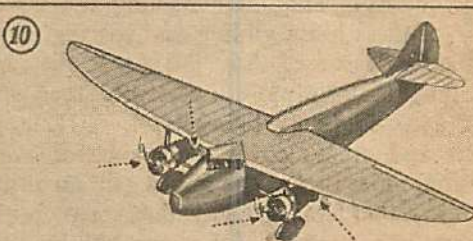
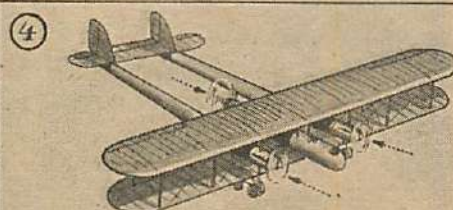
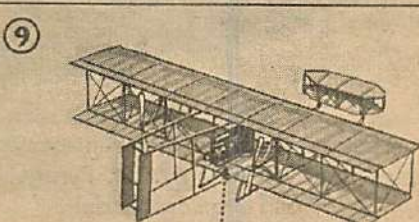
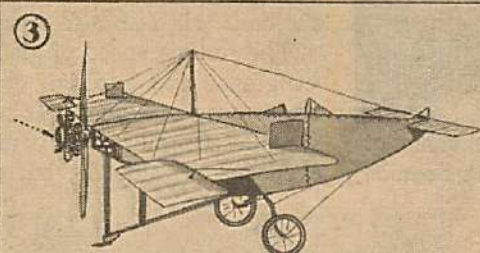
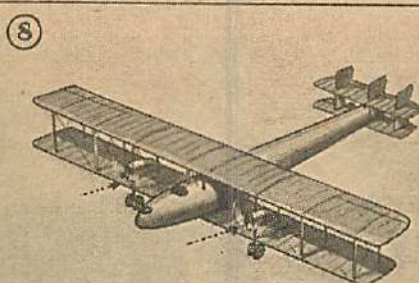
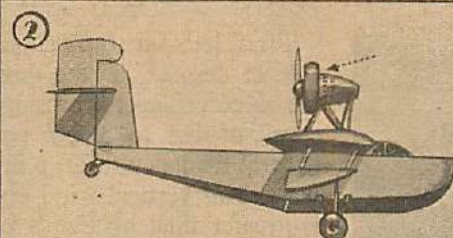
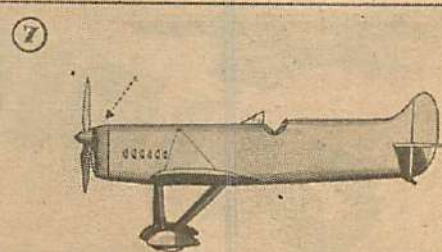
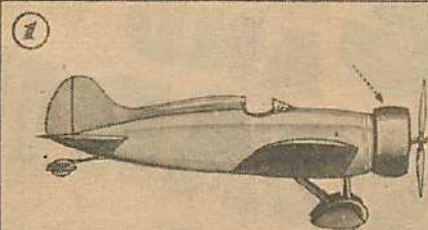


# THE FLIER'S DICTIONARY

The twenty-sixth lesson in the technical terminology of the air. Save your files!

## MOTOR INSTALLATIONS

- 1 Engine in nose of fuselage, driving tractor propeller.
- 2 Engine mounted above wing, driving pusher propeller.
- 3 Engine mounted in tail. Pusher propeller.
- 4 Three engines. One tractor on forward end of each tail boom. One pusher on rear of fuselage.
- 5 Engines mounted in wing. All tractor propellers.
- 6 Two engines mounted in tandem above the wing. One driving a tractor propeller and one a pusher propeller.
- 7 Engine mounted in nose but inverted, driving a tractor propeller.
- 8 Two engines mounted between the wings in nacelles. Both drive tractor propellers.
- 9 Engine on Wright plane was mounted on lower wing and drove two pusher propellers by means of chain belts.
- 10 Four engines mounted below the wing. Two driving tractor propellers and two pusher.
- 11 Engines of some dirigibles are within the hull, driving the propellers by means of bevel gears and shafts.
- 12 Two engines mounted tandem within the fuselage. Both driving tractor propellers.







# GLIDING AND SOARING

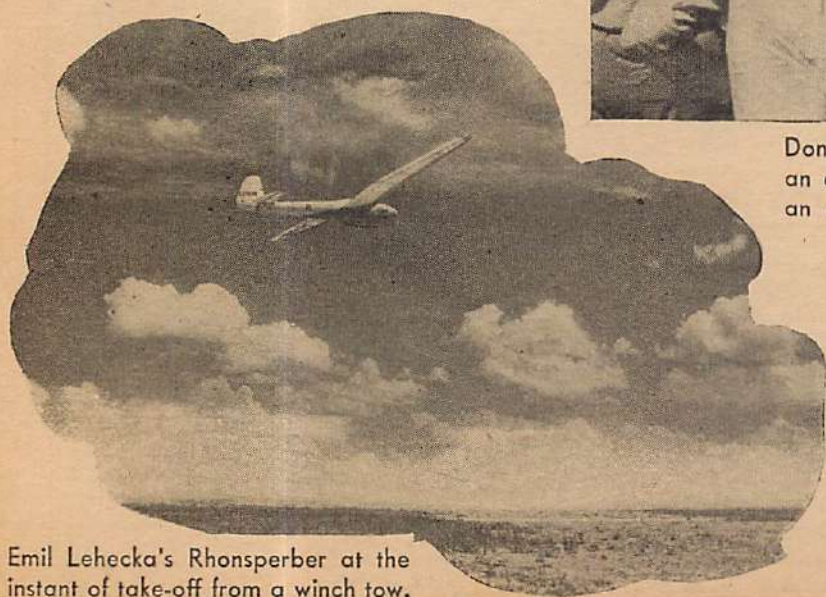
Conducted by Alexis Dawydoff



The Rhonsperber sailplane that represented Lithuania at Elmira Meet and left to right: Lt. Pyraguis, Kirk Seamon and Bronious Oskinis.

## WHAT MAKES SOARING POSSIBLE?

**N**O doubt many of you have asked this question, and after reading the account of the Elmira gliding and soaring contest in the last issue of *AIR TRAILS*, it may have occurred to you more insistently than ever. Just *how* do pilots like Riedel, duPont, Lehecka and others cover a distance of over a hundred miles in a single flight, gain an altitude close to 6,000 feet, and stay aloft for more than 6 hours at a stretch? Of course you know it's a matter of utilizing air currents, and the sinking speed of the ship is involved, but the details may still be hazy. The purpose of this article is to explain those details, simply and concisely.



Emil Lehecka's Rhonsperber at the instant of take-off from a winch tow.

First, let's take up "sinking speed." This means the rate of descent, or the downward pull of gravity, and varies according to the ship. Sailplanes have a sinking speed of  $1\frac{1}{2}$  to 3 feet per second. In soaring, this natural tendency to drop is overcome by the pilot making use of vertical wind energies, whose rate of ascent is greater than his ship's rate of descent. This ability to climb follows a definite ratio. For example, if the sinking speed of a sailplane is 2 feet per second and the vertical velocity of an up-current is 5 feet per second, the craft will rise 3 feet per second.

The sinking speed of gliders, because of their smaller wing span and different design, is greater than that of the soaring machines. It varies from  $3\frac{1}{2}$  to 5 feet per second. In gliding, of course, a ship does not gain or even sustain altitude, but continually loses it, so that



Don Wallace and the M. I. T. winch. Incorporating an automatic guillotine which cuts the tow rope in an emergency, this winch eliminates an already small hazard.

the length of flight depends entirely on the rate of descent and the initial altitude. If the glider has a sinking speed of 3 feet per second and starts at an altitude of 300 feet, its flight will last 100 seconds.

But the real purpose of motorless flying is to gain altitude, to advance from the gliding to the soaring stage, and here's where courting the air currents comes in.

The best-known type of soaring, and the kind first practiced, is that which makes



use of slope currents. Wind blowing against the side of a slope or hill obviously cannot penetrate but must go over, thus creating an upward current. The strength of such a current is governed by the steepness of the hill, the velocity of the wind and the topography of the surrounding country. This last factor is highly important, for if there are mountains with narrow valleys near the take-off site, the air will be quite turbulent by the time it reaches the slope, and unsatisfactory for soaring purposes. Given favorable conditions, however, this method of soaring is excellent for duration flights, especially above extended ridges, since the pilot can remain up as long as the wind lasts.

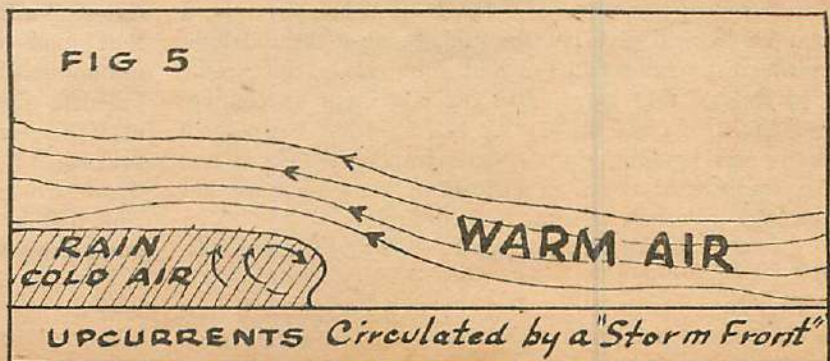
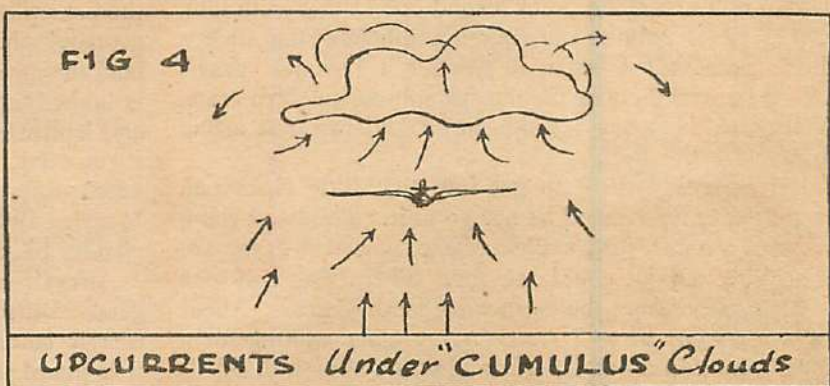
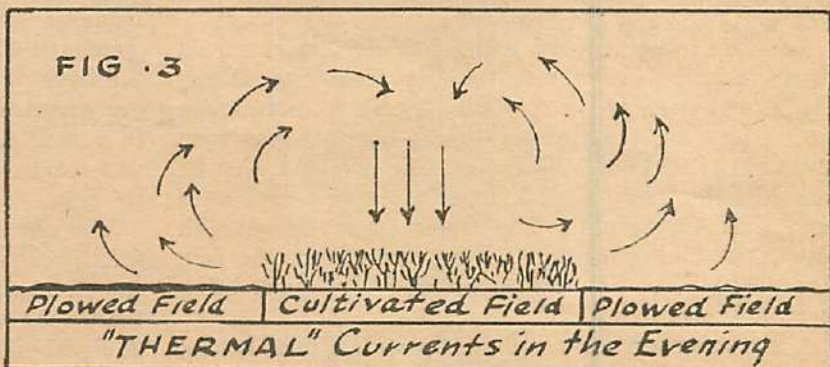
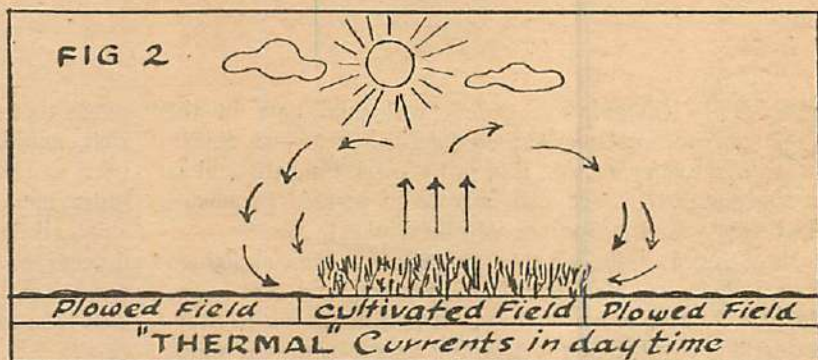
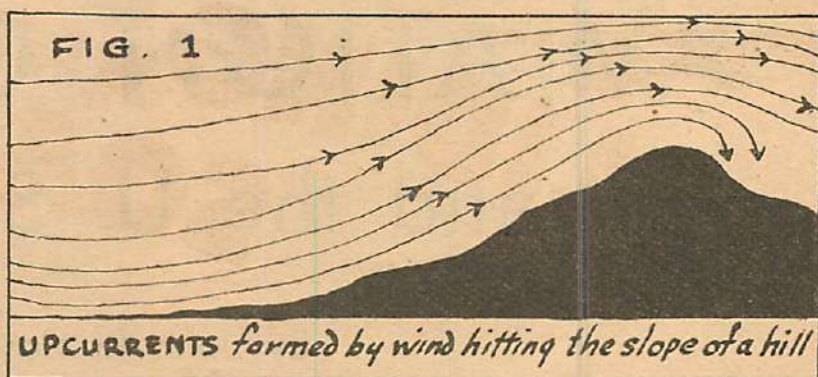
For many years slope or ridge soaring was the only type known. Then the men who fly without benefit of motor realized that thermal up-currents could be employed.

Thermal currents are generated from the uneven absorption and emanation of heat by ground surfaces. Certain of these surfaces throw off the sun's heat, as for instance a field of corn. Now suppose there is freshly plowed land on either side of the corn. This plowed land, contrariwise, *absorbs* warm air, leaving cool air in its place. The cool air rushes toward the cornfield, is heated, and starts rising, column fashion. In this manner a strong thermal up-current is built.

As soon as a pilot feels his ship being lifted in such a current, he circles to keep within its force and is carried aloft. By watching carefully he knows where the thermals are most likely to be. He knows that cultivated fields, dry sections of ground, rocks, sand stretches and buildings emanate heat. On the other hand, freshly plowed—that is to say moist—land, moors, marshes, woods and water take in heat.

All of which holds true for the daytime. After sunset this rotation of air streams reverses itself. Then moist land begins to give off the heat it has retained, while the cultivated field, cooling quickly, causes the air above it to stream down.

Thermal currents make still another type of soaring possible, and without doubt the most thrilling of all—cloud soaring. This involves the cumulus kind, those white masses with round or dome-shaped tops so often seen on summer days. When thermal currents rise to great heights, where the temperature rapidly drops, the moisture in the warm air condenses and cumulus clouds result. On a good soaring day, with the sky dotted by them, a pilot can fly great distances, for what altitude is lost in gliding from one cloud can quickly be regained by circling under another. The up-currents under such clouds are quite strong, having been known to (Turn to page 93)





# AVIATION CADETS

## and the U. S. Fleet

By John R. Hoyt

*Aviation Cadet, U. S. N. R.*

OVER 100 aviation cadets will take part in the annual maneuvers of the fleet this year—an epoch-making event, for this is the first time that pilots in the status of cadet will operate in massed problems. And next year the number will be tripled!

In a recent issue of this magazine it was explained how navy cadets were appointed, trained, and sent to the fleet for 3 years of active duty. It is difficult not to overestimate the value of the training as given by the navy, for as one of the first class that graduated from Pensacola, I know whereof I speak!

The first cadets arrived at the fleet air detachment on North Island (just across the bay from San Diego, California) in September, 1936. Fresh from training, we thought ourselves pretty "hot"—but that was soon taken out of us by the old-timers, who wouldn't even let us solo a ship until we had passed a test in course rules around North Island. The traffic is so heavy, with formations taking off and landing throughout the day, that they take no chances on a "green" pilot not being aware of rules.

I was taken up for my first hop with a pilot having around 3,000 hours with the fleet—and that is quite some time in military flying. For a solid hour I flew with him, having fields pointed out, but not touching the stick a single moment! I began to wonder if I would "pass," i. e., if he would check me out for solo in the darn crate. About the third day he did, and I had my first actual flying with the fleet.

It was a real thrill to get into that little Grumman single-seater fighter and let her go to it. The latest thing in naval aircraft, fast, maneuverable, powerful—they are everything a pilot could ask for. There was only one point to remember: the retractable landing gear. About the second day or so I stood by my plane waiting for a hop; coming in around the Island was a section of F3F's—Grummans. Just then I noticed that one of them had his wheels up! Lower and lower he came. Surely, I thought, he will give her the gun, because the red light on the instrument panel would shine in his face if he tried to land that way! But the pilot kept on coming, until the final pull on the stick as he set her down for a three-point landing, right on the fuselage! There was a scraping, and the trim little craft went over on her back, not so much as scratching the pilot.

"A pretty dumb trick," says I. "Next to impossible. I'll never do that!"

So I took off, put the ship through her paces for an hour, and turned back to North Island. Now in each

plane there is a check-off list: gas on reserve, mixture rich, stabilizer back, and *wheels* down. I came in, trying hard to obey every course rule, keep my eyes peeled for other planes (the groove, or traffic lane, is filled with ships all day long). About the time I was ready to land it occurred to me that I'd better check the check-off list—and when I got to wheels—well, they were *up*! So that was Lesson 1,000: *What happens to one pilot may happen to you. Don't get cocky.*

Within a week or two we started to practice carrier landings—that great bugaboo of the new pilot. We wondered when we'd have to fly out and land aboard the *Saratoga*, if we'd get aboard, and so on. But imagine our surprise to find that more than a month of landings in a *small field*, simulating actual conditions aboard ship, was required before beginners like us were allowed *near* the ship.

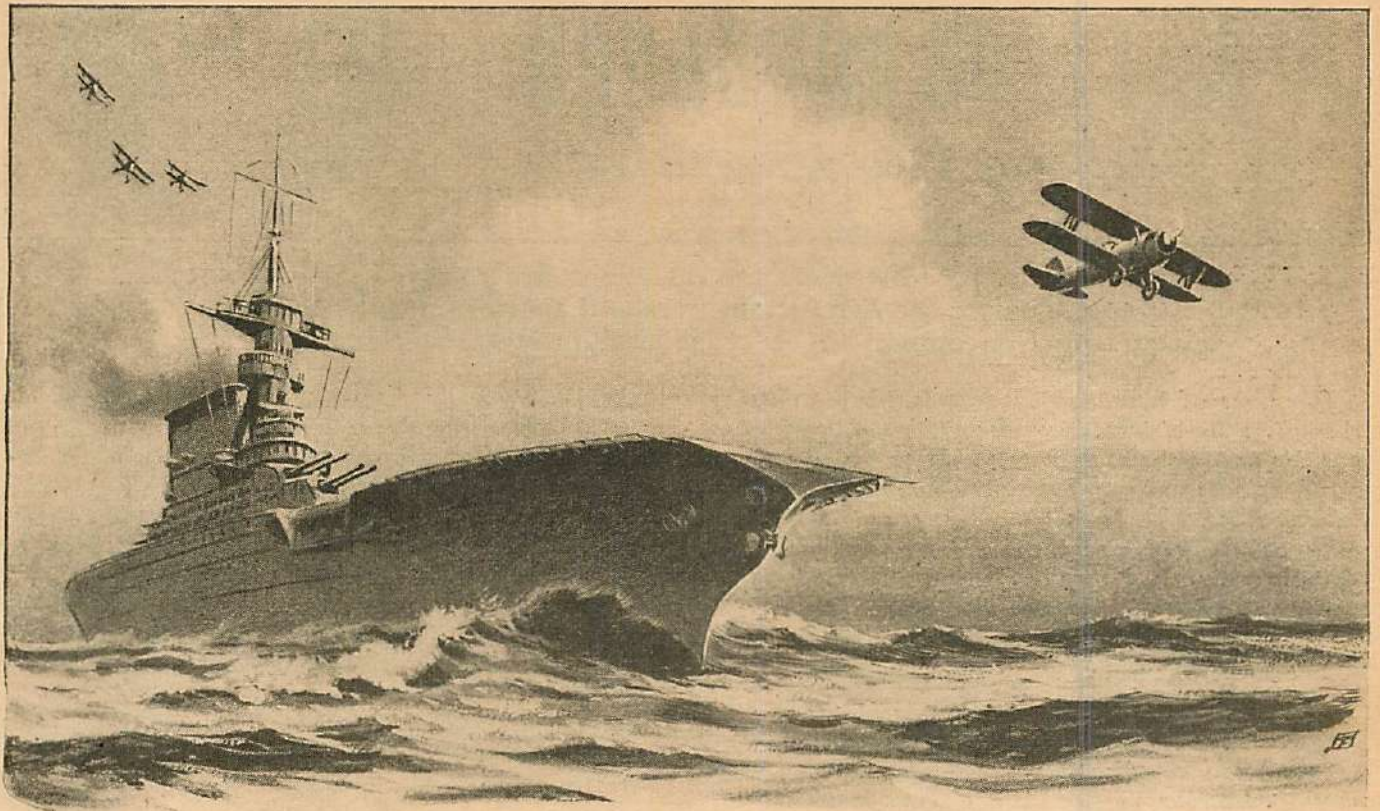
The day finally came when a certain group took off for the carrier. Once over the ship the sections circled waited for the signal, "Land Aboard." Then one by one the planes went down, came up the groove and landed. A signal officer stood on the stern, signaling instructions with a couple of flags. I came up slowly, nose high, in the prescribed manner, flying as slow as possible without actually spinning in, because the ship must be ready to land the minute the gun is cut. Space aboard the carrier is limited, and a pilot can't "float" clear across the deck and land when the plane is out of flying speed. Finally, I got a cut, whacked my gun, and landed. It was not much different than it had been on the field at North Island. But the real difference was that I was *much* gladder to set down than I ever had been back there!

Aircraft carriers are not without their attending dangers. During one short cruise a cadet came in for a carrier landing. Astern of the carrier was the regulation guard of 2 destroyers, ready to pick up any plane that might have a forced landing in the water. The cadet pilot came down, concentrating on the carrier, intent upon coming up the groove as he should, with a minimum of flying speed. So intent was he that he failed to observe the destroyer astern of the carrier, and at 100 miles an hour crashed into the mast of the little "tin can." His plane nosed over and fell into the sea; the destroyer backed down, but so fast did the Grumman sink that by the time it backed to a stop, the cadet had gone down with his plane.

Perhaps the greatest thrill we have is dive bombing, whereas the most interesting work is fixed machine-gun practice. In dive bombing great speeds are attained;



*Over 100 Aviation Cadets will take part in fleet maneuvers this year—next year the number will be tripled!*



from a high altitude the ship is nosed over until practically vertical. The ship is aimed at the target, held steady until the proper altitude is reached, and the bomb dropped. Then an easy, steady pull-out—and up for the next dive.

It isn't all so easy as that sounds, however, for sometimes complications arise. At one time I went up with a bad head cold, and by the time we reached 10,000 feet my ears were quite uncomfortable. Then we started back down—a bit faster this time—and at the end of the dive I thought my head would burst with pain! I had shattered my eardrums, due to the great, unequalized pressures that were built up in coming from a comparatively rarefied atmosphere into a denser one. Result: no flying for about a month.

Then, too, the manner of pull-out is important. If you pull out too slowly the ground is liable to come up and hit you—or so it seems. If you pull out too abruptly a certain law of Newton's comes into effect, namely, that a body in motion tends to move in its own path. In other words, a diving plane tends to continue in the dive, and a sudden pull out causes a strain on the wings, the pilot, and motor. The strain is measured in Gs, or multiples of gravity. If a pilot pulls out easily, only 2 or 3 Gs may be experienced, whereas an abrupt one puts from 7 to 15 Gs on the plane and pilot.

One pilot claimed that his method was easiest: he pulled out with a snap of the stick, very abruptly, but only momentarily so. One day he came down, dropped his bomb, and pulled back on the stick. Probably 15 Gs were exerted on his wings, which promptly peeled off, leaving both plane and pilot to continue in the original

dive, as Newton's law would have it. It took him, at his tremendous speed, only 4 seconds to reach the ground—hardly time enough to get out of the cockpit, much less pull the rip cord.

Altogether, being on active duty with the U. S. fleet is about as interesting an experience as one could desire or imagine. I often recall the days at the airport when a half-hour hop was all I could afford, and that at \$12 an hour. To-morrow we go out for a 3-hour tactics problem, flying 750-horse-power planes costing anywhere from \$100 to \$200 an hour to operate, and at the end of the 3 hours we will be longing for *terra firma*, a place to stretch our aching limbs, and a hot cup of coffee.

As junior officers, we have duties that are informative and interesting: engineering, upkeep, overhaul, gunnery, and flight. When we are not flying there are many things to keep us busy—but, of course, who wants to do book work instead of fly! At the end of our 4-year period we should have, besides our thousand hours, an adequate knowledge of an airplane and what makes it go—which should make us an asset on somebody's air line.

Between now and that distant time we are looking forward to exciting days in distant ports: Honolulu, Alaska, the Canal Zone. Rumor has it (good old rumor, or scuttlebutt: the one thing the navy has plenty of!) that we may see Europe before we're through. And then the adventure of going to sea (the best part of which is getting back home!) will be a thrill for many a land-lubber who has never smelled salt spray before. So with two more years as aviation cadets, we say to each other, "Fly low and slow, and may your carrier bounces be little ones!"



# What's Your Question?

## By CLYDE PANGBORN

### Wing Commander



As soon as possible after the questions are received, the Wing Commander of the Air Adventurers will answer on this page such questions as appear to be of general interest to our members.

*Question: I have had an argument concerning the size of the Lakehurst Naval Air Station Hangar. Is it possible to put the Hindenburg and the Los Angeles in the Lakehurst hangar at the same time? C. A., Elizabethtown, Pa.*

*Answer:* As far as width is concerned both ships could be placed in the hangar at once, but the length of the *Hindenburg* was 804 feet, whereas the inside measurements between the closed doors is 806 feet, which would leave but a foot of space at each end.

*Question: I am a Canadian boy of fourteen. Can you tell me how much I could make as a test pilot, and how much such a course would cost? V. A., London, Ontario.*

*Answer:* A good test pilot might make anything up to fifty thousand dollars a year, if he is regularly employed, but the few test pilots available to-day have to hold other aviation jobs between calls for their test work, so it is difficult to figure how much they actually earn.

*Question: Some time ago you stated that the world's altitude record was 49,967 feet, and held by an Englishman. Recently I read that an Italian has flown to 51,348 in a Caproni 161. Which is right? A. M., Boston, Massachusetts.*

*Answer:* Both were right at the time of writing. That is, Squadron-Leader Swain of the R. A. F. did hold the record, but by the time our magazine came out it was broken by Pezzi of Italy. Now, to show you how things go, another Englishman, Flying Officer Adam, has broken it again with a flight of 53,937 feet. Perhaps by the time you read this the Italians will have taken the record back again. Please try to remember that our magazine has to be made up weeks ahead of the issue date.

*Question: How does a department of commerce inspector go about testing a ship before it is given a license? J. C., Lima, Ohio.*

*Answer:* The flight test of an aircraft offered for a license is a normal examination of the plane in flight. The inspector first gets the manufacturer's report, signed by the firm's test pilot, showing that the craft has been fully test flown through all required maneuvers. Then the inspector takes the ship up and flies it to find out whether, under all load and power conditions, it displays adequate control in a landing at a minimum landing speed with tail down and the power off. It must prove

to be longitudinally, laterally, and directionally stable under all load and power conditions. Full details of this work may be found in the U. S. Department of Commerce, Bureau of Air Commerce Bulletin No. 7-A, which may be obtained by writing to that department in Washington, D. C. The inspector has a regular routine to follow, which requires considerable time. It is hard, painstaking work and only the most conscientious pilots can carry it out. They are all highly skilled men with experience in design, engineering, and practical flying.

*Question: Is the plywood used on modern airplanes just plywood, or is it chemically treated? W. D., New York City.*

*Answer:* The most important feature of aircraft plywood is the type of glue used. The subject has a wide scope, but various types of glue are used, depending on what part of the structure the plywood is to be used. Plywood used on leading edges would have to be built to stand certain torsional strains, whereas that used on hulls or pontoons would have to be made with glue selected for its resistance to water. You could get fuller details by writing to the air commerce bureau and asking for the required standards.

*Question: I am interested in the construction of a light plane and would like to know where I can obtain my State laws on the licensing of such a craft. B. B., Phoenix, Arizona.*

*Answer:* Write to M. C. Hankins, secretary of the Arizona Corporation Commission for a copy of the State aviation laws. This body has full charge of aeronautical operations in the State. You must have a Federally licensed craft and hold a Federal pilot's license to fly in your State. The Arizona Corporation Commission is in Phoenix.

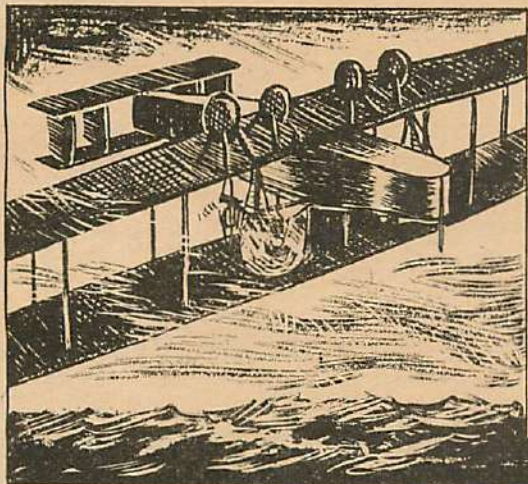
*Question: How old must I be to get a job as an airplane designer for the government, and how must I go about getting such a job? T. S., Houston, Texas.*

*Answer:* You must first take a recognized course at one of the government-rated schools, which means you would at least have to be of college age. After that, it's all up to you. Designers usually start low in a factory and work up to the exalted position of chief engineer. The U. S. government usually selects its own designers from the flying ranks and sends them through special schools, on inspection trips abroad and through recognized universities and high-ranking factories.



# SPLIT-SECOND ACTION

*Hair-breadth escapes, hair-trigger decisions, dangerous moments that come once in a lifetime.*



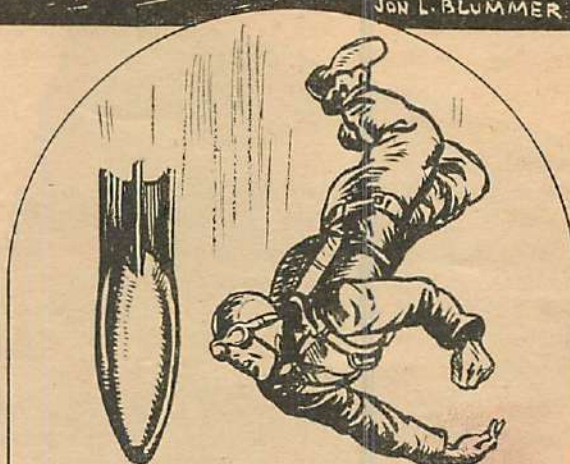
ALCOCK AND BROWN IN THEIR MEMORABLE TRANSATLANTIC FLIGHT WERE, FOR A TIME, FLYING UPSIDE-DOWN. FLYING BLIND, DUE TO FOG, ALCOCK, BELIEVING THEY WERE HEADED DOWN, TURNED THE NOSE OF THE SHIP UP. CONSEQUENTLY, THE PLANE MADE A HALF LOOP, JUST MISSING A TAIL SPIN. THEY DID NOT REALIZE THEIR POSITION UNTIL THE BLOOD, RUSHING TO THEIR HEADS, MADE THEM FEEL DIZZY.

JON L. BLUMMER

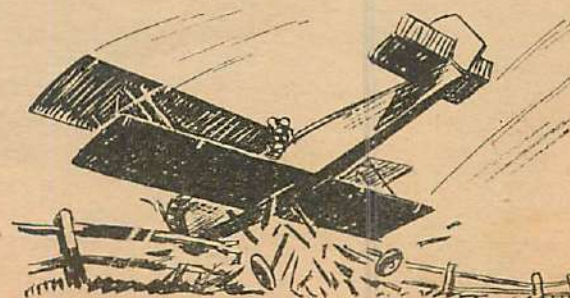
WHEN A PLANE CRASHED NEAR HIM AND BURST INTO FLAMES, PRIVATE JOHN B. SMITH, OF THE ARMY AIR CORP AT FT. CROCKETT, TEXAS, ALTHOUGH INJURED BY A PIECE OF FLYING DÉBRIS, RUSHED INTO THE BLAZE AND EXTRICATED THE UNCONSCIOUS PILOT, WHOSE FOOT WAS CAUGHT IN THE CONTROLS, AND DRAGGED HIM TO SAFETY—A MOMENT BEFORE THE GAS TANK EXPLODED.



JEAN ELLIS, A NOVICE PILOT, WAS FLYING SOLO, HER PLANE AT FULL SPEED, WHEN THE THROTTLE STUCK. SHE ATTEMPTED TO LAND BY COMING IN LOW AND CUTTING THE SWITCH, BUT EACH TIME OVERSHOT THE FIELD. SIGNALS AND SIGNS FROM HER INSTRUCTOR FAILED TO AID HER. FINALLY, THE GAS RUNNING LOW, SHE CUT THE SWITCH—BUT TOO SOON! THE LANDING WHEELS HIT A FENCE. THE PLANE TURNED OVER AND SLID ON ITS BACK. JEAN UNFASTENED HER SAFETY BELT AND FELL FROM THE COCKPIT, RECEIVING, THEN HER ONLY INJURY—A SLIGHT CUT ON THE FOREHEAD.



FLYING CADET J.A. PHILLPOT HAD BEEN ACTING AS OBSERVER, HIS HANDS TAKEN UP WITH SCORE PAD AND MICROPHONE, WHEN THE BOMBER LURCHED AND THREW HIM THROUGH THE BOMB BAY. HE FOUND HIMSELF RACING A BOMB TO EARTH. QUICK ACTION WITH HIS CHUTE KEPT THE RACE FROM ENDING IN A DEAD HEAT.





# Instrument

By James Smithson

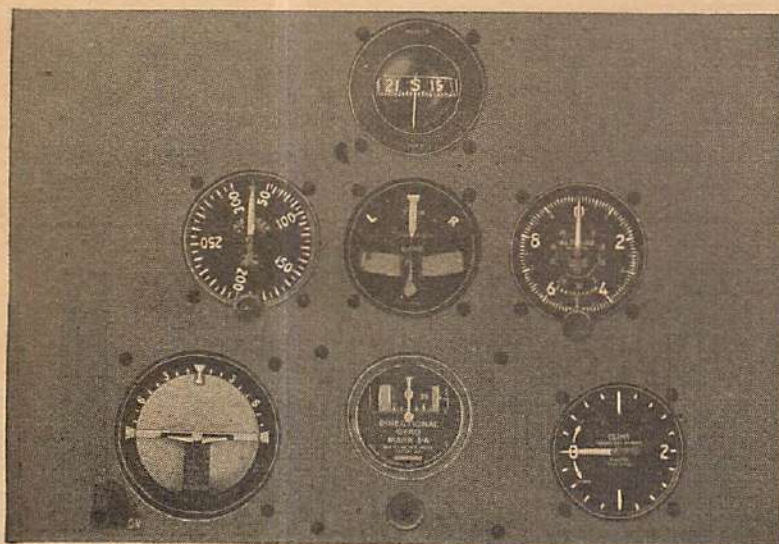


Fig. 1. The instrument panel. Top: magnetic compass; middle, left to right: air-speed indicator, turn and bank indicator, and altimeter; bottom: Sperry horizon, directional gyro, and rate-of-climb indicator.

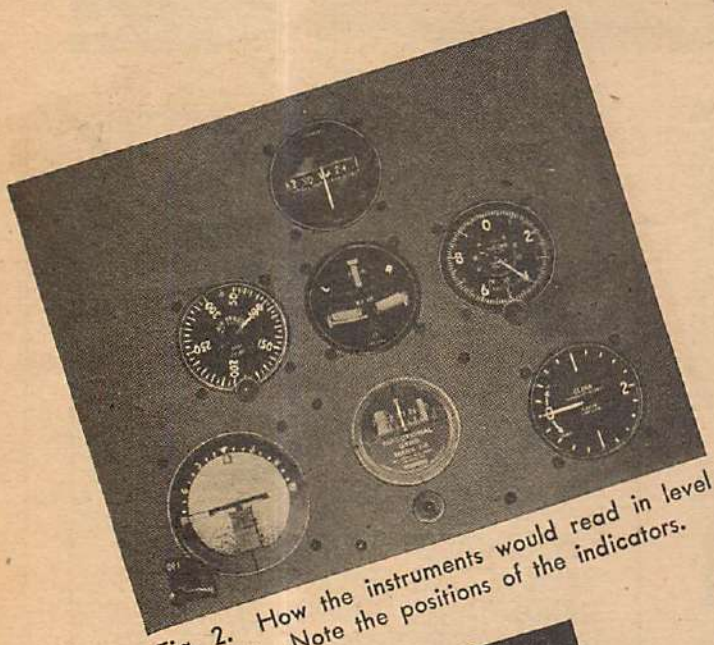


Fig. 2. How the instruments would read in level flight. Note the positions of the indicators.



Fig. 3. A right turn; note especially the turn and bank indicator and Sperry horizon.

ONE of the least understood phases of aviation is the art of blind flying. The term conjures a variety of pictures in the minds of the uninitiate, depending, of course, upon the degree of their acquaintance with the subject. Some see it merely as the plunge of an aircraft through a medium of no visibility, in much the same manner and with as little attendant inconvenience as one experiences in passing through a darkened room. Others have it connected in some vague way with the radio beam and are content to let it drop at that. The better informed know that the plane's instruments have a great deal to do with it but are uncertain as to just what kind of instruments they are and whether they or the radio beam is the more important. Very few persons really understand what is meant by "blind flight."

Nor is this surprising. In the first place, the greater proportion of persons interested in aviation are not familiar with the science of piloting itself, of which blind flight is a refinement. Secondly, a great number of those who are pilots have little or no acquaintance with the art. This does not include the air-line and military pilots of to-day, who are required to be familiar with the practice, but it did apply even to them as late as 1932, at which time the army conducted tests on pilots picked from those classes and found less than three per cent capable of controlling the airplane in flight while under the hood.

To arrive at some understanding as to what the art of blind flight involves, it must first be realized that the physical and psychological make-up of man renders him basically incapable of controlling a plane in blind flight without artificial assistance. A few simple tests, which, although they do not fully explain the phenomenon because they do not go deep enough, will serve as a partial illustration: let the reader stand on one foot and try to maintain balance with his eyes closed. This, he will find, can be done, but not without considerable difficulty. Next, let him try walking or driving a car in a straight line while blindfolded. He will find in-



# FLYING

*Instruments are the cornerstone of modern flying—on them depends the future of transport and light plane.*

variably that his trail ends up in a spiral. Almost every one has had the experience of believing that the train or trolley car on which he is seated has begun to move, and has braced himself against the imagined movement, only to find that it is the train on the adjacent track that is pulling out. Probably every one who has spent the night on a Pullman sleeper has at some time been unable, upon awakening, to tell in which direction the train is traveling. Similarly, in a closed-in elevator, the passenger is unable to ascertain from physical sensation whether the car is going up, or down, or has stopped altogether, so long as no acceleration or deceleration is taking place.

The foregoing illustrations are cited chiefly to introduce the fact that, in order for a pilot to control his airplane, he must have a visual reference point by which to orient his own position relative to the earth. This reference point may be an object on the earth itself, the horizon, or a star; but whatever it is, it must present a definite and easily recognizable fix with respect to the earth's surface, in order to be of value to the pilot.

Physiologists attribute this necessity for a visual reference point to the fact that sight introduces a corrective factor to the human body's balance-regulating organisms, which organisms form a part of the inner ear and are known as vestibular labyrinths. In the absence then, of the corrective influence of sight, the vestibular labyrinths, when stimulated as they are by motion or force, may send false impressions of motion and balance to the brain and reflex centers of the body. In these circumstances, the pilot, being himself in a state of disorientation, is incapable of controlling his aircraft.

"What then," the logical question arises, "is needed as a substitute for this visual reference point in order that balance may be maintained and blind flying accomplished?"

For an answer it might be well to imagine oneself "under the hood" with a pilot undertaking a blind flight. Directly ahead of the pilot, lying in what is known as the instrument panel, the faces

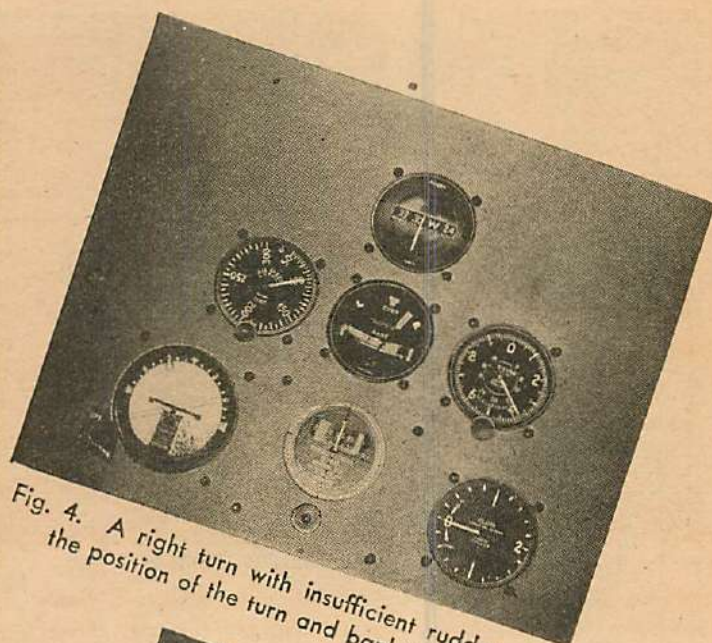
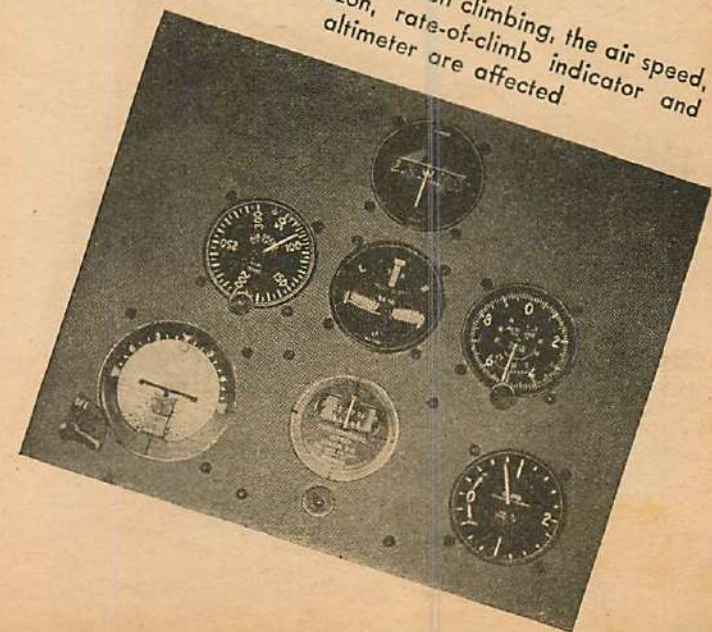


Fig. 4. A right turn with insufficient rudder; note the position of the turn and bank indicator.



Above: Fig. 5. Right turn with too much rudder.

Below: Fig. 6. When climbing, the air speed, Sperry horizon, rate-of-climb indicator and altimeter are affected





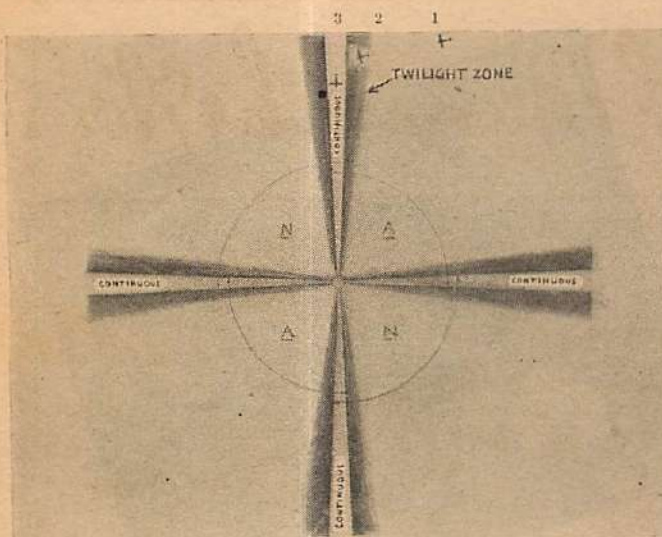


Fig. 7. How the radio beam emanates from a radio-beacon station.

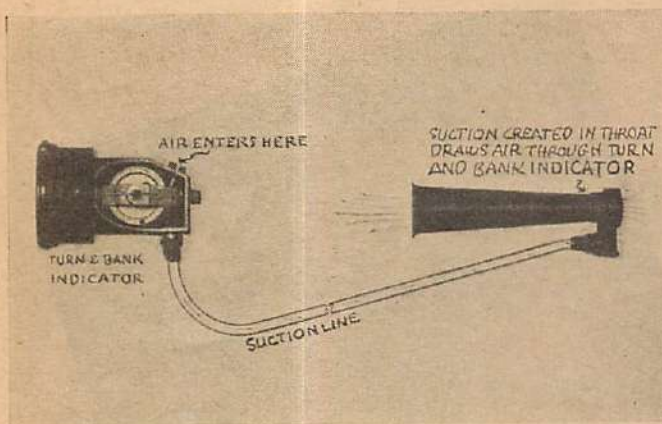


Fig. 8. How the turn and bank indicator functions.

of half a dozen or more instruments will be observed. Some of these belong to the key instruments, without which the flight would be impossible, others to supplementary instruments which, although not indispensable, serve to facilitate the procedure. In the first classification are listed: the magnetic compass, the turn and bank indicator, the altimeter, and the air-speed meter. In the second (only the most commonly used of which will be mentioned) are: the rate-of-climb meter, the directional gyroscopic compass, and the artificial horizon.

Figure 1 illustrates how a panel carrying only those instruments previously mentioned would probably be arranged. The grouping is an ideal one and might necessarily be deviated from in actual practice, but the general arrangement is pretty closely followed in the cockpits of most instrument-equipped planes.

It will be noticed that the instruments of the first classification, i. e., the four most important ones, are grouped together at the top of the panel. Inasmuch as these are the ones by which blind flight is actually accomplished, their operation should be of primary interest.

The first, the magnetic compass, is sufficiently well known to require little discussion. Its operation depends on the fact that the bar magnets, which are securely fastened to its "card," continuously seek the magnetic north point of the earth. Thus when the airplane turns, the compass card remains steady (theoretically), its

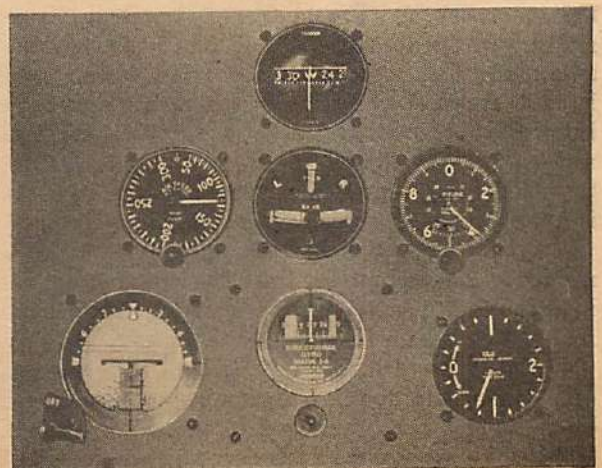
north end pointing toward the magnetic north of the earth. The heading, therefore, of the plane is at all times shown by one of the three-hundred-and-sixty-degree graduations, into which the card is divided.

The second, the turn and bank indicator, the instrument to which the pilot gives his closest attention, is worthy of more detailed investigation. It is, as the name indicates, a combination of two instruments, the turn indicator and the bank indicator. The bank indicator consists merely of a liquid-filled, curved glass tube containing a steel ball. Its function is to denote whether or not the pilot is giving the plane the correct amount of bank (inclination) for the amount of rudder carried. In other words, if the plane is carrying too much bank while making a turn, it is slipping sideways toward the earth. The ball indicates this fact by falling to the lower end of the tube. If there is too much rudder being carried, the tail of the plane will tend to skid upward away from the earth and so will the ball. The same thing will happen if too much rudder is being carried in level flight, i. e., the plane will skid, which will be indicated by the ball's moving in the direction of the skid. The bank indicator is fastened in the face of the turn indicator.

The other half of the combination instrument is the turn indicator. Its operation is based on the fact that a gyroscope, while spinning, will maintain its position in space—that is, the position of the axis about which it is spinning will not change unless it is acted upon by some outside force. When it is acted upon by an external force it always shifts its axis in a direction ninety degrees from the direction of the applied force. Actually, the mechanism of the instrument is very simple, consisting merely of a little gyroscopic wheel which is made to spin through the action of a jet of air spraying against little cuplike hollows in the wheel's surface. The air jet is generated by the sucking action of a Venturi tube, which is placed out in the air stream and is connected to the turn indicator by a small metallic tubing.

When the turn indicator is in its place on the instrument board and its little gyroscopic wheel is spinning, this wheel will maintain one position as long as the airplane is flying straight. When, however, the airplane commences a turn, this tends to disturb the gyroscope so that it will seek a new axis of rotation, i. e., will precess in a direction ninety degrees from the (Turn to page 91)

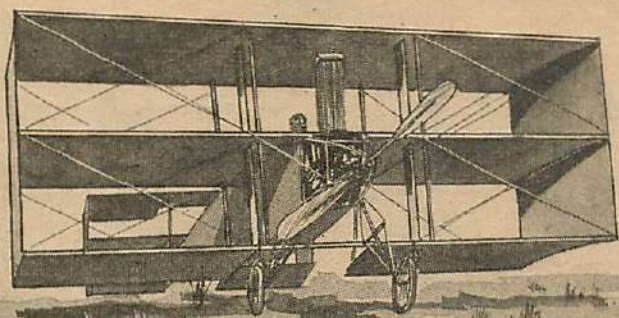
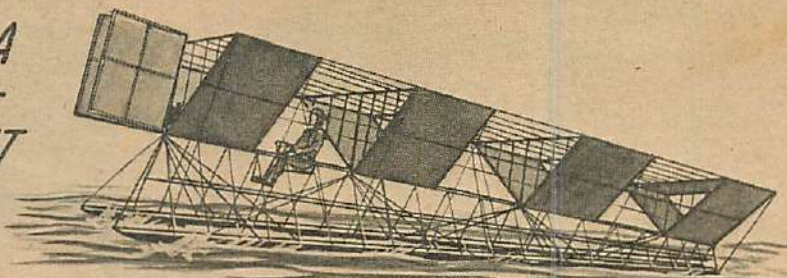
Fig. 9. Gliding. Note the negative reading of the rate-of-climb indicator, the increased air speed, and the Sperry horizon.





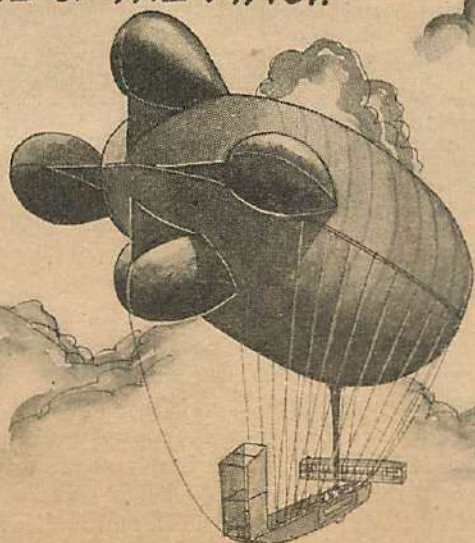
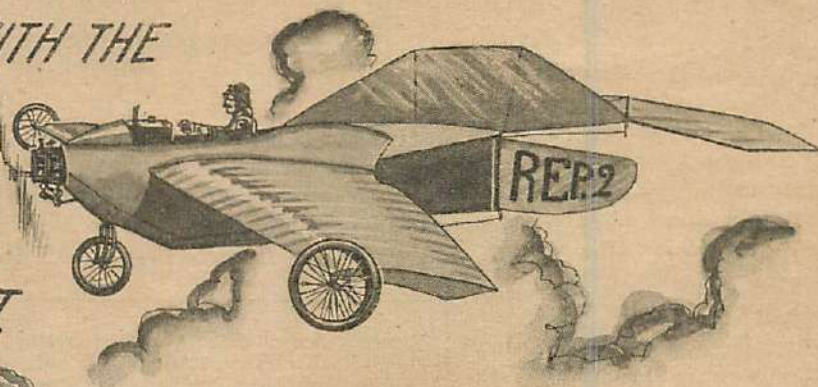
# Pictorial History of Man in the Air

**1909** THIS YEAR SAW A RADICAL TYPE OF SEA-PLANE IN FLIGHT ABOUT NEW YORK. IT PROVED IMPRACTICAL AND WAS FINALLY ABANDONED BY ITS BUILDER, ISRAEL LUDLOW.



**1909** AN OUTSTANDING EUROPEAN PLANE OF THIS YEAR WAS THE TRIPLANE "GOUPY I" USING A TRACTOR PROPELLER.

**1909** COMPETING WITH THE "GOUPY I" WAS THE "ESNAULT-PELTERIE'S" MONOPLANE, WHOSE AIR COOLED ENGINE WAS ONE OF THE FIRST.



**1909** DURING THIS YEAR ALSO APPEARED THE FIRST COMMERCIAL DIRIGIBLE, THE "VILLE DE NANCY." THIS CARRIED VISITORS TO THE NANCY EXPOSITION HELD IN FRANCE.





"A completely new set of tactics will have to be devised to meet the unusual combat possibilities of this radical fighting machine."

# BATTLE CRUISER

*As a defense against the new "Flying Fortresses," the Bell fighter constitutes the most potent offensive weapon in aerial history—the plane on the cover.*

By Frank Tinsley

**S**HORTLY after the dawn of aerial combat, during the first bloody years of the World War, sky fighting became and still remains a highly specialized affair. Although a first-rate airman in his own department, the skilled pursuit pilot is usually a total loss in the cockpit of a big bomber. Conversely, the first-chop bomb chauffeur frequently looks like an awful monkey when faced with the controls of a 300 m.p.h. single-seater. All of them, pursuit, observation, attack, and bombing pilots, have been carefully trained for their own particular jobs, and they do them superlatively well.

Like the training accorded the men that fly them, the planes, too, are built for special purposes. Early in 1915 military pilots began to notice the advantages and disadvantages inherent in the design of both their own and enemy planes. They soon discovered that certain types of enemy ships had two strikes against them when attacked by particular models of ours in certain ways. After losing an undue number of pilots in these types, the enemy figured out the fatal defects, and hurry calls began going back to the designers to correct the disadvantages. So began the

even more highly developed specialization of plane against plane, model against model.

To-day's aerial warfare in Spain and the Orient shows that the same principle is still in operation. The little, snub-nosed, Russian pursuit ships called "Chatos" (flies)

have proven far superior in fighting qualities to the Italian "Fiats" and German "Heinkels." So we find both Italians and Germans stalling for time, while their designers work frenziedly on new models to answer the Russian threat. American plane builders watch the proceedings with pleased smiles, being well aware that the terrible "Chatos" are merely Soviet-made copies of a more or less obsolete U. S. fighter. The smiles broaden when news

Designed and constructed under the most secretive restrictions, the Bell fighter was still undergoing modifications when this article was being prepared. Observers had even reported the landing gear to be painted black to frustrate prying eyes! The drawings of this "mystery fighter," which appear on page 45, represent the latest reliable information as the magazine went to press. By the time this issue has reached your hands, the daily press may have carried pictures indicating the final disposition of external details.

comes that the highly successful light bombers in use by both the Loyalist forces in Spain and the Chinese around Nanking are our own Northrop and Martin designs. Thus far the hostilities in both areas have proven that as regards the production of efficient fighting machines, the United States is running neck and neck with England at the top of the list.

Recent American developments in the heavy-bomber



class have resulted in an entirely different problem of plane-vs.-plane specialization. The new giant "Flying Fortresses of the Air" produced by Boeing have proven so fast and powerful in defense that even the best of our pursuit ships have little chance against them. This impasse has resulted in a controversy among aerial tacticians as to whether or not the pursuit ship has at last reached the end of its usefulness. European designers have answered the problem by slapping more power into their single-seaters and arming them with various combinations of automatic cannons and machine guns. The most potent example of this technique to date is Tony Fokker's twin engine, two-place fighter described in the April, 1937, issue of AIR TRAILS.

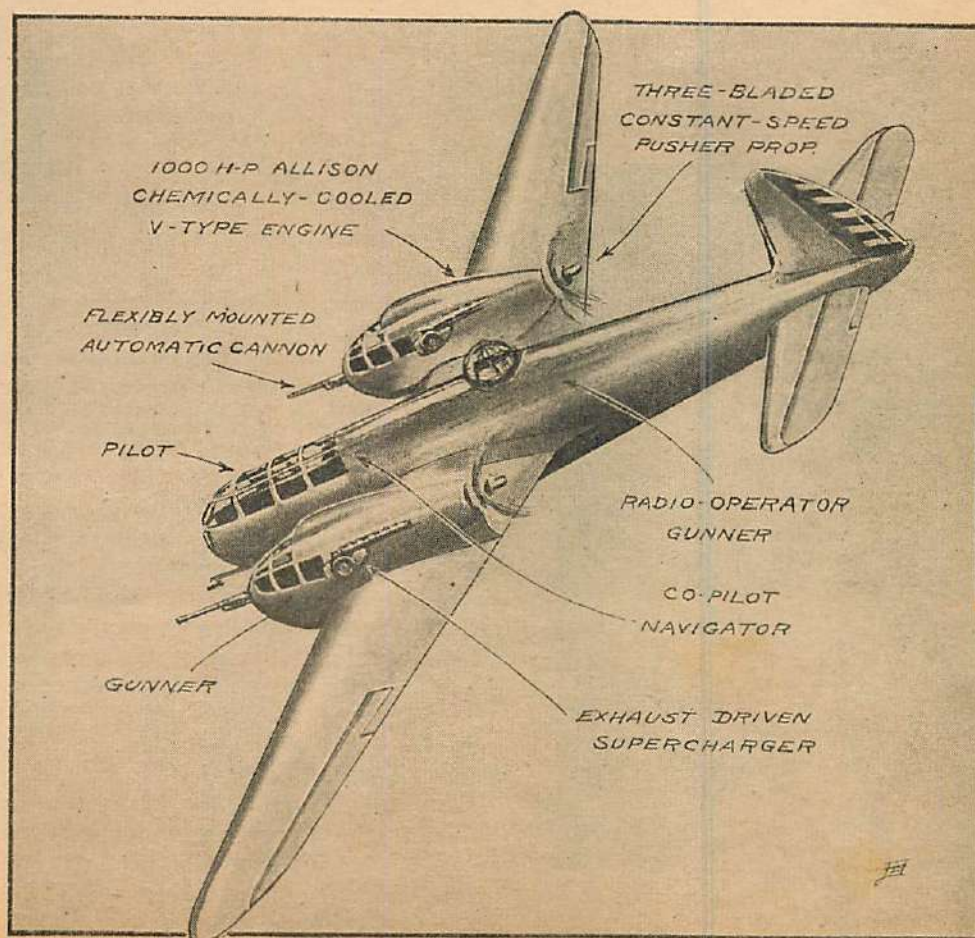
The American solution of the puzzle has just appeared in the form of a miniature "Battle Cruiser of the Air" produced by the Bell Aircraft Co., of Buffalo, N. Y. This firm, headed by Lawrence D. Bell, formerly general manager of the Consolidated Aircraft Corp., has been engaged since its organization in producing as sub-contractor, wing panels and other parts for Consolidated flying boats and military models. Their new fighter, designated XFM-1 (Experimental Fighter Multiplace No. 1), is a product of the engineering skill of Robert J. Wood, one of the ablest young airplane designers in the country. It departs from conventional pursuit design in almost every feature and will undoubtedly result in a radical alteration of present-day pursuit tactics.

The Bell XMF-1 is a twin-engined, low-wing, monoplane of all-metal construction, manned by a crew of five and armed with two automatic cannons and four machine guns. The power plant consists of two supercharged Allison chemically cooled engines driving three-bladed, electrically controlled, constant-speed propellers. The Allison Model 1710 is a twelve-cylinder, sixty-degree V-type engine producing well over 1,000 h.p. This new power plant has been in process of development over a period of several years by the Allison Engineering Corp., of Indianapolis, Ind., in collaboration with air-corps engineers. It is cooled by Ethylene Glycol passing through a radiator situated on top of the motor nacelle, just back of the gunner's cockpit. The unusually small frontal area of this radiator is made possible by the enormous heat-absorbing ability of the chemical compound which has a boiling point of 380 degrees Fahrenheit and is almost twice as efficient as water for the purpose. The arrangement of the cylinders in banks and the position of the exhaust ports particularly adapt the Allison engine to the exhaust-driven turbo-supercharger. These superchargers enable the Bell Fighter to operate at levels above the new-type bombers.

Another radical innovation in the power-plant installation is the placement of the propellers in a pusher position behind the trailing edge of the wing. This arrangement permits the nose of the nacelle to be fitted up as a gunner mechanic's cockpit. Comfortably screened from the wind and unhindered by propellers, these gunners can make engine adjustments and light repairs during flight. During combat they man the automatic cannons mounted flexibly in the extreme nose of each nacelle. These formidable guns fire explosive shells at long range and should prove a potent answer to the increased defensive armament of to-day's heavy bombing planes.

The fuselage of the XMF-1 is long, deep, and narrow. The pilot sits in the nose, well ahead of the outboard nacelles, where he has perfect flying and fighting visibility. Behind him, placed in tandem, is a seat for the co-pilot navigator. Both men are protected from the weather by an air-tight, transparent inclosure. Just aft of the trailing edge of the wing is a cockpit for the radio operator, who doubles in lead as tail gunner. All these positions are intercommunicating. Pilot and co-pilot can exchange places readily, as can "Sparks" and the outboard gunners. The last-named gents crawl from their nests in the engine nacelles into the fuselage through passages in the center section of the wing. The location of the outboard gunners permits easy communication with the pilots during combat, by means of visual signals. In addition, all posts are connected by telephone and heated to provide for crew comfort at the plane's fighting ceiling of well over 30,000 feet.

The landing gear of the new ship is equipped with wheel brakes and is fully retractable during flight. The main wheels lift into the belly of the outboard nacelles, where they nest beneath the engine (Turn to page 86)





# AIR ADVENTURERS

## The Honor Roll For November

### FLIGHT LIEUTENANT

Claude P. St. Amant, Senatobia, Miss.  
Norman Hanley, Lewistown, Mont.  
Ellsworth Halbohn, Brooklyn, N. Y.  
Alfred Borkenheim, New Albany, Ind.  
Larry Miller, Brooklyn, N. Y.  
Oldrich Foucek, Binghamton, N. Y.  
Clyde Wallace, Madison, Ind.

### OBSERVER

Francis Quattuch, Hannibal, Mo.  
Miss Franny Loomis, Merrill, Ore.  
Leo Burnett, Camden, N. J.  
Kay Goff, Riverside, Cal.

### TOPOGRAPHER

Samuel McCulley, Jr., Berlin, N. J.  
Jas. Fitzgerald, South Pittsburgh, Tenn.

Charley Brateres, Castle Rock, Wash.  
N. E. Hanna, Bangor, Co. Down, North-  
ern Ireland  
Terence A. Taylor, Featherston, Waira-  
raha, New Zealand

### AIRPLANE MECHANIC

H. Warren Willhoite, Portland, Ore.  
Jack L. Taufer, Los Angeles, Cal.  
Arthur Patak, Carlstadt, N. J.  
Warren G. Honecker, Sewickley, Pa.  
Wm. T. Burke, Wildwood, N. J.  
Jack Efferth, Lakewood, O.  
Edward Bergethon, Brooklyn, N. Y.

### PHOTOGRAPHER

Arlo Koontz, Onawa, Iowa  
Douglas C. Atkins, Ely, Vt.

Laverne R. Doupe, St. Marys, Ont., Can.  
Fred Dieber, Glen Ellyn, Ill.  
Harold C. Hale, Rockport, Mass.  
Robert M. Smith, Manhattan Beach,  
Brooklyn, N. Y.

Raymond Fisk, Prince George, B. C., Can.  
Walter West, Philadelphia, Pa.  
R. B. Maudling, Beverly Hills, Cal.  
Raymond Gray, Indianapolis, Ind.  
James Caffrey, Waterbury, Conn.  
J. D. Orlando, Rochester, N. Y.  
Herbert S. Luft, New York, N. Y.  
Stanley Peterfreund, City Island, N. Y.

### ENGINE MECHANIC

Howard Wright, W. Summerland, B. C.,  
Can.  
Warren Vreeland, Pittsfield, Mass.  
Harry S. Leon, San Diego, Cal.

## The Call Of Aviation

**A**VIATION is a grim taskmaster at times, and you who would discipline yourselves can select no better hobby or profession than that of an air pilot or designer.

Since its conception, aviation has sounded its call to young and old. In the early days the gray-haired sci-

tists sat and pondered on wing design, lateral control and power, while youth accepted the challenge and went aloft on flimsy frames of wire, linen and bamboo.

We have often wondered what it is about aviation that attracts the youth in man, regardless of his age, for, after all, years are only relative. There are no years in the man who flies or sits before the design-

ing board of flight. We like to believe that only hare-brained youth sits at the controls, but when we look over the rosters of our great air lines, the men with the greatest responsibilities are men

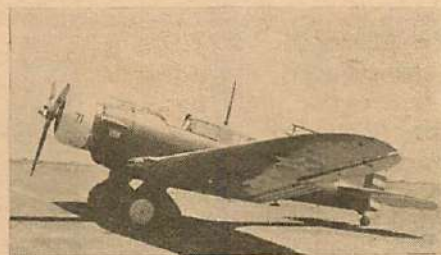
many years past their teens. Aviation, the grim taskmaster, has reversed many of the rôles in flight. To-day, it is youth who sits at the drafting board and puts down on paper the first streamlined lines of the coming airliner or bomber, while the men of greater years, men who have learned to discipline themselves under great stress, are tooling the airliners across continents and across oceans.

Youth and age, then, are combining their skill and making aviation what it is to-day, and old man Aviation makes sure they toe the mark. Youth must sit for years—his most responsive years—in the halls of science, learning what aviation laws demand. Later on he can take his dreams and put them on paper and nurse them through the blue-print stage, the mock-up and finally into the production loft. After that youth of another caliber must take that new plane and make it obey his will, or prove to himself that one of the great laws of aviation has been broken. He's the test pilot.

Then when youth has built, and built well, seasoned age takes it over and says: "Thanks. It's a beautiful



Miss Mary Murth of Verona, N. J., and her 5 ft. Cub flying model.



William Larkins, of Oakland, Cal., submitted this Northrop Attack photo.



ship. Now I'll do my part and guide her across the air lanes and build up an industry so that you may continue on and build even better planes."

That's aviation to-day. It demands the best of all of us; youth with new ideas and the courage and ambition to carry them out; steady and solid middle age, capable of living clean and hitting schedules and pin points on the nose; then an even deeper sounding of age—men who have been trained in business and with experience in the halls of finance—men who can think and act in terms of millions. They are all a part of the greatest industry in the world.

We, of Air Adventurers, have a creed, written months ago, and sworn to by thousands of heads-up men and boys. That, without our realizing it at the time, might have been the creed of aviation. It has seven points and we like to mention them now and then, because they mean so much to us and we hope they mean much to you. They are: *Self-reliance, Courage, Initiative, Loyalty, Integrity, Independence, and Obedience*. No one in aviation who means a thing, whether he be an air-line pilot, a leading designer, an amateur pilot, skilled craftsman, a glider pilot or a model builder, can succeed without them. Take any of the seven points, mull it over a few seconds and you'll realize that it cannot be ignored in aviation.

Aviation is a grim taskmaster, and those who can maintain their positions are keeping the Air Adventurers' creed. You can't build or design a new fighter without the courage of your own convictions. It must have taken a tremendous amount of courage and initiative for Lawrence Bell to risk his standing in the profession, when he first suggested a twin-engined pusher plane to replace all single-seater fighters. Boeing required a wealth of loyalty to his great ideals when he first poured his money into the "Flying Fortress." Our light-plane enthusiasts, in their own way, have had to develop a high degree of integrity to go into the business of purchasing a plane and then fighting off all inherent fear of flight to get their private tickets. Even our younger readers make great sacrifices and build up their first true spirit of independence when they work and save to get the money together for their gas-model motors.

We want more readers, of all ages to join Air Adventurers. We'll send you a copy of our creed if you really want one. You can join by filling out the membership coupon in the lower right-hand corner, and inclosing 10c to pay for the mailing of your certificate and wings.

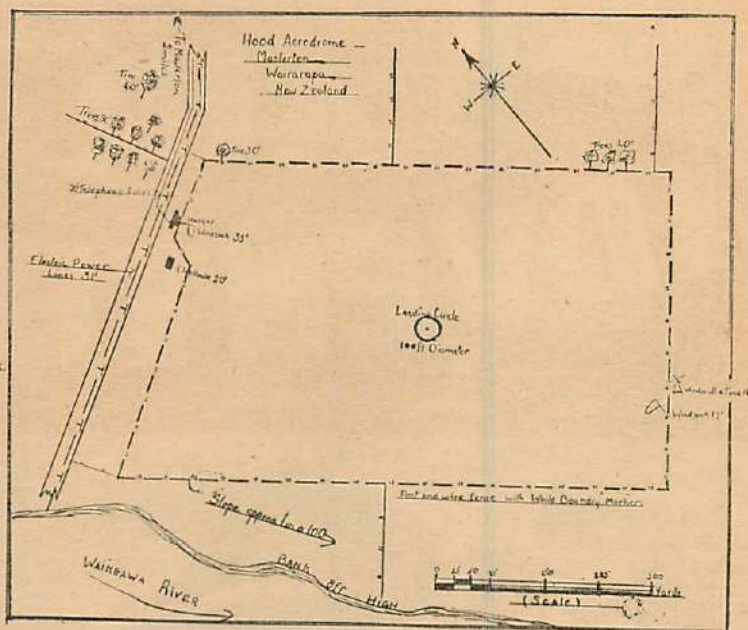
Controlling Authority  
Sovereignty and Power  
Over the

(Radius)  
Latitude 41° 38' S  
Longitude 174° 38' E  
Magnetic Variation 17° 30' E  
Annual Change + 3'

Leading Lines  
N-S 340 M  
NE-SW 1.20 M  
E-W 6.00 M  
SE-NW 7.00 M  
Altitude above SL 350 ft  
(Control Lines, wind speed, etc.)

Boundary Marks  
Between the two islands  
Slightly above the Gulf  
Right Landings  
Flares when necessary

(Drawn by) The Controller  
T. A. Taylor  
Town Hall  
Wellington  
New Zealand  
6-6-37



An excellent example of topography by Terrence A. Taylor of New Zealand.

We're out for many new members this month; for there is a lot of work to do over the coming months and we will need plenty of help.

Aviation needs you—if you can live up to aviation!

So join the grand throng and live the greatest life in the world.

Your Flight Commander,

*Albert J. Carlsson*

#### AIR ADVENTURERS' NEWS

WE are getting so many congratulatory reports on the contents of Air Trails, we are becoming somewhat suspicious or should we say, wary? We have worked hard during the past twelve months to put Air Trails over in a big way, not particularly with an eye to circulation, for that is never a true indication of quality, but from the standpoint of what we are really doing for aviation and our readers who are interested in aviation. We have learned many a hard lesson, and now that we seem to be hitting on all twelve this is probably the time to bow a humble head and dig in again and produce something even better. We know it's possible to slip back faster than we climbed, and we're taking no more chances.

(Turn to page 90)

#### (MEMBERSHIP COUPON)

To the Flight Commander, Air Adventurers,  
79-89 Seventh Avenue,  
New York, N. Y.

I am interested in aviation and its future developments. To the best of my ability I pledge myself to support the principles and ideals of AIR ADVENTURERS and will do all in my power to further the advance of aviation.

Please enroll me as a member of AIR ADVENTURERS and send me my certificate and badge. I enclose ten cents to cover postage.

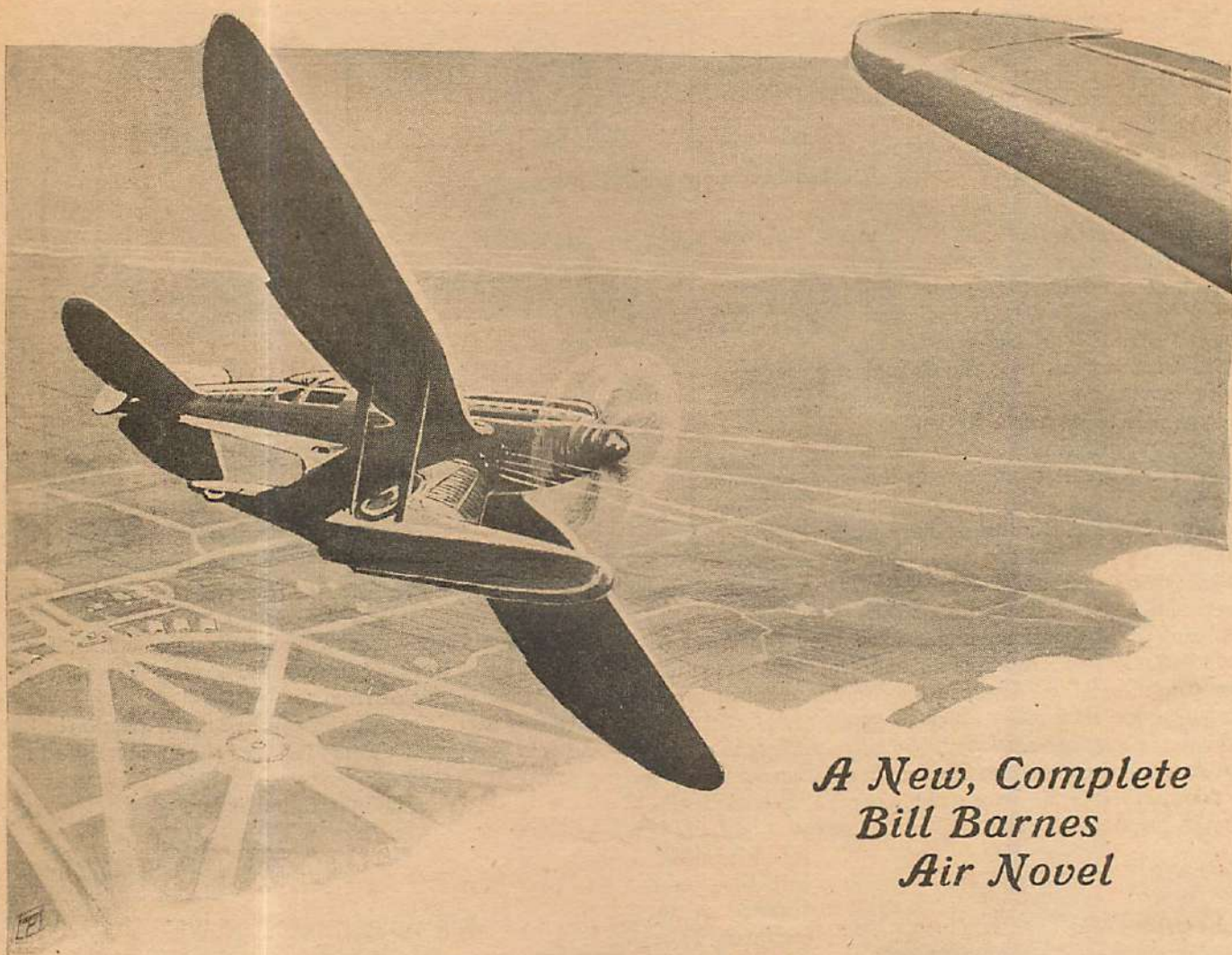
Name..... Age.....

Address .....

☐ Check here if interested in model building.

(This coupon may not be used after December 15, 1937.)





*A New, Complete  
Bill Barnes  
Air Novel*

# WINGS of the WEST

*When the production of light planes increased—rivalry did the same and Bill Barnes was, for once, caught unawares—*

by GEORGE L. EATON

WHEN BILL BARNES struggled with all his will power he managed to get his eyes open. But the room wouldn't hold still. It rolled around him in a dizzy circle that left him sick. The chairs, tables, lamps, even the built-in bookcases, seemed to be moving from one place to another in a hurry.

His head rolled from side to side like the head of an idiot, as cold perspiration bathed his straining body. He clenched his teeth and tried to concentrate his gaze on some one object. The dance the object went through caused his stomach to turn over.

He tried to bring his hands up to his aching head and found that he could not move them. He was aware then of the ropes that bound his wrists to his sides and the wire that held his legs fastened against the legs of his chair. Another piece of wire cut into his chest and held

him tightly in the chair. His lips were taped so tightly he could only make a faint rumbling noise that came from his chest and throat.

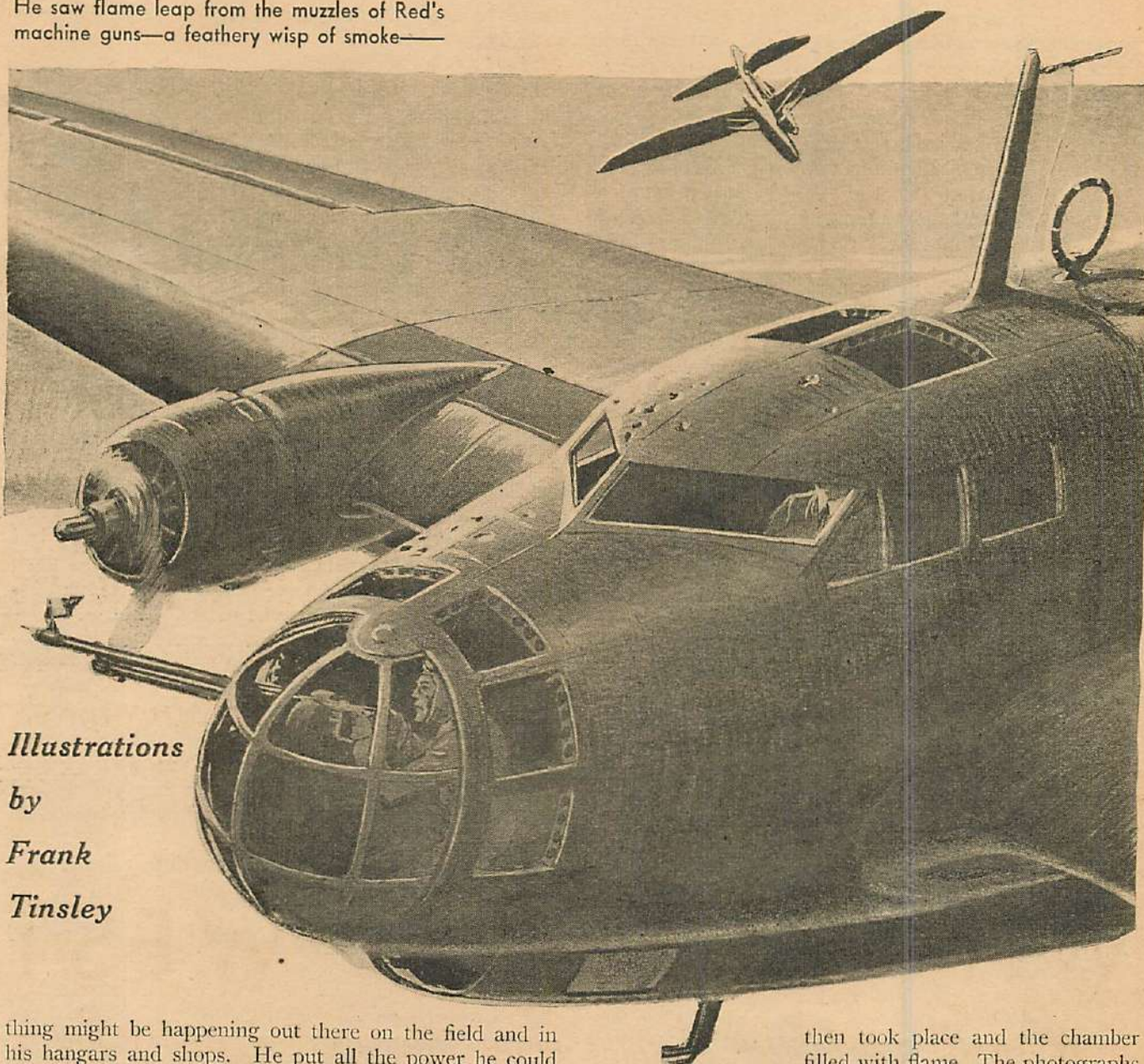
He was conscious of the fact that he was in his living room on Barnes Field, Long Island, but he couldn't remember what had preceded his unconsciousness. The pieces of the jig-saw puzzle that whirled through his brain would not fit together.

Why was he trussed so tightly he could hardly move his legs and arms? Who had done it and how? How did the persons who did it get by the guards on Barnes Field? Where were his men?

He could feel blood running down the side of his face and the sickish odor of chloroform was in his nostrils. He clenched his teeth, fighting to retain consciousness, as the room began to sway again. He knew that any-



He saw flame leap from the muzzles of Red's machine guns—a feathery wisp of smoke—



*Illustrations*

*by*

*Frank*

*Tinsley*

thing might be happening out there on the field and in his hangars and shops. He put all the power he could command into a futile struggle to free his wrists. The bonds seemed only to cut deeper into his flesh.

He sat quietly back in his chair, trying to dispel the panic that suddenly seized him. The silence of the room was terrifying. There wasn't a sound except the ticking of a clock. He tried again to piece together the things that had happened that morning and the day before and the day before that.

There had been no threats against him that he could remember, no attempts to injure him. He had no special job on the books at the moment. He could think of no logical reason for such an attack.

Suddenly, he remembered that he had been looking at some still pictures of a single motor explosion inside the cylinder of a Barnes Diesel engine. The film had been shot through one-inch glass plates of special heat-resistant lens glass three inches in diameter set in the combustion chamber wall storm-window fashion, with an area of compressed air between them to increase the strength of the peephole.

He remembered how clearly the six fuel sprays from the multiple-orifice fuel-injection nozzle could be seen penetrating across the combustion chamber. Ignition

then took place and the chamber filled with flame. The photographs showed very clearly the manner in

which the fuel spread and the manner in which it was ignited spontaneously by the highly heated and compressed air.

It was the first time pictures had ever been taken of the compression-generated explosion within the cylinder. It showed clearly Diesel secrets that scientists had only been able to guess at since 1893.

But the photographs were not secrets. They had been publicly shown a half dozen times. He managed to screw his throbbing head half around, to see that the photographs were still lying on his desk. He tried to remember something after he had looked at the photographs. But he could remember nothing.

Some one, he decided, had gained admittance to his rooms and had bashed him on the head while he was looking at the photographs. But who? And why?

He turned his head again and saw that the room had been thoroughly ransacked. Some one had been looking for something. None of his enemies were active against him at the moment. Things had been quiet to the point of boredom for the past week. His little squadron of famous fliers were becoming restless. They were the



kind of men who thrived on action. It came to Bill with overwhelming force that the ransacking of his rooms and the attack on him presaged that they were going to get action.

He couldn't remember hearing any sound behind him while he looked over the still photographs. The awful stillness of the room began to get on his nerves now. He dug finger nails deep into the palms of his hands, as a feeling of panic swept over him. He couldn't shout for help. He couldn't move and there was something sinister happening.

The low drone of an idling airplane engine came to his ears faintly from the apron on the field. He could tell by the sound that it was not one of his own Diesels. Suddenly, it blasted and he could tell the plane was being kicked around into the wind for a take-off.

"A supercharged twin Wasp," he muttered to himself, and he began to struggle with his bonds again.

Then, as he felt something tightening on his throat, he had that instinctive warning that always came to him when he was in deadly peril. He could feel the hair rising at the base of his scalp, as the pressure slowly increased. He knew now that it had been steadily tightening each time he moved his body. His helplessness drove him frantic, but he knew he mustn't struggle. His body was oozing cold, clammy perspiration, as he tried to shout for help. Only a deep, guttural sound came from his taped lips.

His temples were beginning to throb and his throat ached, as he tried to draw air into his lungs through his nostrils. His eyes flew to the clock. One of his men ought to be coming in almost any time. And old Charlie, the cook, would be coming in to cook his luncheon soon. He knew as he struggled for breath that it would have to be very soon or he wouldn't be there to eat it.

The room was beginning to dance and blur before his eyes again. He fought with all his will power to remain conscious, as his breath struggled through his nostrils and tried to get into his lungs.

He had almost given up hope when he heard running feet. The door to his living room burst open. The face of young "Sandy" Sanders, the kid ace of his little squadron, danced before his eyes. He could see that it was white and terror-stricken.

"Sweet mackerel, Bill!" he heard young Sandy say. Then the pressure on his throat was gone. His head thumped forward on his chest, then came up again as he gulped air into his tortured lungs. His tongue and throat throbbled unmercifully.

"Thanks, kid," he managed to whisper. "Water!"

Sandy ducked into a bathroom and filled a glass with cold water. He held it to Bill's lips. Bill rolled a mouthful around his tongue and spit it out on the floor.

"Who did it, Bill?" Sandy asked, and his blue eyes were wide in his freckled face.

Bill shook his head. "Is everything all right on the field?" he asked.

"Everything but old Baxter," Sandy said. "As soon as I get these ropes off you I've got to go out and release him. He's hog tied out in your corridor."

"Hurry up!" Bill snapped, as his head began to clear. "Who tied him?"

"Two men made a landing in a three-place job about an hour ago," Sandy said. "They had a letter from you. Old Baxter met them on the apron when they stepped out and took 'em to Scotty. He read the letter and told

Baxter to bring them to your bungalow. That was over an hour ago."

"Yes?" Bill whispered.

"Scotty didn't notice that Baxter hadn't come back to take up his post on the apron until the two men hurried toward their ship from the direction of your bungalow. They had left their ship idling and we noticed that there was a third man at the controls. Scotty shouted at them as they climbed into the ship, in a hurry. But they didn't answer. They kicked it around into the wind and yanked it into the air. I thought something might be wrong and I started over here on the run. I saw Baxter and knew something was wrong."

"You got here just in time," Bill said. "They smacked me on the head and went through my rooms. I—Hurry up with those wires and get out there to Baxter!"

Bill tried to push himself to his feet to follow Sandy out into the hallway of his bungalow, but the effort was too much for him. His legs collapsed beneath him. He sank back into his chair and drew great gulps of air into his lungs.

After a moment he picked up the ropes Sandy had cut away from his wrists and throat. He studied them and saw that the slide noose that had been around his neck was tightened each time he moved his arms.

"I never," he said aloud, "saw a noose and knot like that before." He threw it over on a divan, intending to study it later on.

Sandy came in the room with the guard, Baxter, leaning heavily on his shoulder. The old man had a lump half the size of an egg on the side of his head.

"Call Doc Humphries and tell him to get over here fast," Bill snapped at Sandy. "Tell him he has two heads to patch up."

After Sandy had telephoned the tiny infirmary on Barnes Field he asked Bill if he had any idea who the men were.

"If I knew," Bill said, brusquely, "I wouldn't be sitting here. I'd be finding out what it's all about."

Sandy wiped one hand across his mouth and the worried expression on his face gave way to a grin. Bill glared at him questioningly.

"What are you grinning about, you hyena?" he snapped.

"Nothing, Bill," Sandy said, hastily, "nothing. I was just thinking that when you begin to act the way you're acting now you're all right."

"Certainly, I'm all right," Bill growled. "Get Scotty on the telephone and tell him to bring that letter over here!"

## II—ROBBERY

THE DOCTOR had just finished patching up the three-inch wound on the side of Bill's head when dour old "Scotty" MacCloskey, head technician and major-domo of Barnes Field, came into the room.

"I'm going to send for the ambulance and take Baxter over to the infirmary to X ray his skull," Doc Humphries said. "I want to be sure there's no fracture."

"What about Bill?" Sandy asked anxiously.

Doc Humphries grinned. "His head is too hard to fracture," he said. "But you better take it easy for the rest of the day, Bill. Bed is the place for you."

Bill made a noise in his throat that might have meant anything, then turned to Scotty MacCloskey.

"I'm sorry, boy," Scotty said. "I had no idea or I—"

"Let me see that letter," Bill said.



"I threw the stick to the right, to come around, and the whole ship fell apart——"



"Where the hell did they get this stationery?" Bill asked as he gazed at his own letter head with the Barnes aircraft insignia engraved at one corner. He didn't wait for Scotty to answer.

"Check every man on the field carefully," he instructed. "Have Martin check all the men in the shops and hangars, especially any new men he has hired. That piece of paper was stolen from the administration building. The dye for our insignia is always in my vaults when the printer doesn't have it."

"What about the printer?" Sandy asked. "They never got it from him," Bill said.

The letter was written to a Mr. Thomas Butler of 11 River Drive, Dayton, Ohio. It said:

DEAR MR. BUTLER:

The next time you are flying East, please drop in to have a chat about the things you mentioned in your letter of the 23rd. I am more than a little interested in what you tell me.

This letter will gain you admittance to my field. Mr. MacCloskey will inform you of my whereabouts when you call. Very truly yours,

BILL BARNES.

Bill studied his own signature for a moment, then shook his head. "I didn't sign that," he said. "And I never heard of Thomas Butler of Dayton, Ohio."

"It's a forgery!" Sandy said, excitedly. "You can have the man arrested."

Bill gave Sandy a withering glance and shook his head again. "Every day in every way you get dumber and dumber," he said. "First we have to know who he is and then we have to find him."

"Maybe you could get some idea about that from the letter he wrote to you," Sandy said.

"He never wrote to me, you nit-wit!" Bill shouted. "Throw him out of here, will you, Scotty?"

"All right," the aggrieved sixteen-year-old said. "But don't forget you'd probably be choked to death by now if I hadn't come in."

"O. K., kid. O. K.!" Bill said. "But, please, sit down and be quiet."



"Did you get a good look at those men, Scotty?" he asked.

"There was nothing outstanding about them," Scotty said slowly. "The one who handed me the letter said his name was Butler. He was a big man with blue eyes and light hair, about thirty-seven or thirty-eight years old. He looked like an Englishman, or maybe a German. One of the others was wiry, dark-complexioned. I remember he needed a shave. They came in a three-place cabin job, a Hartman Oriole with a twin Wasp motor. They wore ordinary business suits. The man at the controls was wearing a tan overall. That's about all I can tell you."

"And it doesn't tell me a thing," Bill said. He put his hands to his head. "My head is going to explode."

"You better take it easy like the doc said, Bill," Sandy offered.

"See if you can find Shorty," Bill said to Scotty. "Tell him I want to see him over here immediately."

"Shorty" Hassfurth, that imperturbable Pennsylvania Dutchman and Bill's chief of staff, came sauntering into the room a few minutes later. His eyes widened as he saw the bandage on Bill's head and the pieces of rope and wire on the floor. He turned and looked at young Sandy, and there was a distinct twinkle in his eyes.

"What did you do? Tie him up and then hit him, eh?" he said.

"Phooey to you, you barrel of sauerkraut!" Sandy said scornfully. "When dumber Dutchmen are built the Hassfurthers will build them!"

"Shut up!" Bill snapped. "Sit down, Shorty. I want to hear what you think about this set-up."

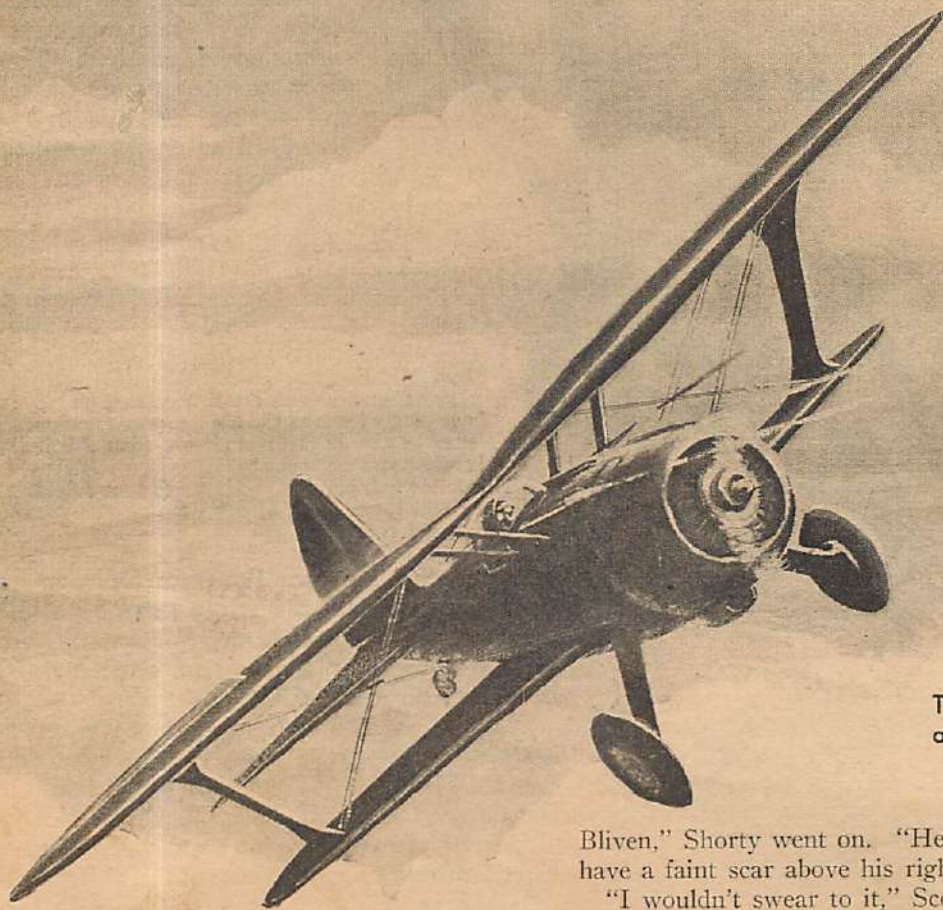
Shorty sat down and turned his ice-blue eyes on Bill. He listened without a change of expression as Bill told him the things that had happened in the past two hours and showed him the forged letter.

"Any ideas?" Bill asked when he had finished.

Shorty shrugged. "Somebody is after something," he said, frowning thoughtfully.

"Smart boy!" Sandy said under his breath.

"The big lad with the light hair sounds as though he might be our old pal, Moose



The little monoplane rolled and slipped to keep out of the line of fire—

Scotty picked the telephone out of its cradle and made a connection with Tony Lamport, Bill's superintendent of communications and chief radio operator.

"Tony," he said, "locate Shorty and send him over to Bill's bungalow."

Bliven," Shorty went on. "He's a slick fellow. Did he have a faint scar above his right eyebrow, Scotty?"

"I wouldn't swear to it," Scotty said, after a moment of thought, "but I think he did."

"If he did," Shorty said, "the rest is easy. Although Moose usually plays safe. He seldom resorts to clubbing a person over the head unless he's positive he won't be seen."

"He wasn't seen," Bill said. "They must have known



exactly what they were going to do, the way they went about it. What's your idea, Shorty?"

"Where are the specifications and plans for the light plane Colonel Sexton sent you the other day?" Shorty asked.

Bill sat up in his chair and stared at Shorty for an instant, then slumped back.

"You're barking up the wrong tree," he said. "They're over in the vault in my study."

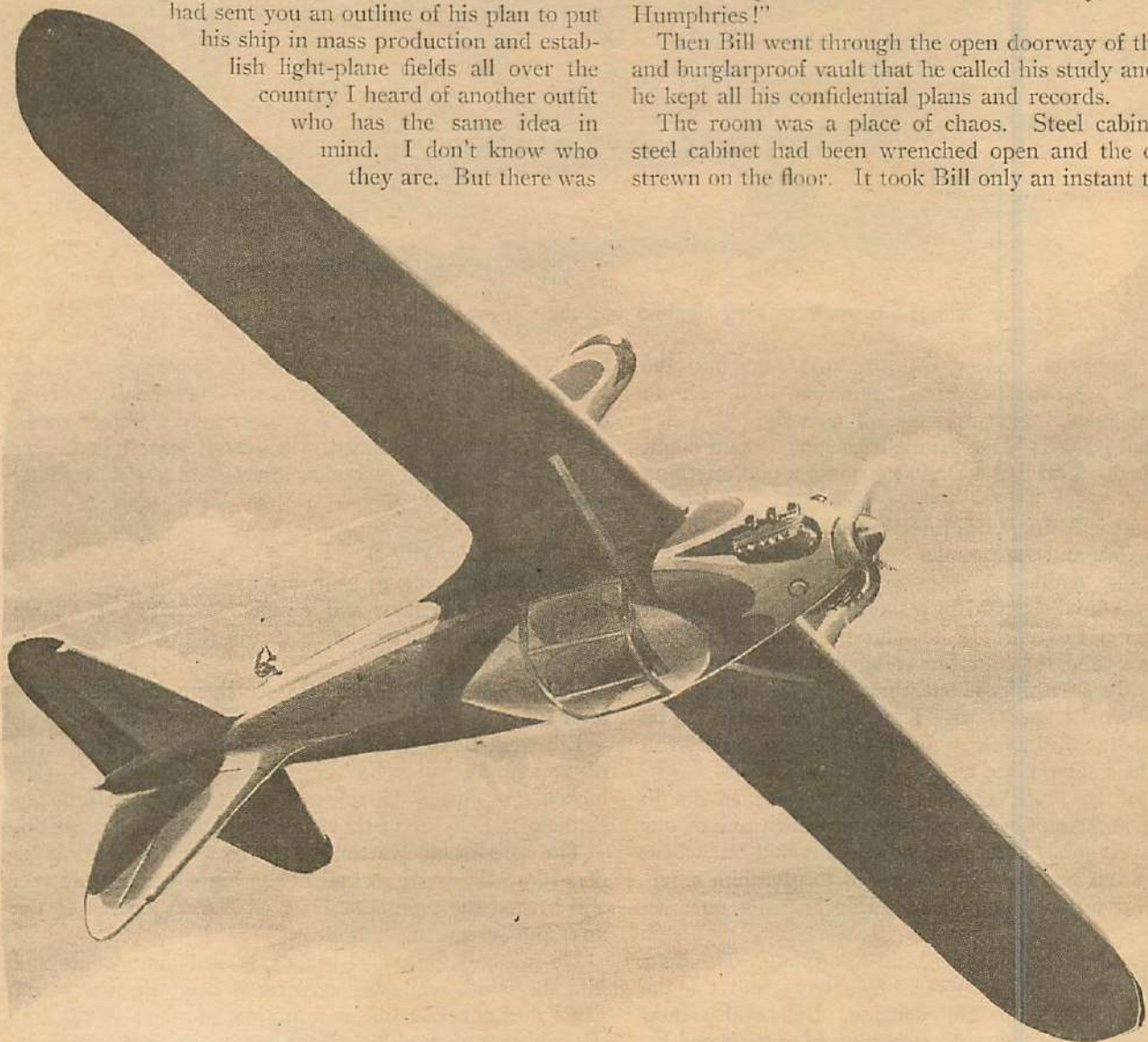
"They might have been looking for them here," Shorty said. "After you told me Colonel Sexton had sent you an outline of his plan to put his ship in mass production and establish light-plane fields all over the country I heard of another outfit who has the same idea in mind. I don't know who they are. But there was

the office and opened the door of an innocent-looking closet. Inside were coats on hangers and a shelf with two or three hat boxes. Bill's finger pressed a concealed switch and the whole back of the closet swung open, revealing a flight of steps leading below.

They followed Bill down the steps and into a brightly lighted passageway. As Bill reached the bottom step a startled curse came from his half-open mouth. He covered the distance to the massive steel door at the end and bent over the unconscious figure lying there. He felt the man's pulse and then said to Sandy, "Get Doc Humphries!"

Then Bill went through the open doorway of the bomb and burglarproof vault that he called his study and where he kept all his confidential plans and records.

The room was a place of chaos. Steel cabinet after steel cabinet had been wrenched open and the contents strewn on the floor. It took Bill only an instant to locate



some talk about it last night over at the Air Hawks Club. Stewie Barton was telling me about it. He said he heard Moose Bliven was mixed up in it and crossed his fingers."

"Those plans are safe enough," Bill said, but his eyes were worried.

"How about that dye for our aircraft insignia?" Scotty said. "You said that was in the vault, too."

"They could have had a copy made," Bill said, uneasily. He pushed himself to his feet and walked unsteadily across the room and back. They could all see that he was worried now as they watched him. "Let's go over and take a look," Bill said.

"You'd better go easy, Bill," Scotty said.

But Bill was already going out the door. They all walked over to the administration building and through Sandy's little office to Bill's private one. Bill crossed

the cabinet that contained the papers Colonel Cyrus Sexton had sent him. He stared at the place where they had been with unbelieving eyes.

"You were right, Shorty," he said. "They're gone!"

"Sexton will have copies," Shorty said.

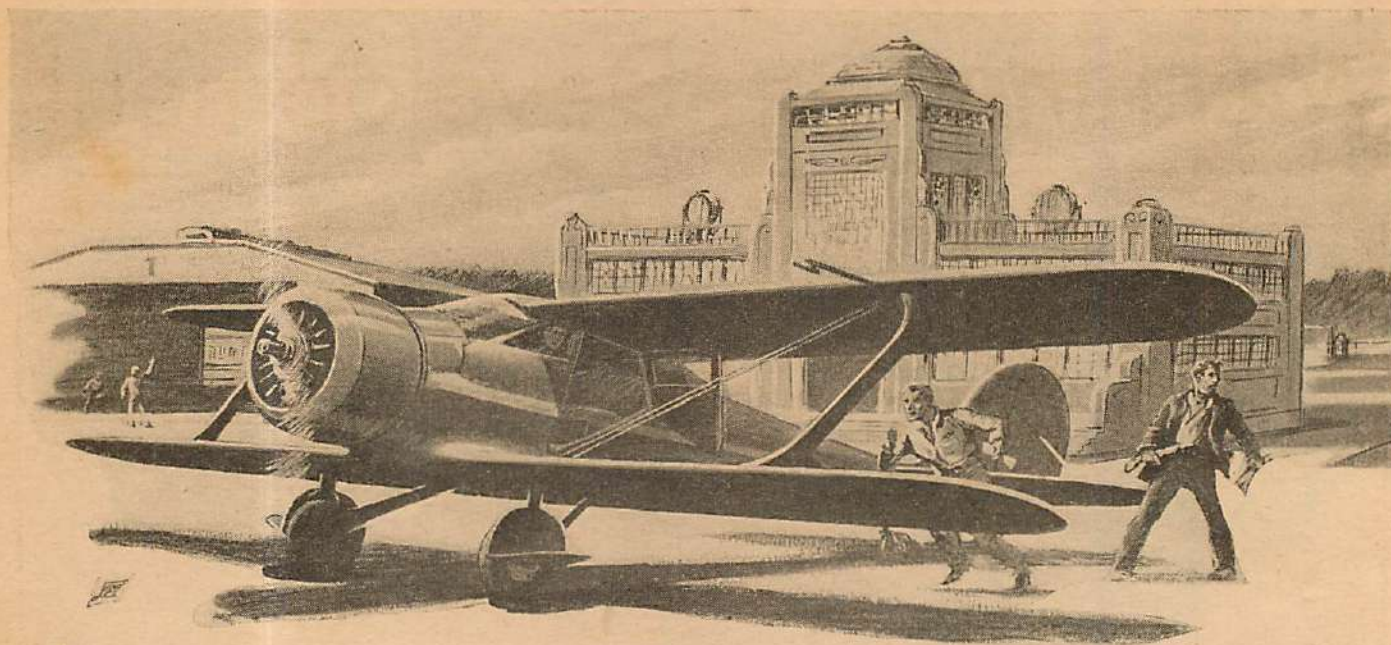
"Some one inside our own organization is double-crossing us," Bill said. "This is an inside job. It was done at the same time they went through my rooms. What does doc say about the guard?"

"He's all right, Bill," Humphries said behind him. "Just knocked out and trussed like Baxter."

"No one could have got into the corridor leading down here unless the guard knew him," Bill said. "I want to talk to him as soon as he is able to talk."

He lifted a telephone from its cradle where it stood on a drafting board and asked for Martin, his head mechanic.





Scotty shouted at them as they climbed into the ship—but they didn't answer—

"Warm up the Lancer, Martin," he said into the mouthpiece. "Check her for ammunition. I'll want to use her in about fifteen minutes. That's right."

"I forbid it, Bill!" Doc Humphries said. "You ought to be in bed. You had a slight concussion and anything might—"

"Nothing will, doc," Bill interrupted. "I've got to hop out to Dayton and see Colonel Sexton." He reached for the telephone again.

"Hello, Tony," he said in a moment. "Make contact with Colonel Sexton. If he isn't in Dayton find out where he is and tell him I'm coming to see him. . . . I don't care anything about that. He'll see me fast enough when he knows why I want to see him. I'll be leaving here within a few minutes for Dayton, unless you find out he's some place else. . . . That's right."

"Sandy," he said, "get this mess straightened out in here. Scotty, you check and find out which one of our men did this job. He's gone now. But find out where he came from and how we happened to give him a job. It's a hell of a note when we have thieves inside our own field."

Doc Humphries shook his head in anxiety. He knew that Bill was running on nervous energy and that he might do himself irreparable damage. But he also knew the hopelessness of trying to stop him. He shrugged his shoulders and half spread his hands in resignation. They were all watching Bill carefully as two attendants from the infirmary lifted the moaning guard on a stretcher and carried him down the passageway. They were watching him because they knew he might collapse at any moment.

They all started nervously as the rasp of the telephone bell broke the silence of the vault. Bill grabbed it out of its cradle again and spoke into the mouthpiece.

"Yes, Tony," he said. "Bill."

"I was just going to make contact with Colonel Sexton," Tony said, "when he got me on the radiophone. He's flying in from Dayton and seems very much upset about something."

"How soon will he be here?" Bill asked.

"He said in a few minutes," Tony answered. "Wait a minute. I think we're picking him up on the detectors

now. Yeah." There was silence for a moment. "He'll be down in a couple of minutes. He's circling down to—" Suddenly, Tony's voice rose to a higher pitch. "Hey, Bill!" he screamed. "Colonel Sexton is calling for help. He says a plane has attacked him with machine guns! He—"

### III—TROUBLE AHEAD

BILL didn't wait to hear any more. He dropped the telephone on the floor and jumped for the door. They heard his feet drum on the cement of the passageway and on the stairs.

"What the hell!" Shorty Hassfurther said, and started after him.

Bill went through his offices and down the front steps of the administration building like a runaway truck. He looked up twice as he ran and saw two planes tumbling through the sky eight thousand feet above Barnes Field.

The astonished Martin started to speak to him as he dived into the front cockpit of the big silver sesquiplane. Bill blasted the twin supercharged Barnes Diesels in the nose and screamed, "All clear!"

He released the wheel brakes, kicked the nose around into the wind, while his eyes raced over the instrument panel and checked the ammunition counters of his two .50-caliber guns and his 37mm. automatic engine cannon.

Where the runways converged in the center of Barnes Field, Bill nudged his rudder to bring the Silver Lancer directly into the wind. He eased the stick forward until the tail came up. Then he yanked it back into his stomach and hung the big ship on its two enormous props.

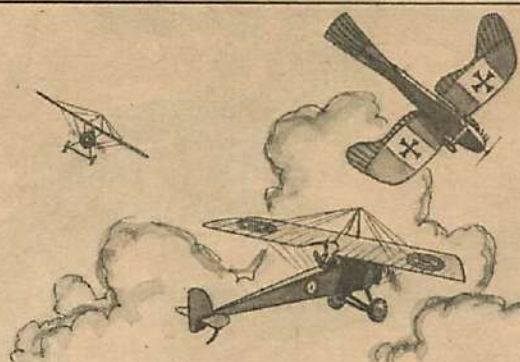
At a thousand feet the landing gear snuggled up into the belly of the fuselage and the wings. The big ship became a silver bullet with the morning sun dancing across its metal wings. The two opposed props screamed in protest as he poured soup into the engines and studied the two ships overhead.

He saw Colonel Sexton bring his fast, all-metal, low-winged monoplane up and over in a flashing Immelmann turn, as the black biplane behind it dived on it.

Bill held his breath as Sexton stuck the nose of his monoplane toward the earth in an almost (Turn to page 64)

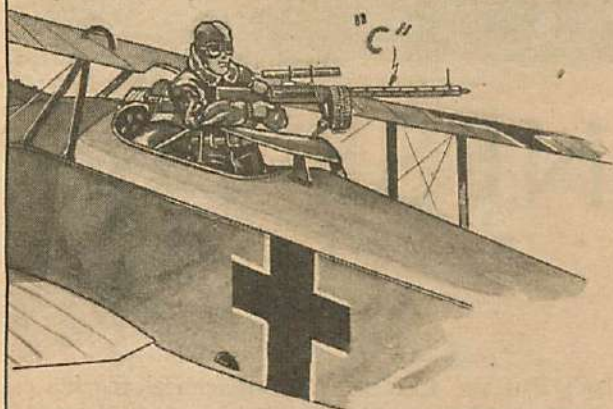
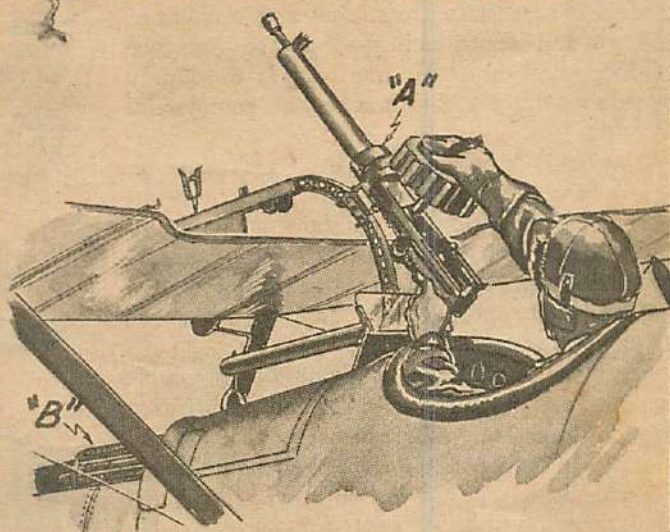


# Machine Gun Development



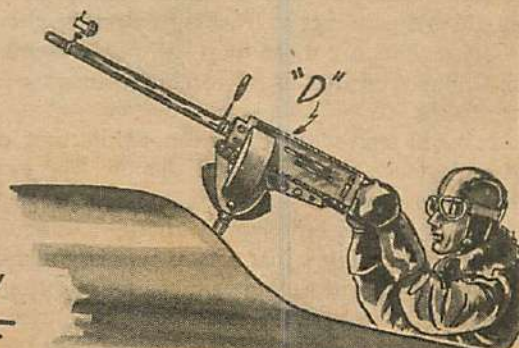
IN THE EARLY DAYS OF THE WAR PILOTS FOUGHT WITH PISTOLS, RIFLES AND SHOTGUNS. PLANES WERE EVEN DOWNED WITH A BRICK SHATTERED PROPELLER!

AFTER A YEAR APPEARED THE LEWIS "A" AND VICKERS "B" FIRING THROUGH ALLIED PROPS. THESE FIRED 500 SHOTS A MINUTE. SIMILAR TYPES WERE THE MARLIN AND HOTCHKISS, ALL ABOUT .30 CAL.



AGAINST THESE, ON THE GERMAN PLANES, WERE THE PARABELLUM "C", BERGMANN, AND THE GERMAN MAXIM, OR "SPANDAU." ALL WERE OF SIMILAR TYPE AND FIRED 400 SHOTS A MINUTE OF APPROX. .30.3 CALIBRE.

THE LAST WORD IN AIR COMBAT ARMAMENT IS THE COLT AIRCRAFT MACHINE GUN. THE .30 CAL. GUN IN EITHER THE "OBSERVER", "D", OR FIXED TYPE FIRES 1200 SHOTS A MINUTE! THE HEAVIER .50 CAL. GUN FIRES 650 SHOTS A MINUTE. NOTE SOME OF OUR NEW PLANES CARRY SIX OF THESE GUNS!





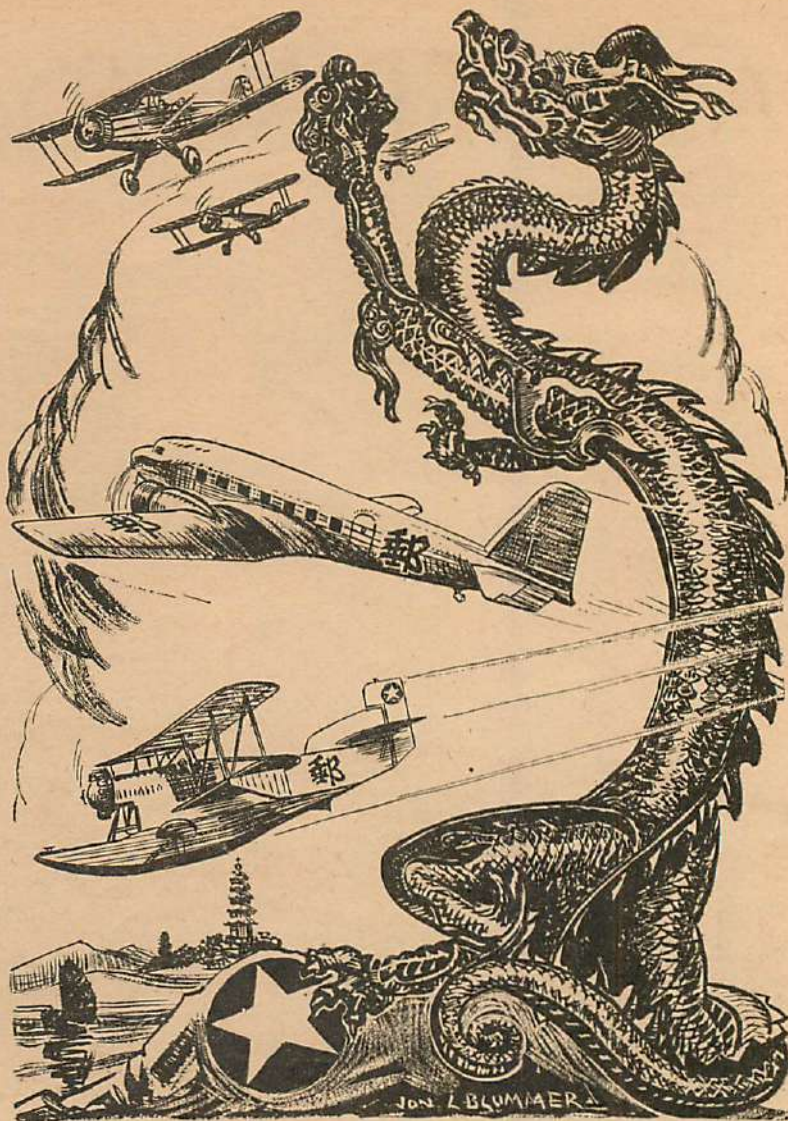
*Note: The author of this article flew the Shanghai-Chengtu route of the China National Aviation Company during most of the time from 1931 to 1936. He learned to fly at the Navy Flying School at Pensacola, Fla.*

I DON'T know how many times I've been asked why there are so many American fliers in China at present, working for commercial lines which are partly Chinese-owned.

The answer that comes at once to mind, of course, is that there are so few native pilots of ability—and dependability—that the presence of foreigners in large numbers is absolutely necessary for the continuance of commercial aviation.

Now, this is by no means due to a failure on the part of the government to realize the importance of aviation for military purposes, to train military pilots, and to try to cultivate air-mindedness in the nation's youth; nor is it a national failure, or disinclination, to utilize the airplane in commercial transport.

The terrain of China is certainly as favorable for the development of aviation and the creation of widespread air-mindedness as that of any country in the world. A trip over mountainous country which requires two weeks by sedan chair, the previously accepted and even to-day the most popular mode of travel, can be made by plane in a little over two hours. In the face



# Can the CHINESE Fly?

*A startling opinion offered  
for your consideration.*

By Herbert O.  
Arnold

of contrasts such as this the Chinese are most certainly not foolish enough to disregard air travel, or to minimize its value. Of the forty-two hundred persons who flew between Shanghai and Chengtu during the year 1935, I should estimate that at least eighty per cent were Chinese.

Why, then, are more than half of the commercial pilots in China recruited from foreign countries and foreign-trained?

In plain terms, which I do not think any capable pilot of experience in China will dispute, the explanation is that you simply cannot teach the Chinese to fly well and safely, no matter how hard you try or how well equipped you may be. They just aren't mentally adapted to it.

It goes without saying that there are exceptions to this blanket statement, and to contend that every individual Chinese pilot is a bad pilot would be rash indeed. But I will go on record in the assertion that good Chinese pilots are rare enough to let the indictment stand, surprising as it is to most people.

It isn't that the Chinese lack mechanical ingenuity. There is adequate reason for the familiar quip about their cleverness, and I have personally known several whose theoretical knowledge of planes and their use was quite comparable to that of the Western flier in every respect. Competent and conscientious technicians are plentiful among the Chinese—but usually they are better off at a desk than at the controls of a fast-moving plane. "Three point" is a layman's conception of a good landing, as every initiate knows, but "Chinese three point" is an apt and concise definition of the opposite type of landing. It has often been demonstrated before my eyes.

If there is a single racial deficiency which is particularly responsible for the Chinese ineptitude in the air, it is the lack of a perspective sense. Women, I understand, are supposed to lack a feeling for perspective to a certain degree, though it must be added that there are many excellent women pilots to disprove the supposition. In the case of the Chinese, as a race, I think (Turn to page 87)



# AIR TRAILS GALLERY

*A Picture Page of Modern Planes for the Collector*

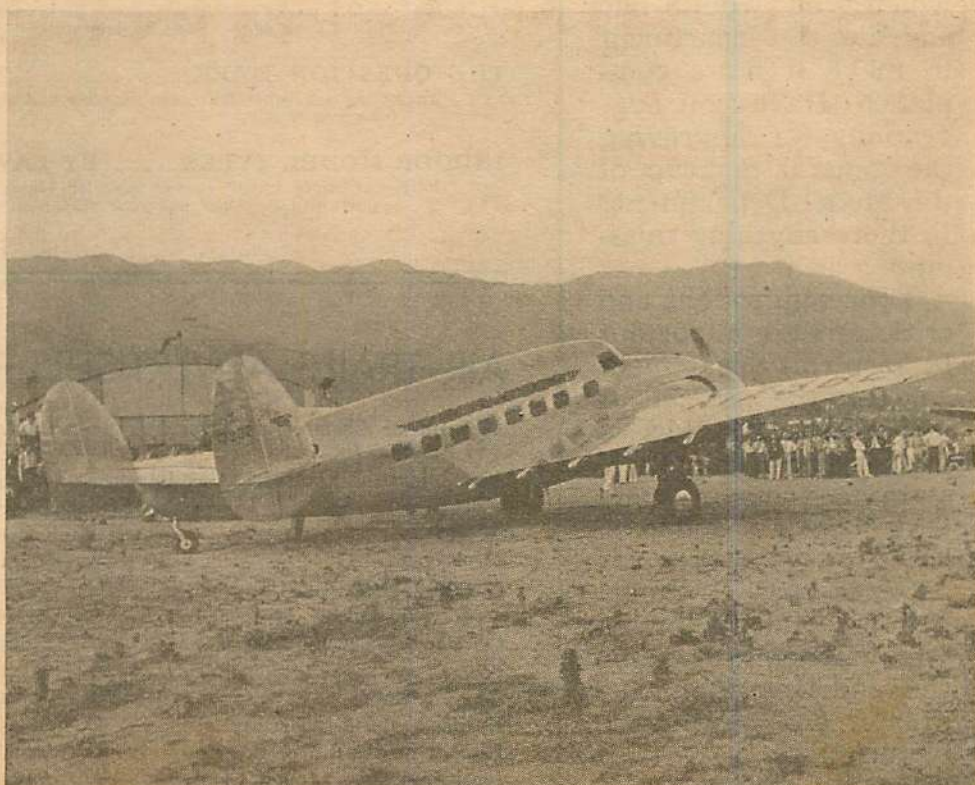


## SIKORSKY XPBS-1

Designed for the U. S. navy and dubbed *Flying Dreadnaught*, the XPBS-1 is the largest patrol bomber in the world. Of all-metal construction it is powered by 4 P. & W. Twin Hornets, each rated at 1,150 h.p. and capable of developing 1,400 h.p. for take-off. Constant-speed propellers are fitted. The complete radio compartment is comparable to a destroyer's. The wheels shown in the photo are for handling purposes only and are detachable when the ship is afloat. Early reports claim a cruising speed of 200 m.p.h., with a weight of 55,000 pounds. The span is said to be 125 feet and the length 78 feet. Outstanding among its many features, the XPBS-1 boasts a gun turret in the tail, beneath the rudder. Commonplace in British military practice, this type of installation of defensive armament marks an advancement in the design of U. S. service machines.

## LOCKHEED 14

The Lockheed 14, an enlarged midwing version of the *Electra*, is the fastest transport in the world and was ordered in quantity before the first ship was completed. The "14" is constructed entirely of metal, the wing itself being the result of years of research. The 2 P. & W. Hornets, rated at 850 h.p. each for take-off, develop 525 h.p. for cruising. Grossing either 15,000 or 17,000 pounds, the "14" climbs at sea level 1,410 and 1,120 feet per minute respectively. Absolute ceilings are 26,000 and 23,000 feet; service ceilings 24,300 and 21,600 feet. Maximum speeds at 6,700 feet are 249 and 247 m.p.h.; cruising 224 and 220 m.p.h. The "14" is soundproofed and is distinguished for its luxurious passenger accommodations. Provisions are made for 11 passengers, 2 pilots and a stewardess. Fowler wing flaps, which extend rearward from the wing as well as down, are more efficient than the conventional flap installations.





# MODEL MAKING—

*Air Trails Department of Practical Construction*

## Model Suggestions

Write us a letter this week

The Air Trails Model Department has presented the finest articles and plans that could be assembled each month. Not content with resting on progress made, the editors are endeavoring to improve an already satisfactory department. Many things which are paramount to your satisfaction we will learn only through your comment.

Do you have any suggestions for improving the plans appearing in Air Trails? What kind of plans do you prefer? How should they be drawn? Who are your favorite model designers, regardless of association with Air Trails? Are there any things which you would like added to the department to make it more complete? Have you suggestions for improving the general makeup of the Model Department? Is there anything missing?

Your suggestions and criticisms are important to keep this department keyed to the interests of its readers. By addressing a letter to the model staff, to acquaint them with your opinions, based on your own experience as a model builder and hobbyist, you will make possible the rendering of an even greater and more complete service.

## 13 Model Building Items

FOR BETTER MODELING.....	BY GORDON S. LIGHT	39
<i>A discussion of widespread criticisms directed at practices now a part of the model hobby.</i>		
THE CONTEST CALENDAR.....		39
<i>A schedule of competitive events which keeps Air Trails readers up to the minute.</i>		
1937 MOFFETT TROPHY WINNER.....	BY JAMES CAHILL	40
<i>Complete plans for a trophy-winning fuselage model, a ship applying latest technical developments.</i>		
THE WAKEFIELD CONTEST.....	BY ALVIE DAGUE	44
<i>A participant's view of the world's premier contest. Interesting notes arranged especially for Air Trails.</i>		
THE BELL XFM-1.....	BY MARTIN DICKINSON	45
<i>3-view drawings of a fighter that threatens to obsolete world aeronautical fighting tactics.</i>		
INSPIRER.....	BY FRANCIS TLUSH	46
<i>Easy-to-read plans and instructions for completing a sturdy, practical gas job. The second of two installments.</i>		
THE DISCUSSION CORNER.....		49
<i>This month readers discuss "Climb."</i>		
DIVE BOMBER.....	BY ALAN D. BOOTON	50
<i>Complete plans for constructing a flying model of Europe's finest dive bomber, the Blackburn.</i>		
PRACTICAL MODEL DESIGN.....	BY FRANK ZAIC	55
<i>An expert in a discussion of the origin of lift, paves the way for lessons in model aerodynamics. The first of four articles.</i>		
HEINKEL He51.....	BY WILLIAM WINTER	56
<i>Replica plans of the German standard pursuit ship. A 1/4" scale solid model.</i>		
MODEL MATTERS.....		58
<i>Club notes, model activities everywhere, news of recent contests, pictures. This is your page. Send in your notes, news, snaps.</i>		
THE QUESTION MARK.....		61
<i>Answering your questions about models and model problems; interesting points for every reader.</i>		
INDOOR MODEL TYPES.....	BY LAWRENCE N. SMITHLINE	62
<i>Pertinent facts about indoor models; class, weight, performance, etc. An opportunity to round out your model-building knowledge.</i>		

## AIR TRAILS ADVERTISERS—NOVEMBER, 1937

Aeronautical Chamber of Commerce of America, Inc. . . . .	71	Imperial Model Aero Supply . . . . .	81
Aero Industries Technical Institute, Inc. . . . .	Back Cover	International Correspondence Schools . . . . .	1
Aircraft . . . . .	2nd Cover	Johnson Smith & Co. . . . .	3rd Cover
Airpoyment . . . . .	91	Lionel Train Corp. . . . .	91
American Flyer Mfg. Co. . . . .	93	Litwin Bros. . . . .	93
Aviation Institute of America, Inc. . . . .	3	Mechanix Universal Aviation Service . . . . .	93
Cleveland Model & Supply Co. . . . .	91	Megow's . . . . .	63
Federal . . . . .	91	Metro Publications . . . . .	87
Gun Model Co. . . . .	91	Model Airplane Utility Co. . . . .	93
Heath Model Airplane Co. . . . .	65	Ronald Press Co. . . . .	67
Howard Engine & Mfg. Co. . . . .	91	Scientific Model Airplane Co. . . . .	75
Ideal Aeroplane & Supply Co., Inc. . . . .	85	Skyway Model Aircraft Supply Co. . . . .	98
		Trindl Products . . . . .	91
		Vacumatic Co. . . . .	89



# For Better Modeling

*The haphazard growth of model building emphasizes many mistakes—what they are and how to correct them are matters of importance to all modelers.*

By GORDON S. LIGHT

WE are passing on some of the criticism we've heard recently about various phases of the model hobby. The first concerns the running off of the Wakefield and the Moffett elimination contests as a combined event, as was done at the last national meet. The objection to this method is that the same 6 contestants are picked to represent this country in both international events. In previous years 2 separate teams of 6 modelers each were selected for each event by running separate elimination contests.

The reason for holding the 2 elimination contests as one event was to save time. But this seems a rather flimsy excuse for depriving a half dozen modelers the thrill of flying in the finals of an international contest. It's disappointing to builders who spend considerable time and money to enter a national meet. More timers should be furnished and the 2 international contests be run off as such—each as a separate event from start to finish.

The present rules governing the Wakefield and the Moffett events are practically the same, thus making it possible to run these contests together. A good idea would be to change the rules, so that the eliminations produce 12 different winning models. Then no one will be denied the privilege of competing in the finals simply because the same 6 entrants are selected for both contests. If a modeler is able to qualify for both teams he is entitled to fly in both final contests. But he should be required to enter 2 separate elimination events. In the combined contest 1 long thermal flight will win a place on both Wakefield and Moffett teams—which is certainly not fair to the remainder of the entrants.

Another criticism is that many modelers are becoming lopsided. They are neglecting to carry out a well-rounded model program. Indianapolis has suffered the bad effects of such a program. From 1932 to 1935 Indianapolis modelers won many national championships in a variety of events. But during the last 2 years they have put all their energy into gas models. Young modelers just beginning to get the feel of balsa and tissue are urged to build gas models. The result is that they branch

into this difficult phase of modeling with little experience to carry them over the rough spots. And in practically every case, beginners are discouraged and lose interest in the model hobby. As a result, the club loses potential contest winners. There is no new talent developed to carry the club's insignia into the model battles.

This explains why Indianapolis has been forced out of the contest picture by Tulsa, Chicago, and other cities. These clubs sponsor all types of models. And when the winners are tabulated their representatives are at the top.

James Cahill carried on a one-man fight to uphold the prestige of Indianapolis. He entered practically all the events—winning the Moffett Trophy and placing high in other events. He's one of the old-timers who still goes in for every phase of modeling. If he hadn't attended the nationals, there would have been no evidence in the list of winners that 10 Indianapolis boys were entered.

Unless the Indianapolis club changes their program to include all branches of modeling they're definitely headed for extinction. Even now they'll find it's difficult to develop modelers equal to those in clubs which have not allowed their program to become lopsided.

The growth of the gas model has had a widespread effect on model airplane building and flying. In a few short years it has accomplished changes which could not have been visualized by the most radical hobbyist. In a way, the gas model has been a boon. As a tonic to an unvaried field, it has boomed construction on the part of present-day builders and has recalled the older ones who have fallen away.

Nevertheless, other phases of the hobby are equally important. From the performance standpoint a rubber-driven model is capable, under favorable conditions, of matching the timer flights of a gas model. We have knowledge of a local builder who has lost three flying-scale models over New York City! And these were flown from a field some miles from the city.

Rubber models can be built larger. Try it, and watch the results for a revelation in performance. Stability and efficiency are greater with increased size. However, a reasonable limit is to be observed.

## Contest Calendar

**READERS and CLUBS.** Notices should be mailed to the Contest Calendar, Air Trails, 79 7th Ave., New York City, at least 2 months in advance; news of winners and results immediately after the events.

**GAS MODEL CONTEST** of the Trenton, N. J., Junior Chapter of the N. A. A., to be held at the Mercer Airport, Sunday, October 24th. Meet will start 10 a. m., rain or shine; trophies and cash awards; 25c entry fee. For information address Richard Scott, 458 Cleveland Avenue, Trenton, N. J.

**ANNUAL CONTEST** of the Ace Model Club, Marshalltown, Iowa. Tentative date July 4th; announcements to be made later. For further information address Ace Model Club, 19 South Center Street, Marshalltown, Iowa.





James Cahill

### ABOUT JAMES CAHILL

JIM'S first flying model was a high-climb Baby R. O. G. He built it in 1929, from plans and kit furnished by the old Airplane Model League of America. The model's flight of 37 seconds proved mighty encouraging to Cahill.

In 1932 he entered the Nationals at Dayton and took home considerable experience, together with an honorable-mention certificate. The next two national meets were too far from his home in Indianapolis for him to enter.

When Akron was announced as the location of the 1934, Cahill was all prepared and ready for the contest. And at this contest he won his first national trophy—Stout outdoor fuselage trophy. From that time up to the present, modelers have tried in vain to dislodge Cahill from the top of the modeling ladder.

We were tickled to learn that he had won the Moffett this summer at Detroit. The "Hoosier Hick," as we jokingly call him, came through in fine fashion, flying the most outstanding of all the famous Cahill-designed models.

Cahill builds all kinds of models. His pet peeve is that too much emphasis is being placed on gas models at the expense of other types of models.

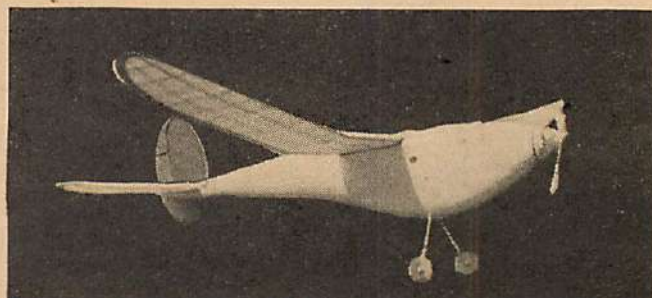
Knowing the Hoosier Hick is one of the best treats the model hobby has ever given us.

# 1937 MOFFETT TROPHY WINNER

*Detailed plans for duplicating the  
model sensation of the Nationals.*

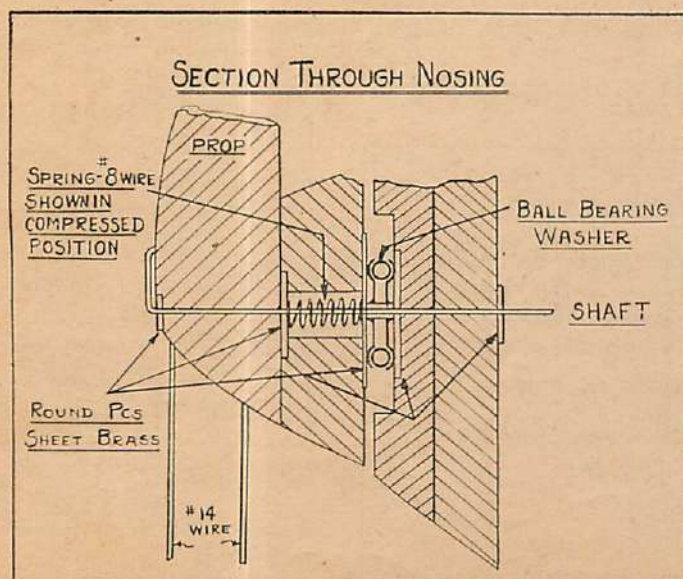
By James Cahill

*in collaboration with Gordon S. Light*



The trophy-winning model is an example of the influence of the new weight rules.

THIS model was designed especially for the Wakefield and Moffett International contest. It is known as Clodhopper II. Clodhopper I was Cahill's entry in the 1936 Wakefield contest. Like most famous models



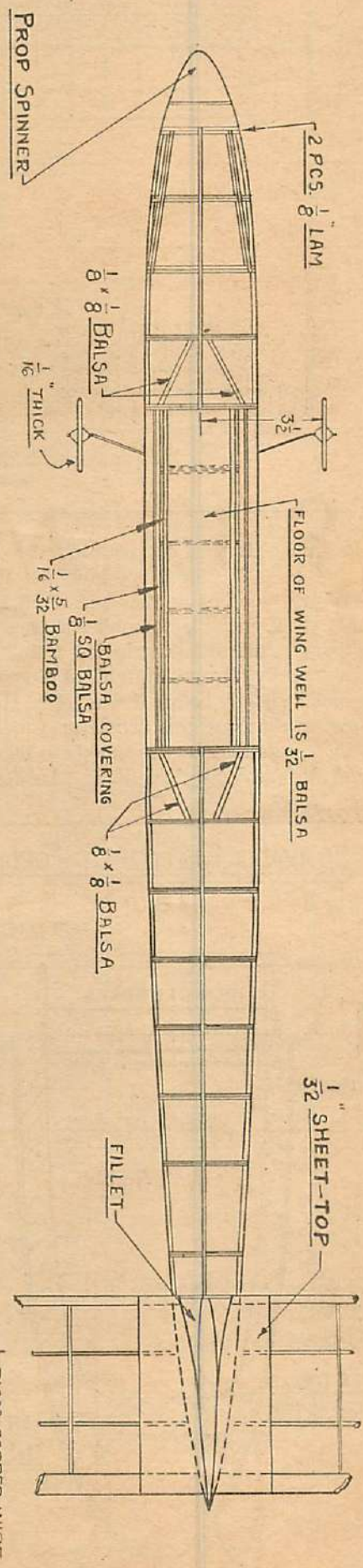
it was still in the last stages of construction the night before the contest. Despite the fact that it lacked some necessary sandpapering and doping, it flew perfectly and required few adjustments.

On the first flight, under full power, it showed a slight stall—both under power and in the glide—turning in only 1:02. Jimmy went to work and applied the necessary adjustments. On the next flight it hit a weak thermal about 400 feet above the hangar of Detroit's Wayne County Airport. Leisurely, it flew in circles above the hangar, taking advantage of the rising air to turn in a flight of 13:32. On the third flight it flew nicely for 2:20. But this flight was turned in at five thirty and the air was calm and free from thermals.

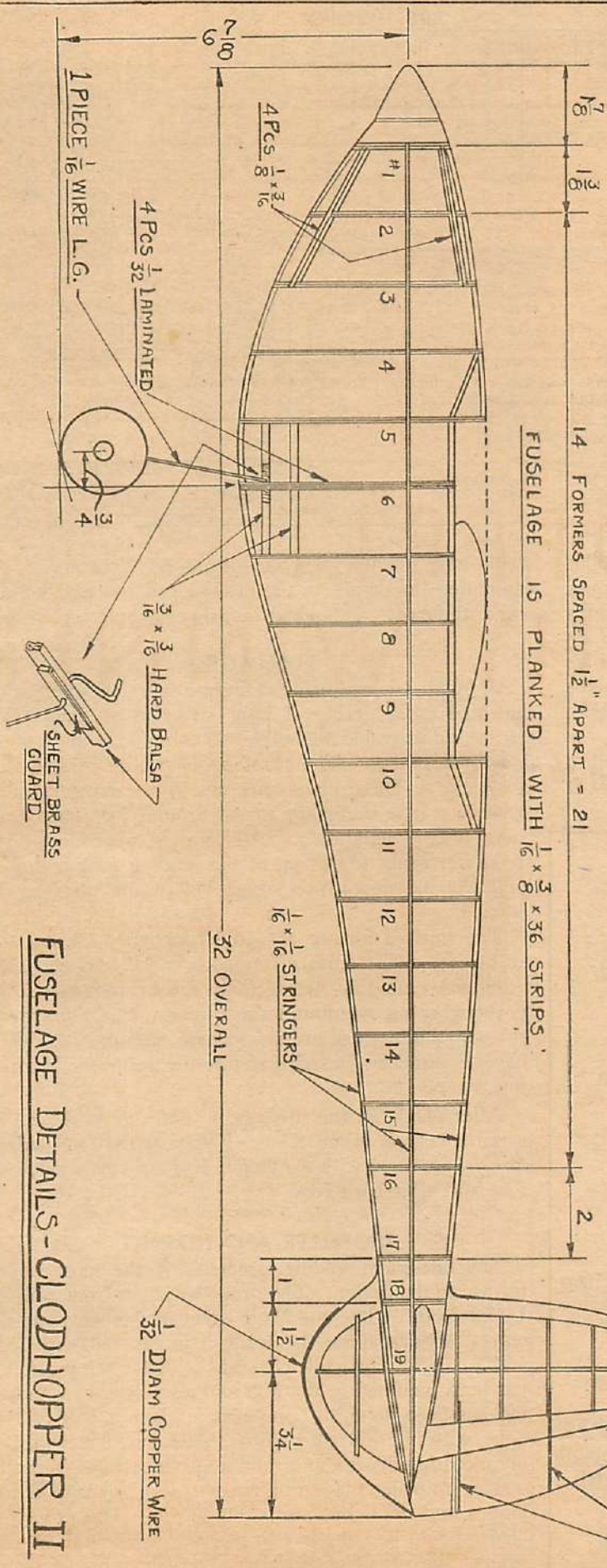
These three flights gave Cahill an average of 5:33 and won him a place on both the Wakefield and Moffett elimination teams.

During the finals of the Moffett the Clodhopper II really showed its true form. On its first official flight it climbed up fast, gained plenty of altitude before the propeller folded back and the model went into its glide. It was soon evident that a strong thermal had the model



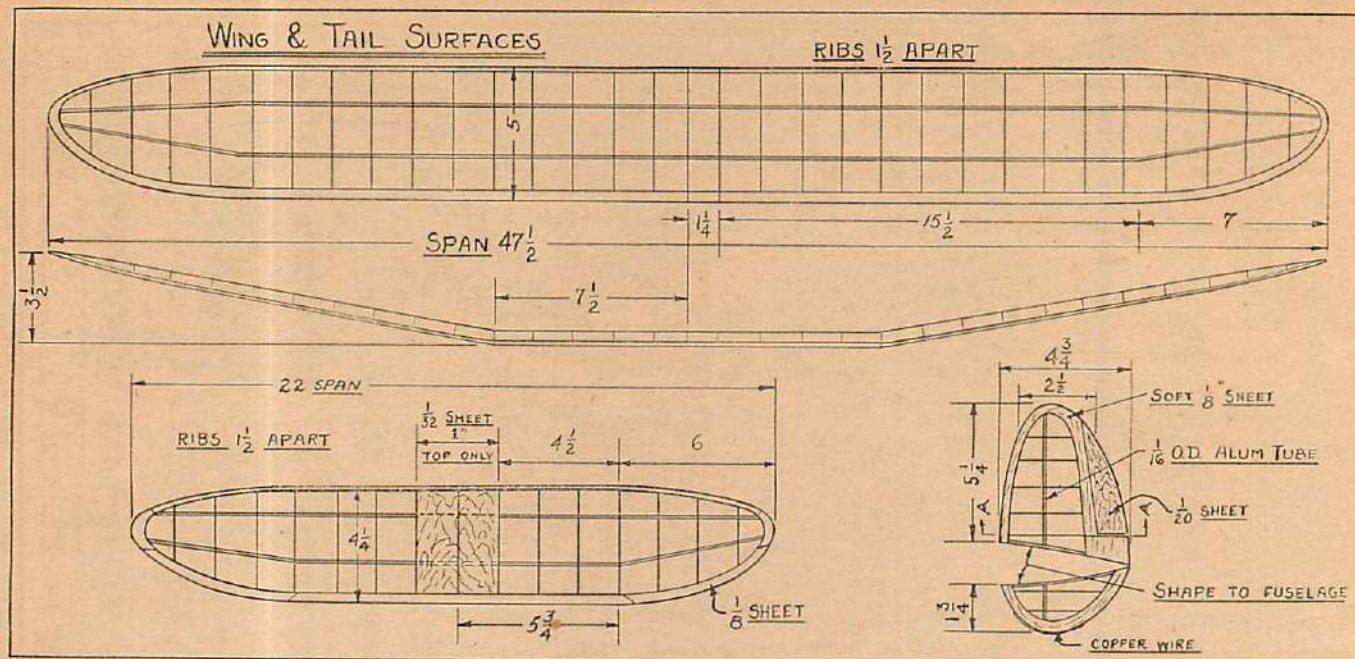


14 FORMERS SPACED  $\frac{1}{2}$ " APART = 21  
 FUSELAGE IS PLANKED WITH  $\frac{1}{16}$  x  $\frac{3}{8}$  x 36 STRIPS



## FUSELAGE DETAILS - CLODHOOPER II





well in hand. It was sucked toward a white cumulus cloud and soon became a speck in the sky. It hopped from the first cloud to another one. And, despite a merry five-mile chase in an automobile, it was lost far off on the horizon. And that was the last Cahill has seen of his model. Luckily, Bruno Marchi, of Boston, took photos of the model shortly before it was lost. He allowed us to use them to illustrate this article on Clodhopper II.

Cahill regrets that he was unable to take this model to England for the Wakefield finals. He feels sure that it

would have made a good showing in any contest. After examining the details of the design, you'll agree that it's one of the most outstanding models ever built.

### FUSELAGE

All bulkheads are made of light-grade  $\frac{3}{32}$ " sheet balsa cemented cross grain. 4 light stringers of  $\frac{1}{16} \times \frac{1}{16} \times 36$ " are used to assemble the bulkheads and hold them in position for planking. The planking is put on in strips of  $\frac{1}{16} \times \frac{3}{8} \times 36$ ". These planks are cut to a narrower width wherever it is necessary to get around the sharp corners of the bulkheads. All landing gear and nose reinforcements ( $\frac{3}{16}$ " sq. at the landing gear and  $\frac{1}{8} \times \frac{3}{16}$ " at the nose) are added before the planking is started.

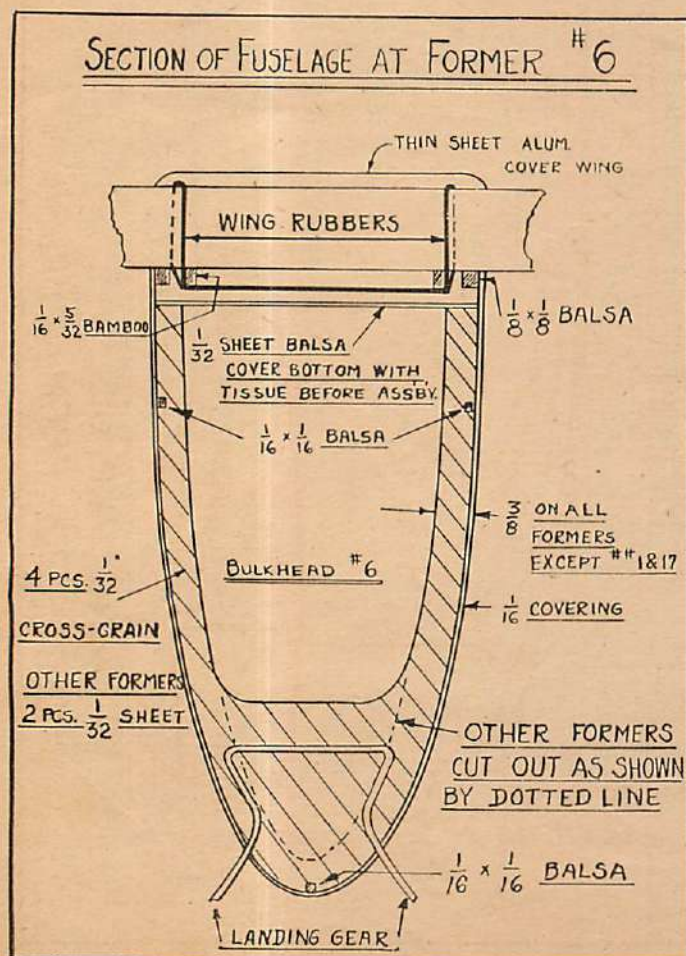
The tops of former #6 to 10 inclusive are cut off to provide a flat surface for mounting the wing. The wing fits onto this flat section of the fuselage. It is covered by an aluminum sheet cover, which fits over the wing and is bent around formers #5 and 10. This cover is attached by strips of interior decorators' masking tape.

After planking, the fuselage is sanded smooth and is given a coat of wood filler. Follow with U. S. army #4 yellow dope with sandings of finest sandpaper, before and after each coat.

### PROPELLER AND NOSING

The one-blade folding propeller is the most novel feature of the design. The propeller is cut from a block  $1\frac{3}{4} \times 2\frac{1}{4} \times 10$ ". The one blade is cut in the conventional way. After shaping the blade it is covered with silk and a coat of wood filler is added. After the propeller has been mounted to the hub and all necessary cementing has been done, the propeller is given a coat of red dope, with intermittent sanding. And, as a last step, apply a coating of wax and rub the surface to a high luster.

The propeller blade is hinged to the hub with dural hinges and #11-music-wire hinge pin. The propeller blade should be cut away to permit the hinge to fit flat against the propeller surface. The edges of the dural hinges are burred with a file to provide a better cementing surface.





The balance weight for the propeller is a piece of sheet brass rolled cylindrically and filled with solder. It is mounted to the propeller hub by a loop of #14 music wire. It should be of sufficient weight to balance the balsa propeller blade.

The propeller spinner has a piece of wire on it which engages a piece of music wire (attached to the nose plug) at the proper time. This "catch" has three purposes: stop the propeller from free-wheeling; stop it at the same position each time, to get least resistance from the folding blade; prevent slack in the rubber from moving back and forth in the fuselage and disturbing the balance of the model. And, in addition, this tension which remains in the rubber eliminates the use of hooks in the nose and tail plugs, as the rubber exerts sufficient tension to keep them in position.

The propeller "stopper" operates in the following way: When the tension of the rubber is strong, the hook on the spinner rides free. When the motor unwinds, the small wire spring inside the spinner forces the spinner forward and the hook on the spinner engages the loop of wire attached to the nose plug.

Cahill predicts that the folding and feathering propeller will prove far superior to the present free-wheeler which is popular among contest modelers. Incidentally, Cahill is the first modeler to use the featherer and folder on a model.

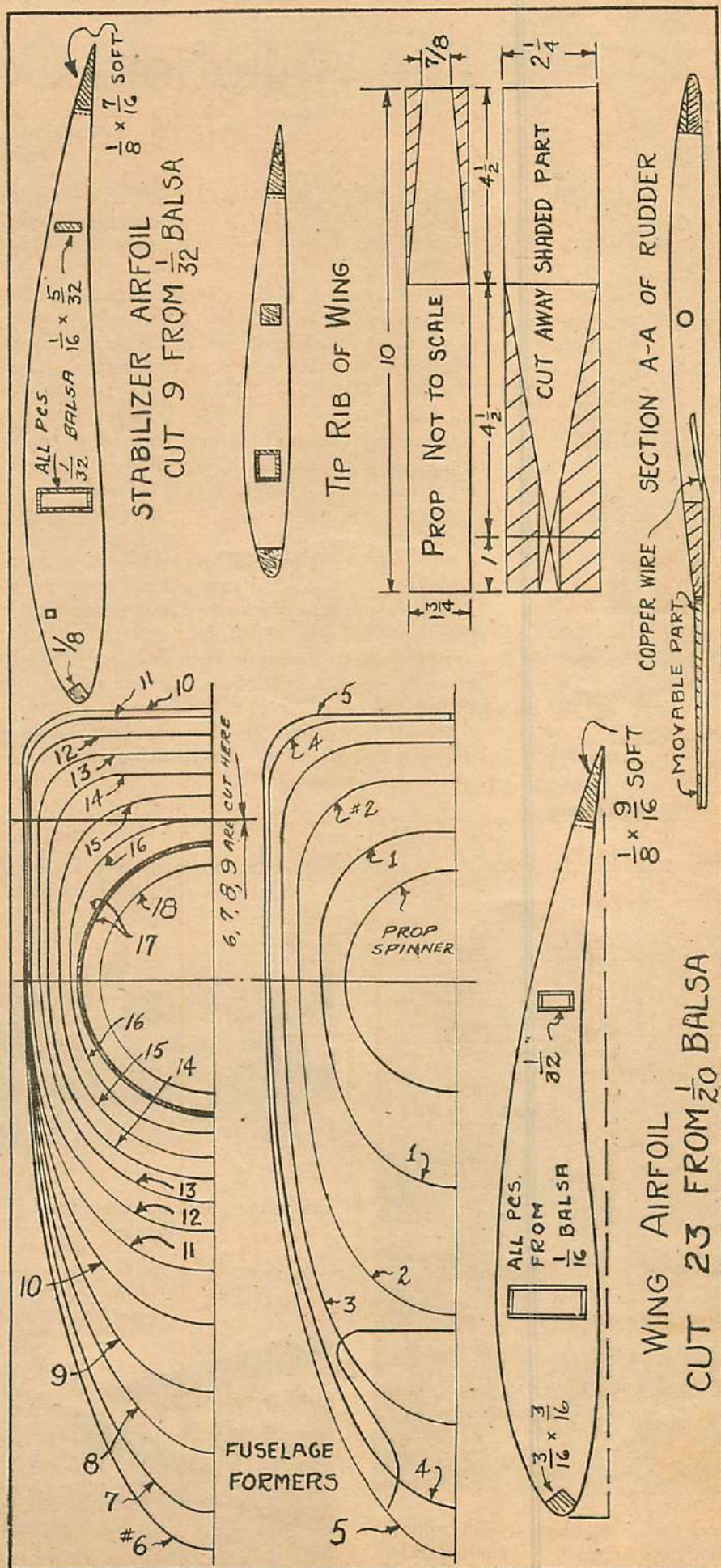
## WING

Ribs are cut, using the template in the drawing. All the ribs are mounted on the 2 center spars before any of them are cemented in place. The spars are built up from pieces of  $\frac{1}{16}$ " and  $\frac{1}{32}$ " flat balsa. The size is indicated in the rib pattern. The spars taper toward the tip of the wing. At the tip, the rear spar changes from a hollow built-up to a solid spar.

The center of the wing is flat for a length of 15 inches. The outline of the wing tip is built up from  $\frac{1}{8}$ " sheet balsa. Where the thickness required is greater than  $\frac{1}{8}$ ", laminate 2 thicknesses of sheet balsa. A strip of silk is doped to the outline of each wing tip to strengthen the balsa tip.

The wing is covered with bamboo paper, water-doped and treated with two coats of Fokker Red dope. It is sanded with fine sandpaper (rubbing chordwise) after each coat of dope.

(Turn to page 96)







Frank Zaic, on a modeling tour of Europe, took part in the Wakefield.

# The Wakefield Contest

By Alvie Dague

THE 1937 Wakefield was one of those rare, but very pleasant contests that run smoothly and on schedule. It was, as Lord Wakefield said, a contest of pure enthusiasm and good will.

On the morning of the contest, August 1st, the foreign teams assembled at the Royal Aero Club and were transported from there, in several large buses, to the scene of the contest. The weather was cloudy, giving no indication of the fine conditions that were to follow. The field, Fairey's Aerodrome, offered excellent model-flying facilities because of its great size. The surrounding country, however, proved a handicap to model chasing. The English countryside is distinguished for its numerous trees, houses and winding roads.

On arriving at the field, the visitors found a great many ships in the air on test flight. Test flying was permitted until eleven o'clock, at which time all contestants were to report to their positions. The actual flying did not begin until eleven thirty.

Each country, to which two timers were allotted, was assigned to a roped-off pen. Although the team captains drew numbers to determine the flying order of their respective countries, team members were permitted to determine their individual flying turns.

When the first ship, a model from New Zealand, got under way the sun filtered through the breaking clouds. (Turn to page 94)



Dick Bodle, 3rd-place winner American eliminations, was a member of the 3-man team.

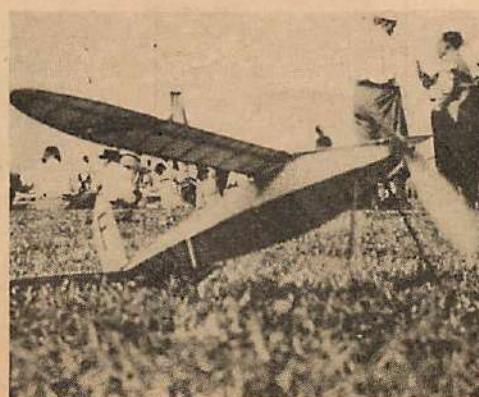


Mr. and Mrs. Herbert Fish with the American elimination winner. Mr. Fish won the Bowden Trophy for gas models.

The American team and English friends relax during the luncheon period.



The winning model, entered by Fillon of France.

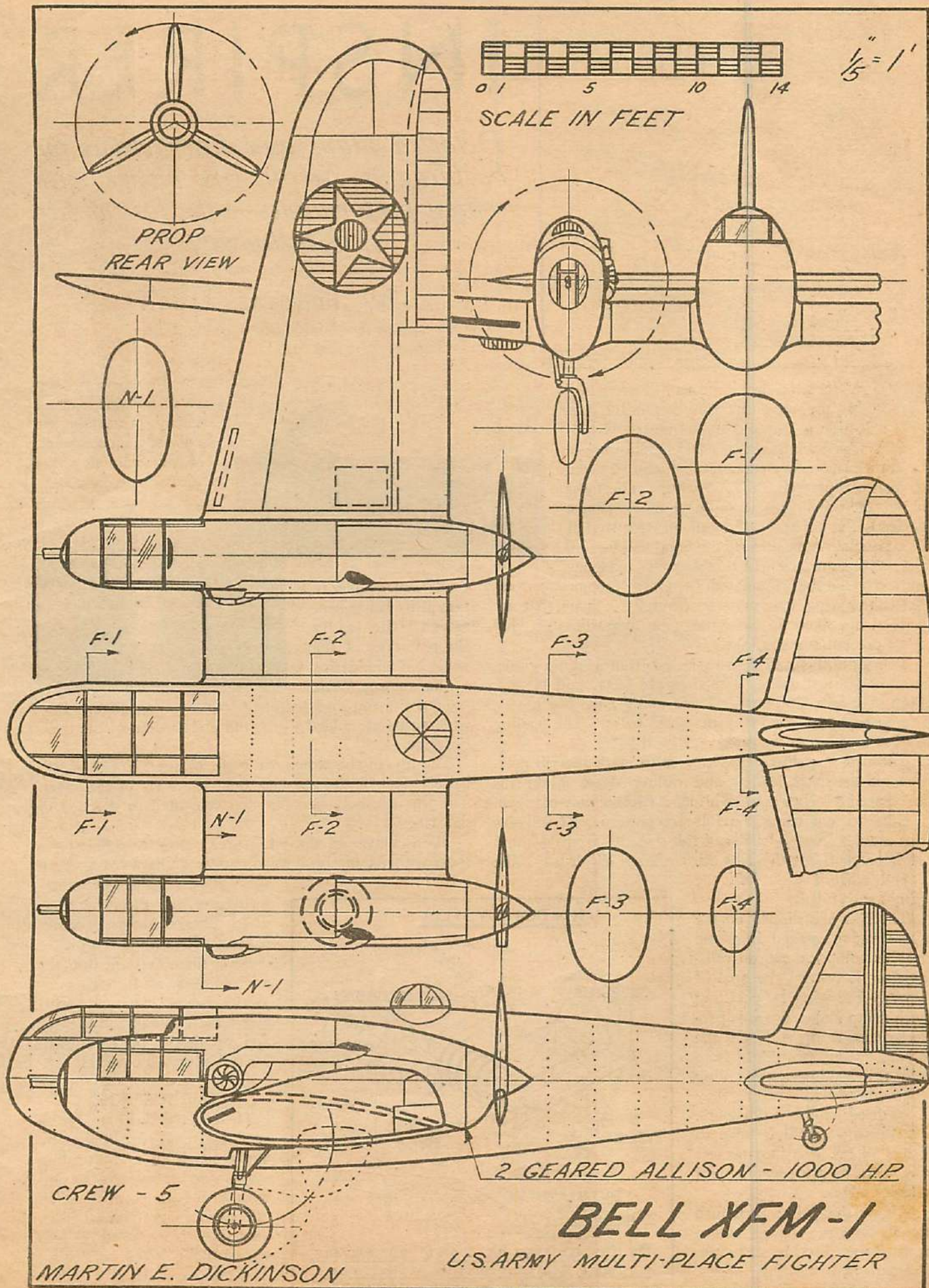


The German models were of unusual design; one incorporated a lifting fuselage.

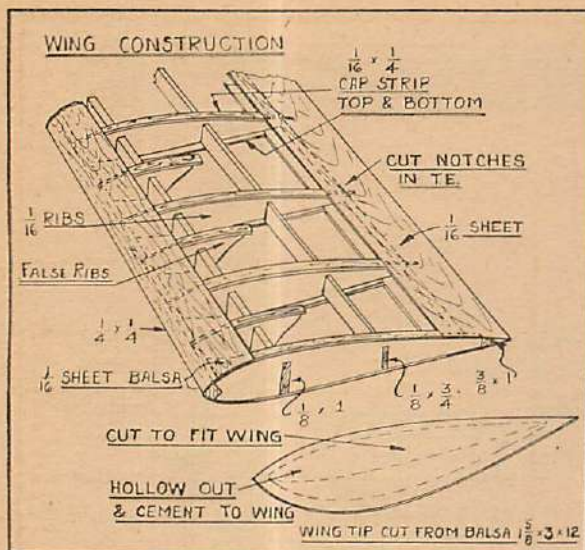


Alvie Dague, prominent American contest modeler and a Wakefield representative.









# INSPIRER

*Detailed plans and instructions for building a simple gas model with contest performance—the last of two installments.*

By Francis Flush

*In collaboration with Gordon S. Light.*

**V**IEWED from the standpoint of successful flights, the most important step in the construction of any gas model is wing building. Warped wings prove a bad handicap. So, from the start, every precaution should be taken to insure a perfectly aligned wing. The most important warning is to build your wing on a perfectly flat surface. Throughout each step of its construction, make sure the wing will line up against this surface. In this way any tendency to warp can be eliminated before it becomes serious. Select the wing spar material carefully. Spars that are warped are likely to twist the wing, regardless of what other precautions you take.

The spars themselves are selected from medium-grade, straight-grained balsa. The sizes are  $\frac{1}{8} \times 1"$  and  $\frac{1}{8} \times \frac{3}{4}"$ . Both spars are 36" long. The trailing edge is cut to a triangular cross section from  $\frac{3}{8} \times 1"$  balsa. The leading edge is a square piece of  $\frac{1}{4} \times \frac{1}{4}"$  hard balsa.

The first step in construction is to mark the rib positions on the spars, leading and trailing edges. Main ribs are spaced 3 inches apart with false ribs halfway between.

Ribs are cut using the full-size pattern. 22 full-size ribs are cut from  $\frac{1}{16}"$  balsa, 4 full-size ribs from  $\frac{1}{8}"$ , and 24 false (half-length) ribs are cut from  $\frac{1}{16}"$  balsa. The 2 end ribs of each half the wing are  $\frac{1}{8}"$  balsa.

The ribs are slipped on the spars and cemented in place. At this point you can do valuable work toward the goal of a warp-free wing by checking each rib to make sure it is perfectly lined up with all the others. Good procedure is to add the leading and trailing edges to the ribs before they have dried firmly to the spars. In this way you'll be able to bring all the ribs into perfect alignment with the leading and trailing edges.

Allow the wing structure ample time for drying before adding the sheet balsa to the leading and trailing edges. The sheet balsa is medium-

grade and pliable, to permit its being bent around the fairly sharp curves of the wing. 3" wide strips of balsa are bent around the top and bottom of the leading edge.  $1\frac{1}{2}"$  wide strips are added to the top and bottom of the trailing edge.

The tips of the wings are made of solid blocks of soft balsa. The blocks are cut to fit the ends of the wing. The tips are hollowed out and cemented to the tips of the wings.

The 2 halves of the wing are joined by splicing the spars with  $\frac{1}{16}"$  birch plywood or  $\frac{1}{2} \times \frac{1}{4}"$  hard balsa. Both

spars are given this same treatment, and after the cement has dried the sheet-balsa covering is put on the center section.

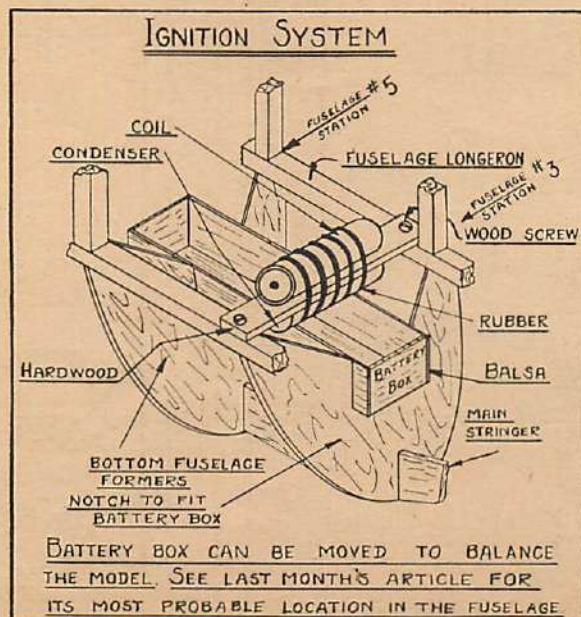
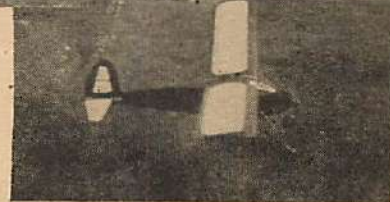
As a final step, all the ribs are capped with strips of  $\frac{1}{16} \times \frac{1}{4}"$  balsa. These cap strips give a better shape to the wing and provide a better surface for fastening the covering.

## TAIL SURFACES

The construction employs no spars. Strength is supplied by ample size leading and trailing edges, further strengthened with sheet-balsa covering. The tail surfaces are flat, that is, no camber is used and the ribs are straight pieces of balsa. The rudder is similar to the elevator. It has slightly less



Left: The climb is steep and smooth, the inherent stability protecting the beginner from crack-ups. Below: Skimming the grass for a landing.









area than half the elevator.  $\frac{3}{16}$ " sheet balsa is used in the construction and all the necessary information can be obtained from the drawing. After covering, the rudder is cemented to the elevator and balsa fillets are cemented in place at the rudder-elevator junction. The fillet is cut to fair out the shape of the rear of the fuselage.

### COVERING

A variety of covering material can be used with satisfactory results. Silk, bamboo paper, and nainsook are the most common. Silk makes an ideal covering but is rather expensive. Bamboo paper is inexpensive but does not produce a lasting job. Nainsook can't be equaled for toughness. However, it is a trifle heavy.

We'll give instructions for covering the model with silk. If you're using other type of covering, the procedure is very much the same.

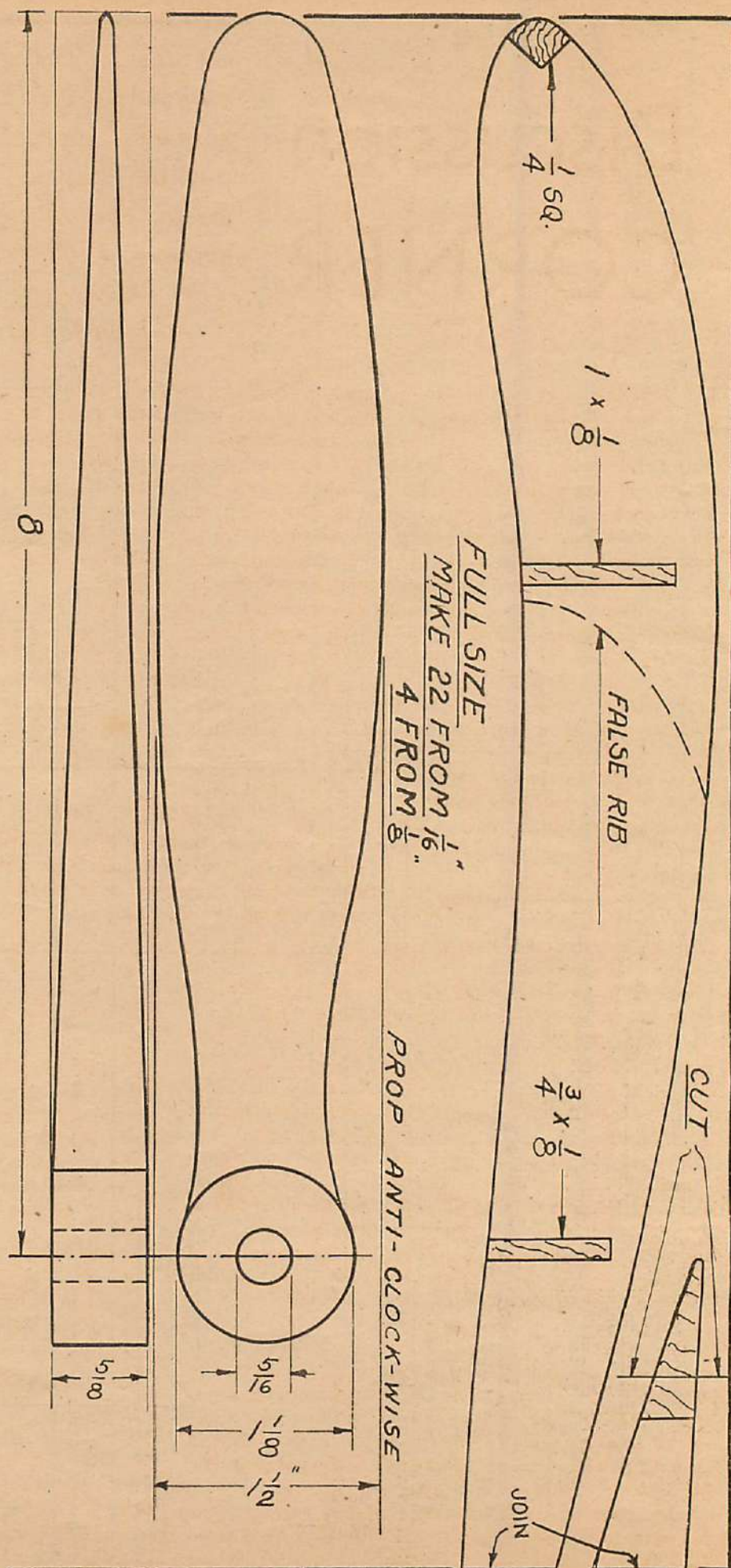
First stretch the silk as tight as possible (crosswise) at the center of the wing and cement it to the center section. After the cement has dried, the silk should be stretched as tight as possible spanwise along the wing and secured to the wing tip. From this point, the covering process is simple. About 1" wide band of the silk is doped down along the leading edge. Any wrinkles which have appeared can be stretched out before the silk is cemented to the trailing edge.

The bottom of the wing is covered in the same way. However, a number of weights must be laid on the bottom of the wing to force the silk covering against the bottom camber of the ribs. While the silk is weighted down, several coats of dope are brushed over each rib to fasten the silk.

### FINISHING

If silk is used it is a good idea to paint only the border of the wing. Not only does this idea save paint but will enable you to keep your model in sight when it is high in the sky. The unpainted surface of the wing gives a sharp contrast to the painted border, allowing sunlight to filter through and giving a color contrast that no other combination can equal.

The wing should be doped with successive coats of dope varying in consistency from light to full strength. Use fast, (Turn to page 84)





# The Discussion CORNER

*The model art progresses through exchange of ideas. The Discussion Corner is a monthly sounding board for your opinions. For December the subject is outline shapes. Other topics are listed below. Think about them, then write your opinion in 150 words or less and send it to The Discussion Corner. One dollar is paid for each answer printed.*

EXPERIENCE has shown me that a short, high climb with limited propeller run will give better duration in any weather than a moderate climb with extended propeller run. My models have from forty- to sixty-second propeller run and they climb from three hundred to six hundred feet. Even without the help of currents, the model requires two to three minutes to glide back to earth. This insures a minimum flight of about two and one half minutes, considerably longer than a model whose propeller turns from one and one half to two minutes and which gains only about one hundred and fifty feet of altitude.—TOM ENGELMAN, Santa Ana, Cal.

For contest flying the new weight rules almost automatically call for a short, high climb. This is because the model is usually brought up to weight by adding more rubber. Added strands mean less turns and thus shorter propeller runs (assuming that the propeller was of optimum diameter from the beginning). A second reason for a short, fast climb is that this type of model is less affected by unfavorable ground currents. Slow-climbing models are apt to be blown behind trees or other obstacles only too soon, thus cutting short the flight.—JOHN PHELAN, Brooklyn, N. Y.

A short, fast, high, climb has a definite advantage for three reasons: (1) The glide of a duration model contributes to the length of flight and naturally more prolonged glide comes with altitude; (2) The greater thermal currents do not build up under one hundred feet of the ground. And, too, their strength increases with altitude; (3) A smaller propeller, usually used with a fast climb, offers less resistance in the glide.—HUGH MCCAIN, Gainesville, Tex.

High climb and short propeller run are desirable, because: (1) the model is better qualified to combat dangerous currents that sometimes make launching disastrous; (2) quicker recovery from bad-flying altitudes caused by gusts, etc.; (3) better chance to reach thermal region; (4) powerful motor can swing a large propeller, giving more thrust and increased efficiency; (5) a short fuselage can be used, insuring sufficient strength and permitting less cross-sectional area.—JOSEPH P. WALSH, New Bedford, Mass.

When flying in warm, sunny thermal weather it is better to get the tremendous altitude offered by a fast-spinning propeller, because strong risers usually thrive high above the ground. On days when there are no thermals, or if you're confronted by a drizzling rain or similar adverse conditions, it is necessary to get time by having a long propeller run.—WILLIAM HEINZ, Baltimore, Md.

A long propeller run is necessary for contest models flown under the new weight rules. The greater part of a heavy model's flight must necessarily be under power, because of the fast-sinking speed in the glide. For the lighter-weight contest model, the limited propeller run with a quick, high climb seems to be the best practice.—

W. E. BIHLER, Elmhurst, Ill.

## *This Month's Topic*

For maximum duration in the outdoor model do you favor a short, high climb with a limited prop run, or a moderate climb with an extended prop run?

For maximum duration an outdoor model should have an extended propeller run and a moderate climb. With this set-up less power will be wasted and the slower-climbing model will climb higher and fly longer than its fast-

climbing but less efficient brothers.—CHARLES J. GERVASON, Canton, Ohio.

A moderate-climbing model is less difficult to adjust and get flying properly. It is less likely to perform any violent maneuver that results in a crash—so discouraging to the average modeler. I find that a moderate climb with extended propeller run gives me the longest flights.—WILLIAM BROWNLEE, Moccasin, Mont.

## COMING UP are these topics:

For January—*Would the use of a retractable landing gear on the new, weight-rule models improve performance enough to justify difficulties in design and construction?* Answers must reach us by October 15th.

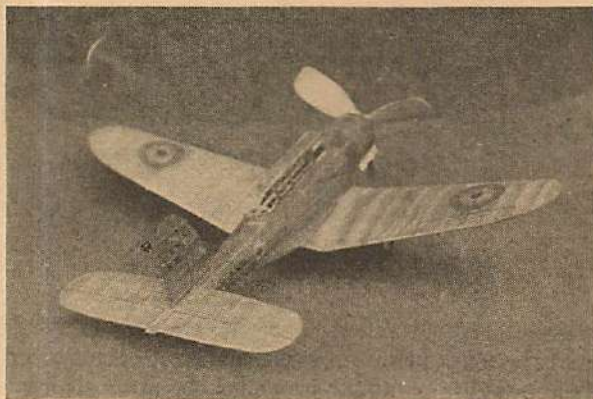
For February—*In designing the outdoor model what fuselage cross section do you consider to afford maximum efficiency?* Answers must reach us by November 15th.

For March—*Does the use of twin, vertical tails improve a model's performance from either the efficiency or stability standpoint?* Answers must reach us by December 15th.



# DIVE BOMBER

Exaggerated dihedral in low-wing models is an indication of good design. Enlarged tail areas and propeller blades are a requisite of all flying scale models.



*Detailed plans of a fast-flying scale model of a formidable plane—the British Blackburn dive bomber.*

By Alan D. Booton

THE first glance at the Blackburn fleet-fighter reveals nothing unusual, but further study brings out several features that are distinctive in military aircraft. For instance: the folding wings and the retractable landing gear. Considering the mechanical difficulties overcome in a restricted space, the combination of these features is quite an achievement.

The gunner's rotating hatch is unique because it can be raised like a roll-top desk, permitting the gunner to break his guns up through the turtle-back panels and bring them into instant action. It is not understood just why the vertical tail is placed so far forward, unless it is to prevent its being blanketed by the stabilizer when in steep climbing conditions.

The model has been designed to faithfully reproduce the prototype simply as possible. The ailerons and tail surface controls are movable, but the folding wing and retractable landing gear were omitted for simplicity.

With the large flying propeller design provided, graceful flights of almost one minute were obtained when the rubber motor was lubricated, stretched and wound in with a winder. The 3" of slack rubber added seconds to the endurance.

Before assembling work on the drawings, place waxed paper on them.

## FUSELAGE

The fuselage is of simple model construction and eliminates the guesswork of attaching the wings and tail surfaces.

First, cement  $\frac{1}{32}$ " sheets together, cross-grained, to form a 6x8" plywood sheet  $\frac{1}{16}$ " thick. Place heavy books on

this and let dry for several hours, then cut two each of the former patterns very carefully. The appearance of the finished model depends on this.

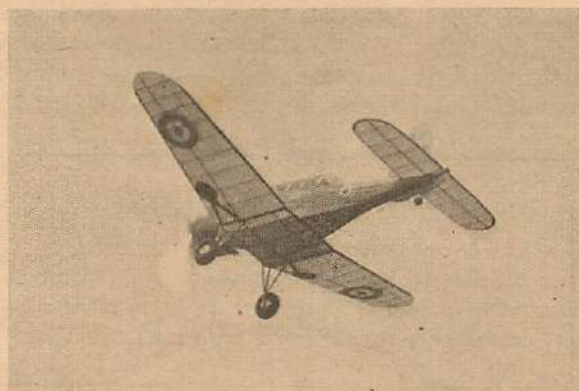
Pin the  $\frac{1}{16}$ x $\frac{1}{8}$ " longerons to the drawing. If difficulty is met in bending the lower longeron to lay unsprung without holding it, cut the curved portion from  $\frac{1}{16}$ " sheet.

It is important that all parts be laid on without tension, otherwise the fuselage will be warped.

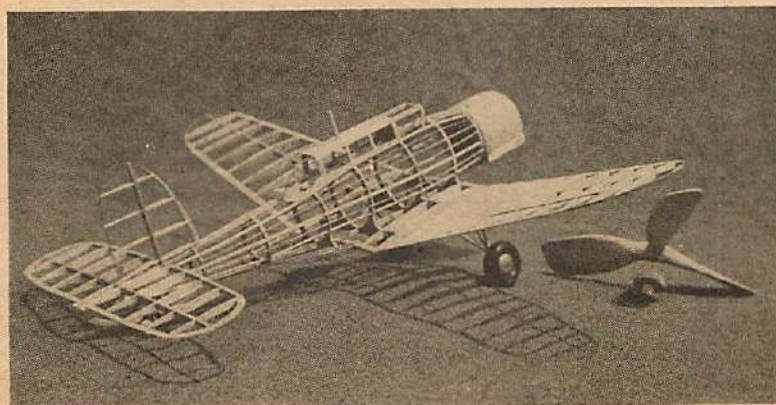
Cement the left halves of the formers to their respective places on the longerons and push pins into the board on the sides of each to hold them vertical. When the formers are set, prebend the  $\frac{1}{16}$ " stringers and cement them in the slots. Cement the  $\frac{1}{8}$ " #1 rib on. When dry, remove the half frame from the board and cement the right former halves to it, then add the  $\frac{1}{16}$ " stringers, the right  $\frac{1}{8}$ " #1 rib, and

all bamboo strips to the formers on both sides. Be sure to use bamboo strips that are as near to  $\frac{1}{32}$ " sq. as possible, because oversize strips are bound to warp the fuselage frame.

Carve the small tail block, split open and hollow and cement to the last former. Now cement the curved  $\frac{1}{16}$ " sheet parts to the rear of the frame. (Turn to page 90)



Low-wing models are spectacular in flight, performing with a zip characteristic to their design. The original model flew for nearly a minute.

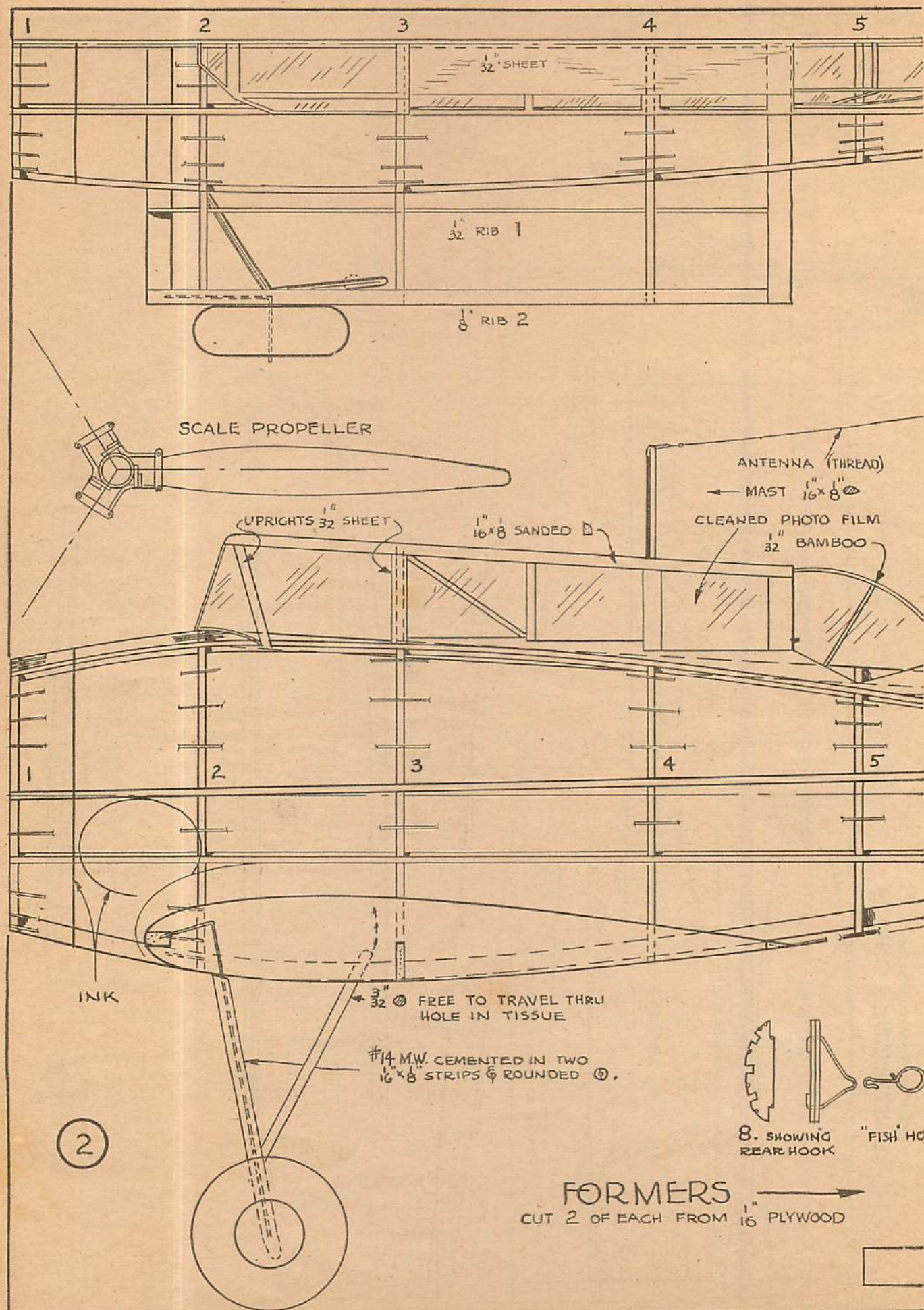


The framework should be adequate for strength and detail, simple enough for light weight and high performance.

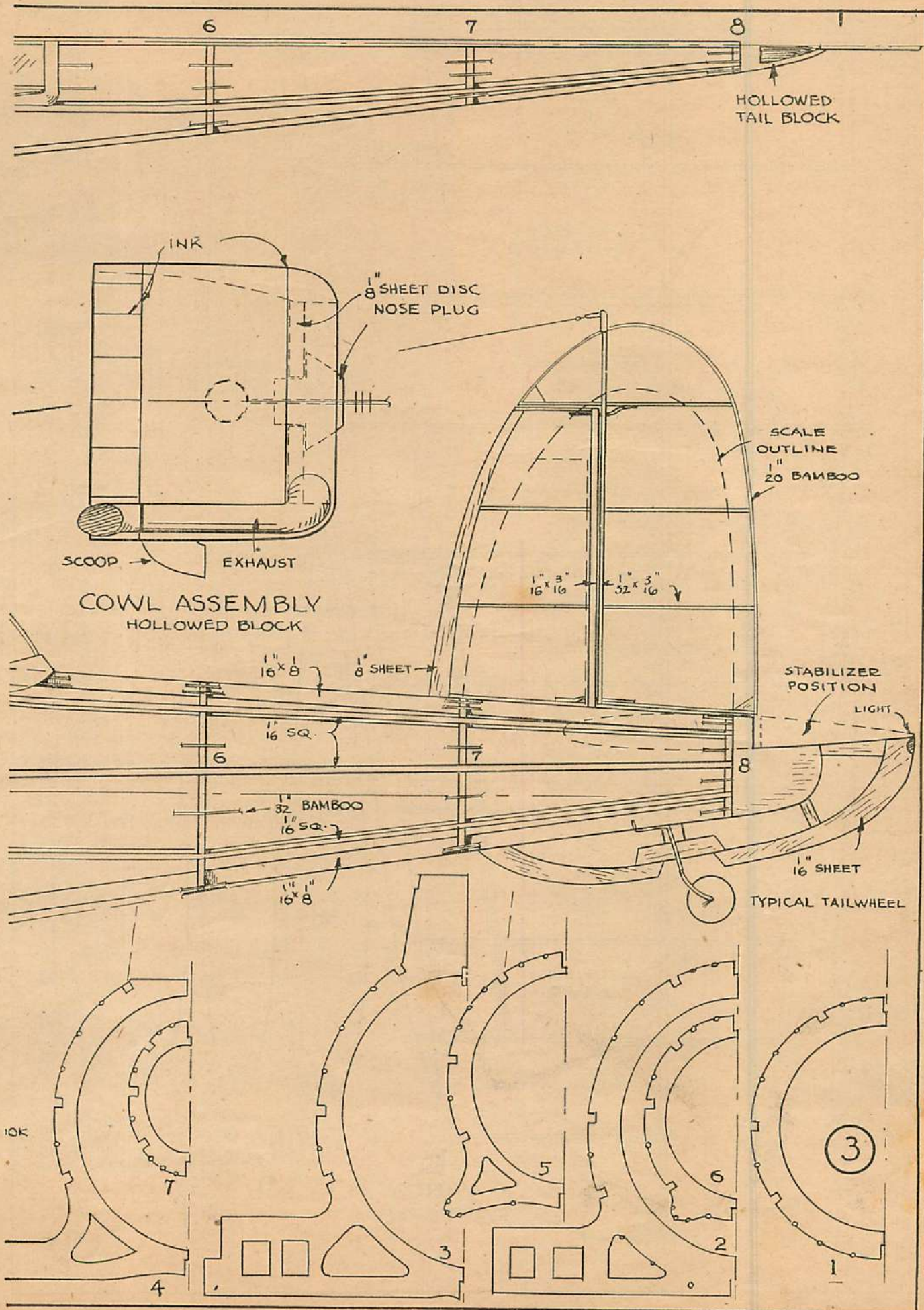




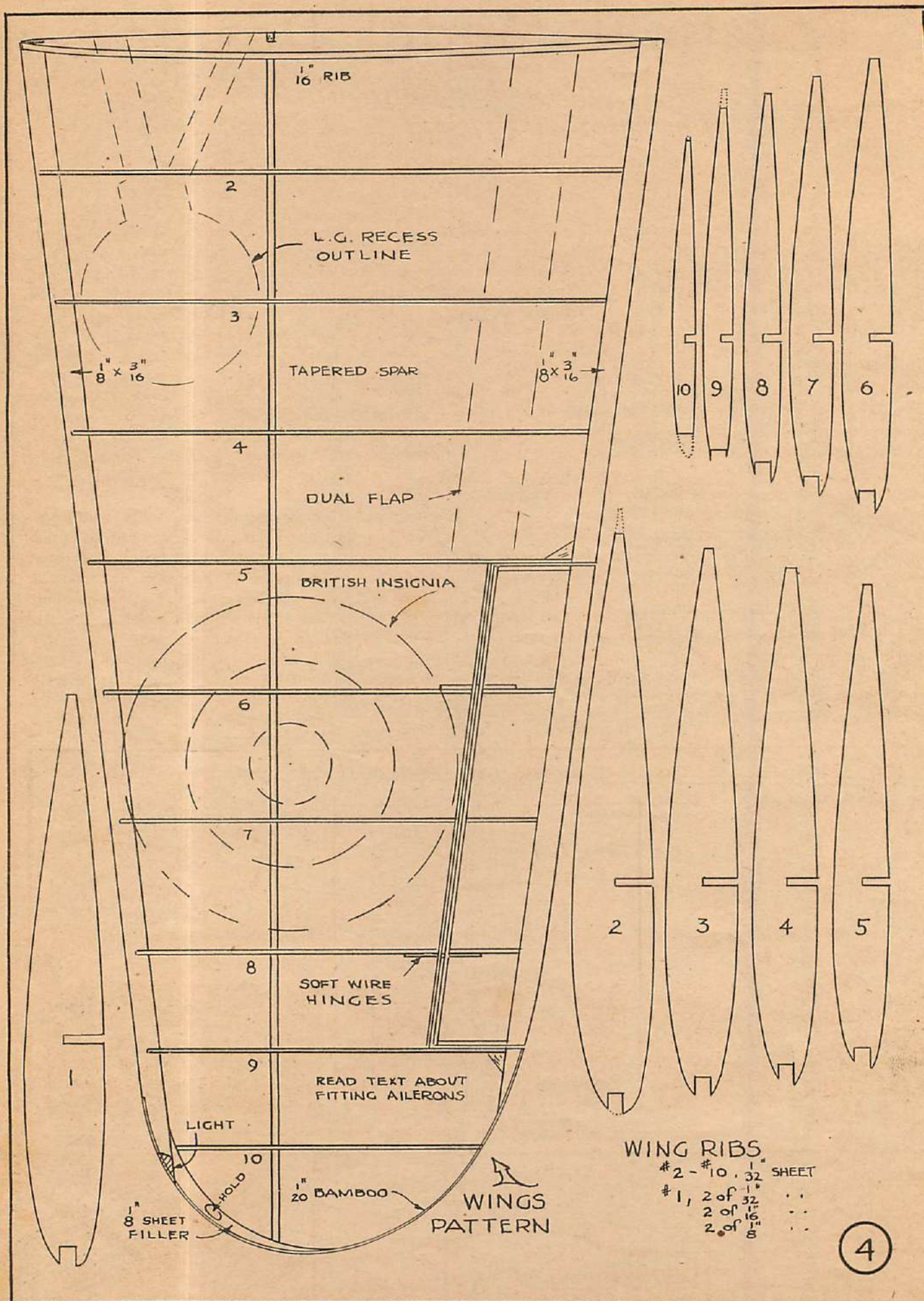














# Practical Model Design

*An authoritative discussion on which articles of actual design will be based—the first of an important series.*

By Frank Zaic

*Author of the Model Aeronautics Yearbook*

IT WAS way back in 1926 that the model-airplane fad first gave promise of developing into a national hobby.

With the boost of the "Lindbergh era" model-airplane construction began to be seen in its true light. Other hobbies were too mild to make headway against its growth, as one successfully constructed model usually results in a confirmed enthusiast. Then, as now, there seemed no end to the designs to build, no end to the exploration road. Somehow the deeper we delve into the model game, the wider becomes the horizons. Just as one corner was rounded another always sprang into view.

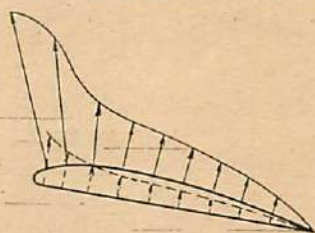
To-day airplane model building has grown to be one of the more scientific hobbies for both young and old. It is the purpose of this series to simplify the problems of aerodynamics as applied to the model.

Although most of us have read as many books as we could obtain, we still find ourselves saying, for example, "I know that there is a vacuum on top of the wing and a compression on the bottom, but the air is so empty and twelve tons to be lifted are twenty-four thousand pounds." The airplane follows certain aerodynamical principles to sustain itself in the air. However, the very nature of the air, its emptiness, its seemingly nothingness, still throws a halo of magical powers over the aeronautical engineers.

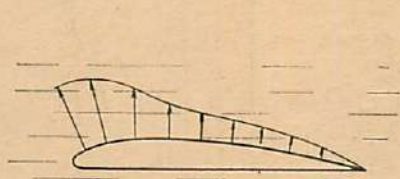
It is quite possible that this magical defiance of gravity with models gives us the incentive to keep going year after year. But, as time goes by the mind tries to find the logical reason for every action and reaction. At the outset of this reasoning desire, it is like looking through dust-caked windows; everything is vague and hazy. Eventually, the windows slowly clear and it seems that the person has suddenly become possessed of molecular eyes—eyes that can see each molecular particle of air. In search for the scientific reason of flight the mind naturally puts two and two together. If you are in search of further advancement in the scientific study of model aerodynamics each model seems to become a super-performer.

To understand how a wing lifts you really should possess these imagined molecular eyes. Try to imagine that the air is a great storage space of ball bearings and that these balls, or molecules to be scientific, are made of rubber. Assume that we are surrounded by such minute rubber balls. You can easily see that crowding exists at the bottom of this gigantic storage space—due to the infinite number of molecules extending upward toward the stratosphere. Visualize the lessening of this crowding as you climb higher and you have grasped the actuality of density; greatest density due to (Turn to page 82)

PRESSURE DISTRIBUTION FORCE DIAGRAMS



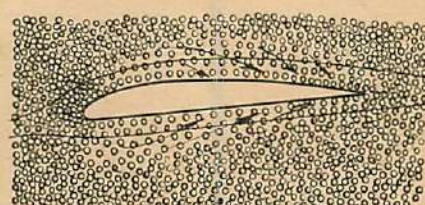
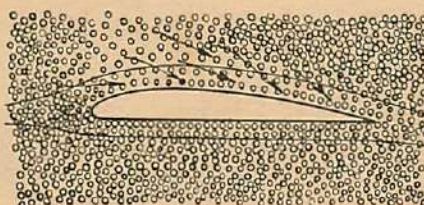
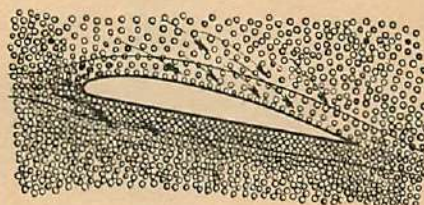
HIGH ANGLE OF ATTACK



ZERO ANGLE OF ATTACK

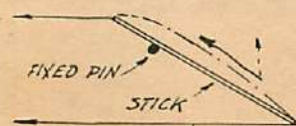


NEGATIVE ANGLE OF ATTACK

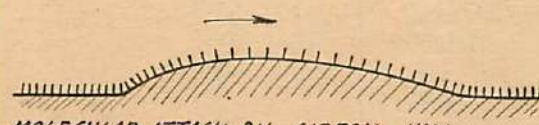


GRAPHICAL ILLUSTRATIONS OF PRESSURE DISTRIBUTION

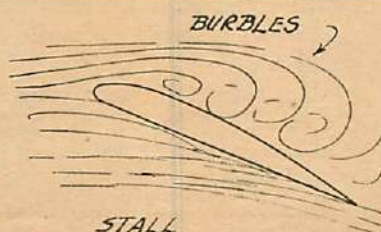
*F. Zaic*



INCLINED PLANE ACTION



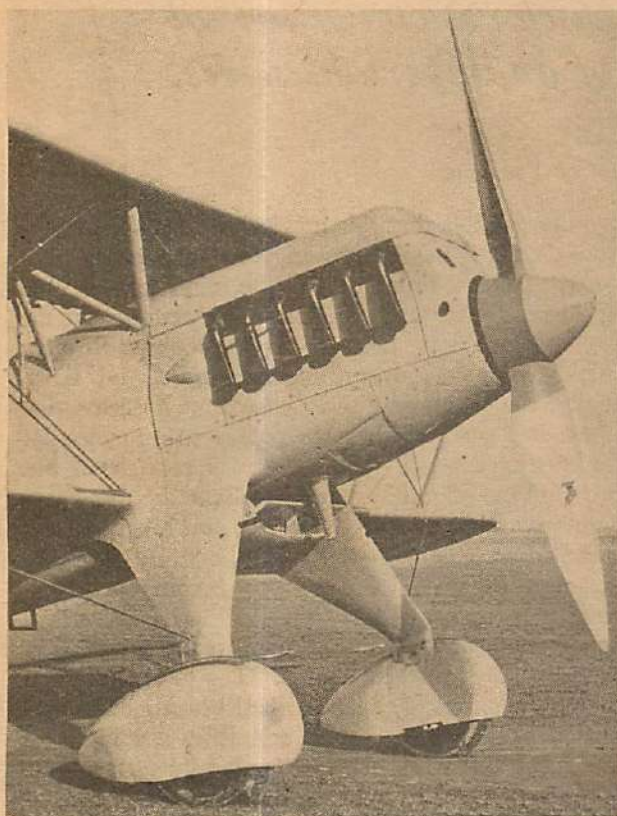
MOLECULAR ATTACK ON AIRFOIL HILL  
ILLUSTRATING PRESSURE REDUCTION



STALL



# Heinkel He51



A close-up of the He51, showing the landing gear and nose construction.

*Replica plans of a high performance biplane — a German fighter.*

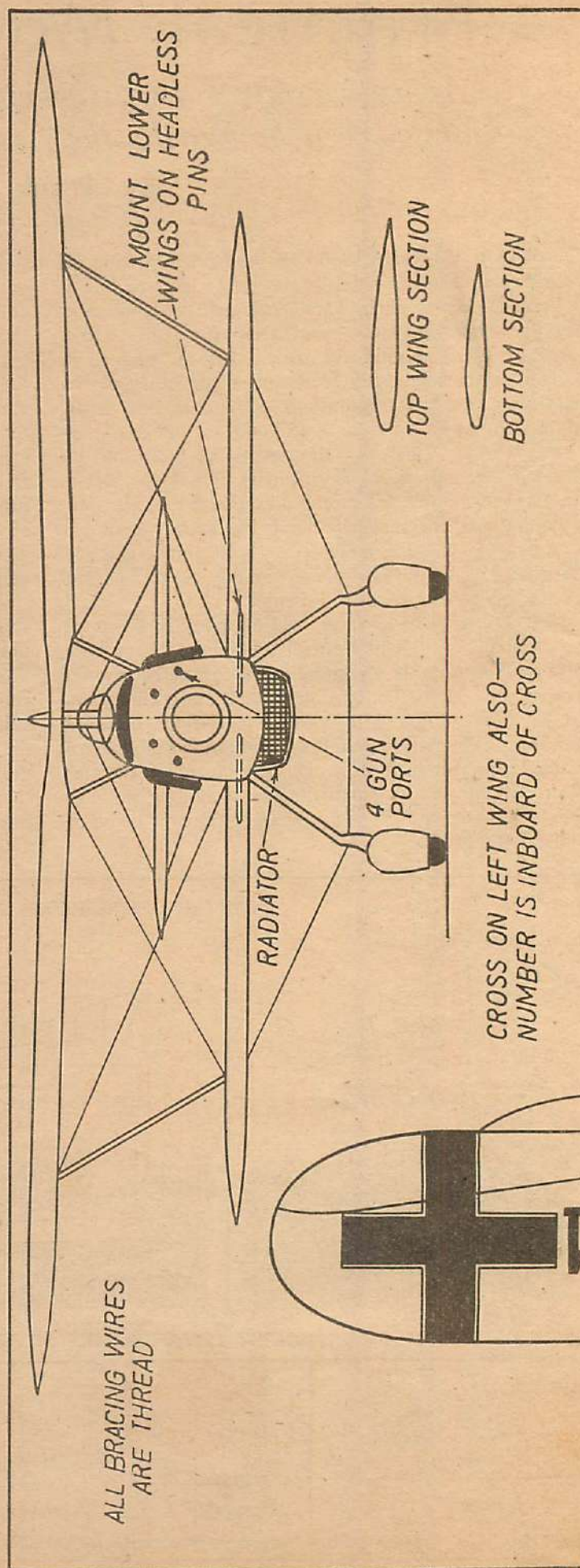
By William Winter

THE sudden aerial rearmament of the German nation created unparalleled difficulties in production and design. To amass an air fleet on a par with those of other first-class nations, and doing so in a few short years starting from scratch, required a practical approach to a Gargantuan task.

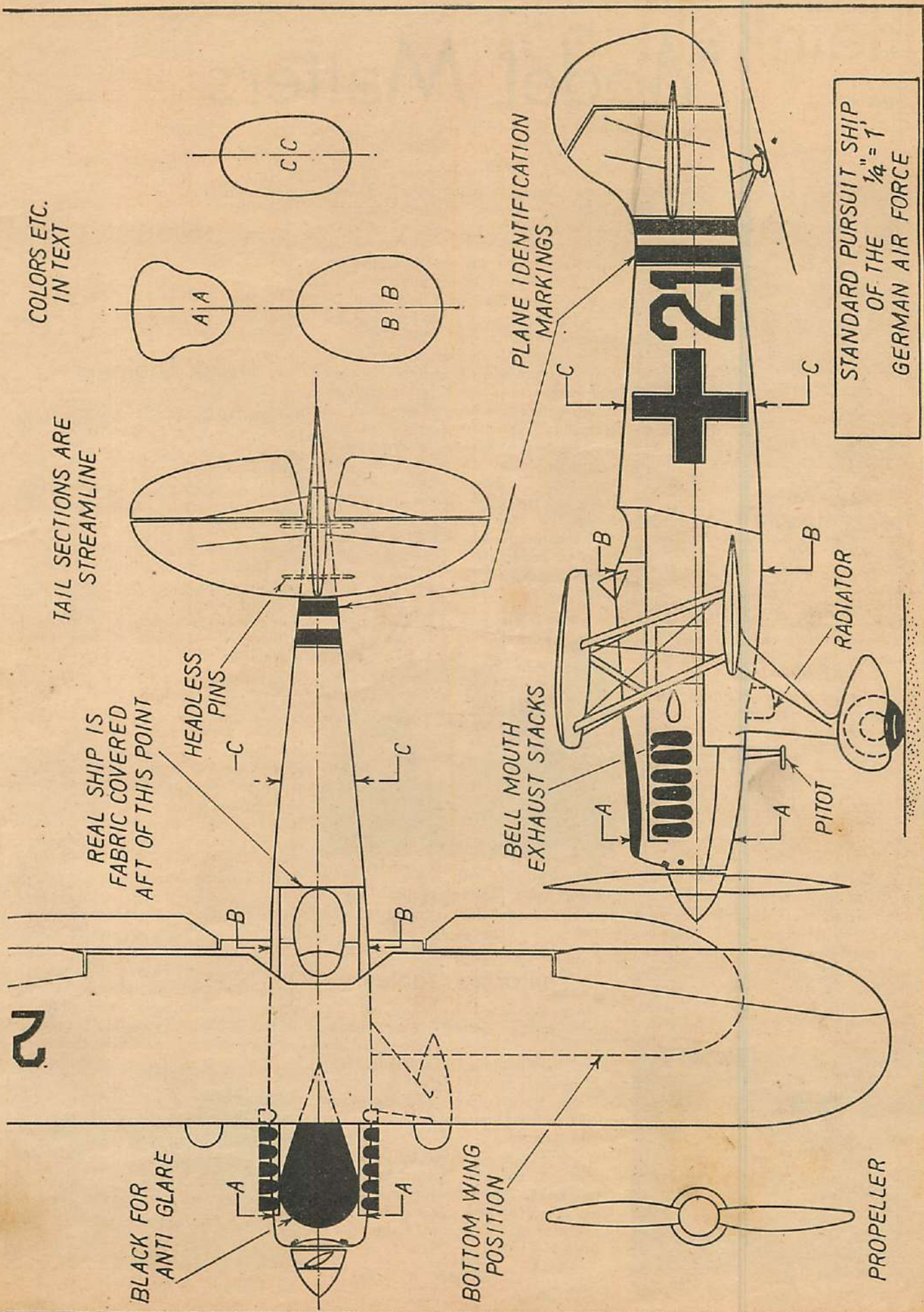
When the world had become suddenly monoplane conscious and the low-winged, all-metal fighter was fast eclipsing the once king-pin biplane, Germany decided to build her new air force around a biplane nucleus. The reasons for doing so were logical.

Time was precious and the design of an ultra-modern fighter would prove, for a nation who had been forbidden certain phases of airplane construction, to be a lengthy affair. Difficulties too numerous to mention could be anticipated both in production and training. A standard pursuit ship, whose constructional and flying characteristics would be familiar to plant and flight personnel, was the natural answer. This fighter was to equip the new squadrons until planes of the Seversky and Supermarine types became available. Such a ship is the He51.

Powered by the 650 h.p., B. M. W. VI engine, its high speed is 217 m.p.h. (Turn to page 86)









*Flight records  
and contestants  
in competitions.*

# Model Matters

*Club notes and  
news of model  
organizations.*

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



A beautifully built gas model by Peter Bowers of Los Altos, Cal. His 6th job, the 2½ lb., Cyclone-powered ship, flew for 35 min.

## Massachusetts Gas Ban

Gas models have been banned in Massachusetts. State Registrar Frank A. Goodwin ruled that gasoline-powered models are legally aircraft and cannot be flown in the State unless licensed and operated by licensed pilots. This verdict was first enforced July 24th, when William E. Heaton, State aviation inspector, halted gas-model flights at the Bowles Airport, near Springfield, Massachusetts.

The gas-model ban is still in effect despite the appeals of the modelers. Anyone who flies his model without a license and an operator's permit is liable to prosecution by the commonwealth.

The Boston Gas Modelplane Society has urged its members, as well as all other gas modelers, to write to the Bureau of Air Commerce, Washington, D. C., asking for a special license for their gas models. Once the modeler has been issued such a license the Massachusetts State aviation commissioner will issue a special operator's license.

We extend the Massachusetts modelers our sympathies and, even more, our

energies in a drive to have this ban lifted. Modelers living outside Massachusetts should take steps now to make sure a similar restriction is not put into force in other States. The close cooperation which gas modelers have received from the aviation industry in the past indicates that we will have plenty of assistance in our fight to keep the gas-model hobby free from restrictions.

We agree with the Boston Gas Modelplane Society when they write in their club publication that this present confusion would have been avoided had not certain discontented factions in the model group conducted a propaganda campaign against the gas model. All this criticism is based on personal prejudices and not with a view toward bettering the model hobby. It's a pity that the model hobby should suffer from the "ax grinding" of one discontented model organization.



Frank Zaic, of New York, left, and Wilbur Tyler, Boston, prepare Zaic's fuselage model for a flight at the Nationals.

## California Contest

Rain threatened to wash out the model airplane contest in Sacramento, California, on July 23. Throughout the morning rain persisted in falling. The sun finally came out late in the morning and the forty entrants had a pleasant model session throughout the remainder of the day.

The meet was sponsored by Weinstock Lubin Co., and was directed by Mr. A Timberlake. The following results have been tabulated and sent to us by Ted Ravellette of Sacramento, California.

### Class B Glider

Robert Amos  
Porter Towner  
Harry Aviazian

:33.8  
:27.3  
:25.4

### Fuselage

Porter Towner  
Harry Aviazian  
Robert Amos

1:10  
:50  
:42.6

### Flying Scale

Porter Towner :19.2  
Sweepstakes Winner—Porter Towner

### Class A

Glider, Wallace Wilson :17.4  
Fuselage, Wallace Wilson 1:58.4  
Flying Scale, Wallace Wilson :18  
Sweepstakes Winner, Wallace Wilson

## Tulsa Engineers

Model Aeronautical Engineers of Tulsa held an indoor contest August 15th for Indoor Class A, R. O. G., Stick-model Class C and R. O. G. fuselage. M. A. E. club members are recovering from their Detroit trip and few of them showed up for the meet. Alvie Dague, Jr., the national indoor champion and M. A. E. member, was in England for the Wakefield and naturally he wasn't able to participate.

The flights turned in were good, despite the 45-foot ceiling with exposed rafters across the ceiling. The winning times are:

Indoor R. O. G. 9:03  
Indoor R. O. G. Fuselage 10:04  
Indoor Stick 12:05

Tulsa modelers are handicapped by not having a suitable building to carry on their indoor work. However, flying under bad conditions leads them to prepare for the worst. And when they get into a suitable indoor-contest site, they always turn in a championship performance. The club records for the building mentioned above are:

Indoor R. O. G., 9:19 Roy Wriston  
Indoor R. O. G. Fuselage, 11:18 Roy Wriston  
Indoor Stick, 16:52 Joseph Frady

*Prop Wash* is the name of the M. A. E. club bulletin which recently made its appearance. It's an interesting 4-page paper that contains news of all phases of the hobby. Tulsa has been doing such big things in modeling that it cer-



A scale model of the Boeing "C" sea-plane, first international mail carrier.



Bill Effinger of Brooklyn entered his latest "Buccaneer" at the Detroit meet.





The annual Lebanon, Pa., outdoor meet is one of the biggest in the East. Gordon S. Light, right, contest director, talks things over with Mark Sherrill of Arlington, Va.

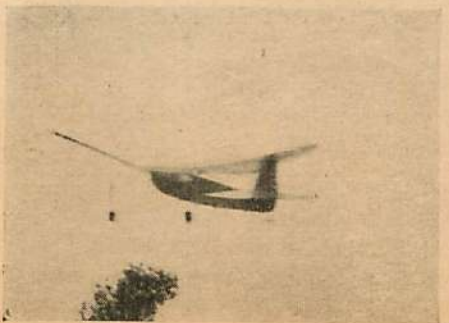


The youngest contestant at the Lebanon contest, Robert Krug, 13, and his 3rd gas model.

tainly seems fitting that they publicize their work. And *Prop Wash* fills that purpose. The co-editors—William Adams and Bruce Luckett—and the society editor—Robert Hoffmann—are to be congratulated for turning out such an interesting club bulletin.

M. A. E. are sending a delegation of members to the Mississippi Valley contest at St. Louis. Alvie Dague intends to stop off at this contest on his way home from the Wakefield contest in England.

Roy Wriston of the M. A. E. won the 4th annual club trophy, which is given for the most consistent year-round performance turned in by any club member. An outdoor contest scheduled for Sunday, August 22nd, marked the opening gun in the battle for the 5th annual M. A. E. trophy.



## The Reading Contest

Perfect weather greeted the contestants of the 10th Annual Model Meet of Croll & Keck Model Airplane Club. Flying was done at Whander Field, outside of Reading, Penn. Contestants came from Pennsylvania and neighboring States. A full schedule of outdoor events, including a scale-model contest, was run off under N. A. A. rules.

Gas models were limited to a fuel supply of  $\frac{1}{16}$  ounce per pound weight. But this was sufficient fuel to carry 2 of the models into Lake Ontelaunee, about 2 miles from the airport. Robert Gable, of Reading, retrieved his plane from the lake after it had been clocked at 13 minutes and 3 seconds, the winning time in the contest. Late in the afternoon another gas model landed in the lake. It was flown by Stephen Kowalik, Wilmington, Delaware. The flight was 12:32—second highest of the day.

We can't blame the gas models for seeking out the lake. The weather was so hot that we began to think that a dip in the lake was the only sensible thing.

The meet was the biggest ever conducted in Reading. The full list of entrants, together with a record crowd of spectators, helped turn in a rousing day of model flying. Boy Scouts from Reading acted as timers. Judges were John F. Wolfinger, Orris D. Brown, and Robert Shultz—all prominent in aviation and boys' recreation activities in Reading.

Additional contest results include:

### Stick Model

1st Roger Hammer, New York	5:31
2nd David Call, Philadelphia	3:46
3rd Robert Gable, Reading	2:12

### Glider

1st Robert Koch, Reading	1:13
2nd James Kroener, Reading	:52
3rd Arthur Eckrenroth, Reading	:48

### Fuselage

1st Robert Gable, Reading	2:18
2nd Charles Roth, Reading	1:35
3rd Bruce Shaefer, Lititz	1:29

### Scale Model

1st Howard L. Flick, Reading	
2nd A. S. Briner, West Lawn	
3rd James Koller, Reading	

## DuPont Gas Winner

We had an interesting letter from Albert E. Dillon, of Jackson, Michigan,



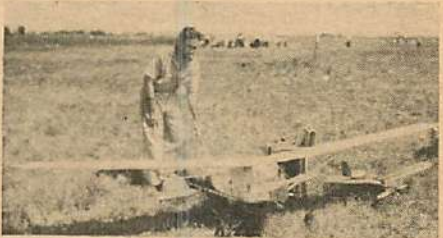
An informal gathering of the Indianapolis boys. Above: Harold Stofer's stick, gas job in flight. Left and right: Art Vulp's capable "Red Zephyr" as it appears in flight.



The Chicago Parks gas-model contest, held at the Harlem airport, attracted builders throughout the mid-West. Below: A gas job taking off the tar-paper runway.



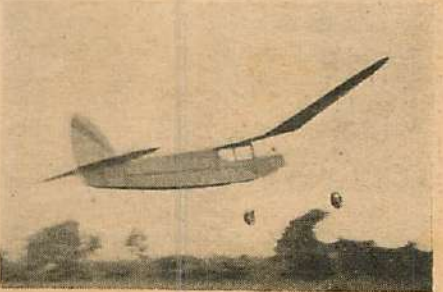
Below: A radio-controlled model entered at the Chicago contest.



winner of the duPont Gas Model Contest at the last national meet in Detroit. Albert is 25 years old and has been building models ever since he can remember.

The model he used in winning the duPont Payload Contest was a revamped Corben Super Ace model built from a kit sold by *Modelcraft* of California. The ship was a year and a half old, powered with a Brown Junior motor, and used a special-type propeller. The model weighed  $4\frac{1}{2}$  pounds. It has been flown in contests all over southern Michigan. Since the meet in Detroit, Dillon put new covering on his model. And it took 3rd in the endurance event and first in the pay-load event at a recent meet in Kalamazoo, Michigan, August 8. In this event the ship carried 25 per cent pay load, half of the amount which was carried at the national contest.

Dillon certainly knows how to fly a gas model. His models turn in con-







sistently good flights. He has taken the "bugs" out of gas-model flying. We expect to present the duPont Winner's ideas of gas-model operation in a future issue of AIR TRAILS.

## Mid-Western States Gas Model Contest

Sponsored by the Gas Model Aero-naut Club of the Chicago Park District and directed by Mr. B. C. Friedman, the Mid-Western States Contest was held at the Harlem Airport on August 8th. The official registration listed 129 contestants from cities throughout Illinois, Indiana, Ohio, Missouri, Wisconsin, Michigan, and Iowa. Approximately 5,000 spectators witnessed the event. Prizes, valuing \$500, consisted of trophies, engines, kits and subscriptions. The awards were made at the Victory Banquet, held at the Sherry Hotel. Following are the results of the meet:

Duration		
1st Michael Roll, Dearborn, Mich.	36:16.9	
2nd Richard Kliefuth, St. Louis, Mo.	31:15	
3rd Carson Carol, Indianapolis, Ind.	18:15.2	
4th John Houboldt, McHenry, Ill.	17:20.3	
5th Henry Gebhard, Milwaukee, Wis.	15:25	
6th Frank Nekinken, Chicago, Ill.	15:24.8	
7th Irving C. Goebel, Chicago, Ill.	14:55	
8th Henry Schmaltz, Chicago, Ill.	14:5.5	
9th E. Shearhod, Chicago, Ill.	12:18.6	
10th Buddy Johnson, Joliet, Ill.	11:11.5	
11th Joseph Konefes, Chicago, Ill.	10:23.2	
12th Robt. Forester, Riverside, Ill.	10:16	
13th John Jackson, Chicago, Ill.	10:4	
14th Arnold Johnson, Joliet, Ill.	9:30.5	
15th Harold Stofer, Indianapolis, Ind.	9:10.5	
16th Roy Marquardt, Burlington, Iowa	9:2.5	
17th E. P. Lott, Chicago, Ill.	8:20.4	
18th Wm. Briggs, Detroit, Mich.	7:51.6	
19th Sterling Harper, Chicago, Ill.	7:38.8	
20th Melvin Yates, Joliet, Ill.	7:30	
21st Kenneth Ernst, Indianapolis, Ind.	7:23.5	
22nd Ray Nazar, Chicago, Ill.	7:5	
23rd Ed Burd, Chicago, Ill.	7:1	

## Consistency Event (Average three official flights— 1/8 oz. total gas)

1st Dr. G. C. Covington, Chicago, Ill.	5:27
2nd Edward Konefes, Chicago, Ill.	3:23
3rd Melvin Yates, Joliet, Ill.	2:47.3
4th Joseph Konefes, Chicago, Ill.	1:43
5th Frank Dallaine, Detroit, Mich.	1:51.6
6th G. E. Shearhod, Chicago, Ill.	:38
7th Barney Johnson, Joliet, Ill.	:36
8th Carson Carol, Indianapolis, Ind.	:22

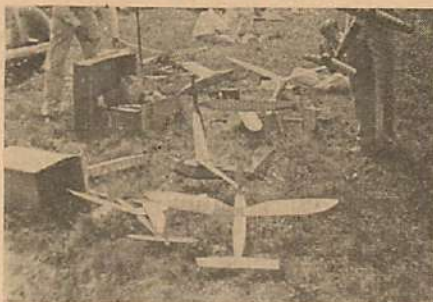
## Union County, N. J. Gas Meet

Frank Yuhasz, of Linden, whose model remained aloft for 11:56, won the first Union County gas-model championship in the meet held August 23rd at Hadley Field.

Yuhasz's winning model was a TD coupé, Cyclone-powered. He represented the Linden Club, of which he is treasurer.

Competition for the next four places was keen, with Walter Marionschek of

The Mississippi Valley Annual Contest, held in St. Louis, is the mecca of contest modelers of national reputation. Left and below are shown typical scenes of this event.



the Queen City Gas Model Club, taking second with 6:7.4; Howard Simmons of the same club taking third with 5:5; and the Linden Club's own plane placing fourth with 4:43.

Crackups during the meet were scarce, as contrasted to those prominent in other meets. Only two occurred during the entire day's activities. Motion pictures were made of the contest and will be shown at a future meeting of the Linden Model Aircraft Club, Linden, N. J.

## 4th Annual Outdoor Flying Meet, Lebanon, Pa.

Saturday, August 28th, proved a fine day for the contest. Modelers in the vicinity of Lebanon had been kept indoors for the week preceding the meet,



Wallace Simmers weighs in at the Nationals. Simmers enters all the major contests and has a brilliant record.

by a persistent week-long rain. The enthusiasm they built up during this week of inactivity was released at the contest. This accounts for the splendid flights, despite the absence of helpful currents.

As usual, we had a part in the direction of the meet. And it's sure a modeling treat to meet the boys who come to Lebanon once a year for a model session. Many of them drove as far as 200 miles for this event.

The meet was sponsored by the Lebanon Exchange Club. But enthusiasm for modeling is not confined to that organization. About 1500 spectators turned out to watch the model flying. And as further evidence of the coöperation given to the modelers, no gas models were lost, despite the fact that they flew into all parts of the county.

The prize list included trophies, medals, gas-motor and modeling supplies, cash awards, and subscriptions to AIR TRAILS. A new crop of modelers won the prizes. Henry Putnam, of Washington, D. C., won the Cabin Fuselage Event, with a splendid flight of 3:19. Henry is an enthusiastic modeler and we've watched his progress during the last 3 Lebanon meets. He seems definitely headed for the top in modeling.

The Model Club of Linden, New Jersey, sent an enthusiastic group to Lebanon. They had some fine models. But it just wasn't their day to win a first place.

Entrants and spectators alike had a mighty pleasant afternoon. Lebanon is looking forward to the meet again next year and extends a hearty invitation to all modelers to enter.

Following are the contest results:

### Cabin Fuselage

1st Henry Putnam, Washington, D. C.	3:19
2nd Earl Stahl, Johnstown, Pa.	2:02
3rd Mathew Smith, Washington, D. C.	2:00
4th Robert Koch, Reading, Pa.	1:48
5th Carl Frank, Linden, N. J.	1:47

### Stick Model

1st Robert Gable, Reading, Pa.	2:51
2nd Mathew Smith, Washington, D. C.	2:05
3rd Roy Messinger, Linden, N. J.	1:56
4th Fred Morgart, Johnstown, Pa.	1:55
5th Henry Putnam, Washington, D. C.	1:40

### Glider (Tow Line Launched)

1st Robert Koch, Reading, Pa.	:57
2nd Charles Roth, Reading, Pa.	:55
3rd Robert Gable, Reading, Pa.	:41

### Glider (Hand Launched)

1st William Weiss, Baltimore, Md.	:45
2nd Henry Putnam, Washington, D. C.	:32
3rd Fred Morgan, Johnstown, Pa.	:23

### Gas Model Event

1st Arthur Eck, Johnstown, Pa.	11:00
2nd Irvin Shiffer, Elizabethtown, Pa.	8:19
3rd George Guest, Scranton, Pa.	7:13
4th Ben Hayden, Reading, Pa.	6:04
5th Carroll Carter, Washington, D. C.	5:44

### Fuselage (Open)

1. Joseph Matulis, Chicago, Ill.	4:02
2. Roy Wriston, Tulsa, Okla.	3:22.3
3. David Seltzer, St. Louis, Mo.	
4. Steve Edwards, St. Louis, Mo.	1:32
5. Christy Magrath, St. Louis, Mo.	1:17
6. Marvin Schmidt, St. Louis, Mo.	1:07.6
7. Carl Fries, St. Louis, Mo.	:57
8. Martin Fitzpatrick, St. Louis, Mo.	:45

### Fuselage Type (Junior)

1. Albert Magenot	1:23
2. Robert Gibbs	1:22
3. Billy Riordan	1:02
4. Donald Sheets	:56.8
5. Chas. Koons	:40
6. Harold Harris	:39.5
7. Bobby Gibbs	:36
8. Frann Kuntz	:33
9. Henry Greenbarda	:30
10. Wallace Seaver	:23

Turn to page 88



*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.*

### SEAPLANE CONVERSION

*Question: Is it possible to convert a 24" rubber-driven model into a seaplane by adding pontoons? J. B. M., Westmount, Quebec.*

**Answer:** It is perfectly feasible to convert practically any type of model into a hydro if it's a ruggedly built, nice-flying job. Rugged construction is needed to withstand the rigors of water flying. Good flying qualities are necessary, since the added weight of the pontoons, plus the additional necessary waterproofing of the model itself, is certain to cut down the flight.

J. B. M. follows up this inquiry about hydros with the additional question:

*How are pontoons built? How are they attached to the fuselage? Where should they be attached to the fuselage?*

**Answers:** For a 24" model the floats should be built up from a framework of balsa formers and stringers covered with tissue. Sheet balsa covering is more durable, but also makes the floats considerably heavier, unless it is skillfully applied. The length should be about  $\frac{2}{3}$  the overall length of the model. Large floats insure water stability, which is essential in a model. The floats should extend forward of the propeller. The center of gravity of the model should be back of the float step. On the water the model should rest well back on the rear of the floats, so that the rear tips are partially submerged.

The 2 floats are first joined to each other with bamboo cross braces. Attachment to the fuselage should be flexible, to take up the shock of rough landings. Use either bamboo or wire. The forward attachment point can be made at the landing gear. A rear strut can be attached to the floats and joined to the bottom of the fuselage, a few inches back of the landing gear.

### MISCELLANEOUS

K. H., of Winnipeg, Manitoba, sent a list of 14 questions to be answered. All the questions represented serious thinking on the part of K. H. Following are those questions of general interest:

*Question: In giving a propeller downthrust, which end of the shaft is pointed down—the end where the rubber is attached or the opposite end?*

**Answer:** The propeller end of the shaft is pointed down for downthrust. Or to say it another way, the rubber-attachment end is raised.

*Question: Which direction is considered right when talking about models?*

**Answer:** Imagine yourself seated in the cockpit when considering direction of flight and also when referring to the right or left side of the model.

*Question: Where should a model be balanced if its*

*wings are tapered,  $\frac{1}{3}$  back from the leading edge of the wing, where it is attached to the fuselage, or  $\frac{1}{3}$  back from the leading edge near the tips?*

**Answer:** Balance the model  $\frac{1}{3}$  back from the leading edge measured at a point halfway between the tip of the wing and the point where it joins the fuselage.

*Question: Can olive oil be used to lubricate rubber?*

**Answer:** Use a more common-type lubricant, such as soapy shaving cream or glycerin. They are easy to obtain and are certainly better lubricants for motors.

*Question: Is the flight of a model improved if the wings and elevator are in line with the hub of the propeller?*

**Answer:** This type of model is generally conceded to be slightly more efficient than its high-wing or low-wing brothers. In the case of the mid-wing fuselage model it is difficult to mount the wing in the center of the fuselage. The result is that modelers sacrifice this slight increase in efficiency for the more practicable high-wing type, with the wing mounted flush atop the fuselage.

### COMPRESSED AIR MODEL CONTESTS

*Question: Do you know of any contests in the vicinity of New York for compressed-air models? Two Brothers, Bronx, N. Y.*

**Answer:** As far as we've been able to determine there isn't any definite interest in a compressed-air model contest. A few years ago there was considerable activity and some really long flights were turned in.

Don't let the lack of contests cramp your activity with your compressed-air models. You can have mighty interesting and instructive experiences with compressed-air models. And you'll have the laugh on many unfortunate gas-model builders. After you've filled the air tank and turned on the valve, the propeller will roar into life, and your motor troubles are over. We can think of many gas modelers whose troubles begin after they've filled the gas tank and turned on the ignition. They spend the remainder of the day cranking a balky motor.

### GAS MODEL BUILDING

*Question: I am thirteen years old. Do you think I'm too young to build a gas model? B. D., Los Angeles, Cal.*

**Answer:** We certainly don't think you're too young to build a gas model. It would be advisable to build your model from a prepared kit of materials. These kits have full-size working plans which greatly simplify construction. We suggest you enlist the aid of some other gas-modeler to help you over the rough spots. If there are no near-by modelers, make it a habit to write your troubles to the Model Board. We'll do our part toward clearing them away.





John Dilly

# Indoor Model Types

*An educational discussion important to all builders  
—about classes, design, sizes and performances*

By Lawrence N. Smithline

**F**EW PEOPLE know the pleasures of indoor models. The slow, majestic flight of an indoor tractor awes even the most callous spectator. An indoor model is a thing of beauty. The iridescence of the microfilm, coupled with the extreme fragility of the plane and the slow revolution of the propeller, plays on the uninitiated's imagination and interest.

The most popular of indoor models is the stick type, consisting of tractors and pushers. A tractor is a model with the propeller in front. The pusher has its propeller in the rear; however, the pusher model is not very popular. There are 3 official classes of models—A, B, and C, which designates the limits of wing areas. The latter is the largest (between 100 and 150 square inches wing area and about 3-foot span), most popular, and the size whose duration record is the highest. The official record with this class of model is almost 26 minutes. Perhaps 26 minutes sounds rather low, but remember this is pure propeller flight. An indoor model gets no aid from rising currents of air to keep it aloft; it stays up purely on its own power.

The next size is the Class B model, which has between 30 and 100 square inches area and whose span generally runs about 30 inches. The record for models of this size, set at the 1937 National Contests at Detroit, is over 21 minutes. The Class A tractor runs up to 30 square inches wing area. The average span for this type of model is about 15 inches, for which the record is about 15 minutes.

Class A tractors are seldom flown without a landing gear and with one is called an ROG (rise off ground). The 15-minute record would not have been allowed if the model had not been equipped with a landing gear. An outstanding thing about models of this size is the extraordinary size of the propellers, which sometimes are as large as  $\frac{2}{3}$  the wingspan. For this reason, ROG's look more unreal than tractors.

Fuselage models run tractors a close second in popularity. As the name implies, fuselage models have a fuselage which gives them an appearance more like the real thing. In order to keep this similarity, contest officials have made a rule that the cross-sectional area of the fuselage must not be less than the  $\frac{(\text{Length})^2}{100}$ . This rule makes it mandatory for fuselage models to resemble big ships. Fuselage models are also divided into classes. They must have landing gears, either wheels or floats. (When a model is equipped with floats it is called an ROW, which means "rise off water.") Tractors may

also have floats or wheels. If they have wheels they are called ROG's.

Records are made in all classes and divisions of these classes. For instance, the record for the fuselage ROG is different from the record of fuselage ROW. The weight of the average fuselage model of Class C size is about .10 of an ounce without rubber. Fuselage models are somewhat heavier than tractors because of the added weight of the landing gear, the fuselage itself, and because of the increased drag of the fuselage, which makes more power necessary for which the parts must be stronger and heavier.

Third in popularity and importance is the indoor glider. Unlike its brother, the outdoor glider, there is no required limit for the weight per unit of wing area. However, extremely light gliders are not built, as they must be strong enough to take the force of the throw of launching. An idea of the force on the wings may be realized when one knows that the gliders are sometimes thrown to the height of 90 feet. Gliders are also divided into classes according to wing area. Models of Class B size have flown close to one minute—really remarkable when one remembers that the flight is entirely unaided. Indoor glider builders attribute these long flights to a highly polished and streamlined glider. Surfaces are oftentimes polished as smooth as glass. Rough surfaces, alone, will cut the duration 50%, it is claimed.

Other types of models are seldom made to fly indoors. Occasionally an autogiro will be flown, but it is rare. Probably the reason for this is the fact that they are so difficult to get flying. The average builder knows

very little of the theory of autogiro flight and does not bother to learn, as competition in this field is very small.

Another type of model which is even more rare is the helicopter. Of course, you know the difference between an autogiro and a helicopter. The helicopter flies upward with the aid of a *powered* lift device such as a propeller. The autogiro vanes are, of course, unpowered and rotate because of the forward motion of the plane. The helicopter is highly practical as a model. The full-sized helicopter is impractical as a man-carrying machine because, at present at least, there is no motor which has a high enough power-weight ratio. Another type of model is the ornithopter, or flapping-wing model. Duration of ornithopters is extremely low—seldom exceeds one minute—and is impractical as both a model and a man-carrying machine.



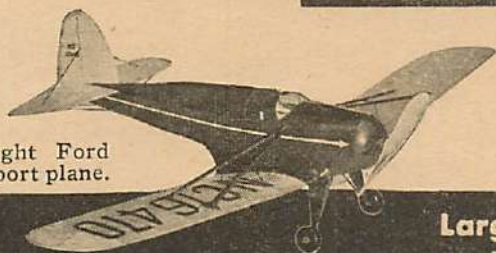
The slow, majestic flight of the indoor model awes even the most callous spectator.



# MEGOW'S Latest

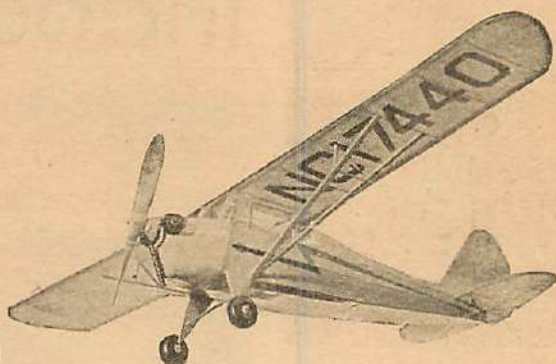
## ARROW SPORT V-8

An authentic detailed model of an outstanding light Ford V-8 powered sport plane.



## AERONCA K

A new development of the famous Aeronca C-3. In place of the old wire bracing, wing struts are now used.



**Large 30 in. Wingspan Fliers**  
**and Exact 1/2 in. Scale Detail Models** **50¢**  
(Postage 10c ex.)



## MISS STRATOSPHERE

Exact 1/2 in. scale model kit of Col. Clarence Chamberlain's high altitude ship, introducing a new type of construction with wood veneer as a covering. 60c Postage 10c extra

## Other Megow HEADLINERS



## QUAKER FLASH

**\$4.95**  
Postage  
30c ea.

Outstanding among all gas-powered models. Large, but folds to carry in car. Easy-to-follow plans. Uses any model airplane motor. 3/4" rubber wheels, well forward for safe landings. Wingspan 67 in. Length, 47 in.

## Build Your Own Ship Models!



Megow ship models include easy-to-follow plans and all materials. Dozens of types such as the BOUNTY, SETH PARKER, SANTA MARIA, QUEEN MARY, yachts, etc., from 10c to \$6.00. Clipper ship GREAT REPUBLIC, \$1.25 plus 15c postage.

## GASOLINE MOTORS!

**New BROWN JR.**

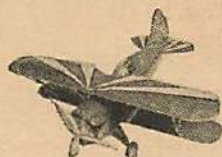
**\$21.50**

**SYNCR ACE**

**\$15.00**

**MORTON  
CHALLENGER  
\$13.95**

**Full line of Gas  
Motor Supplies**



## Al Williams' famous GULFHAWK

A new model kit of the famous Grumman. Duplicate of the latest navy fighting plane, plus new features added by Major Williams.

50c Postage 10c extra

Additional models have been added to Megow's new Fall line announced recently. More large wingspan flying models, and more 1/2 inch scale detail models... and of today's most famous ships, too! Graceful, light and colorful, they give the builder something to be proud of... and yet they are easy to build!

These models in this wonderful new line bear famous names, and are sponsored by famous aviators... Al Williams, Clarence Chamberlain and others.

Megow models are available in scores of kinds and sizes, from small solid designs up to giant fliers and gas-powered models.

Ask your dealer to show you the new models shown here, or use the coupon for ordering direct from us, if he cannot supply you. The coupon with 5c postage will also bring you the latest Megow catalog showing scores of world-famous airplanes and boats.

**Send for it today!**

**DEALERS:**

Write for information on this new line... and ask about the new Megow Prize Contest Plan.

# MEGOW'S

DEPT. AT.

HOWARD & OXFORD STS.

PHILADELPHIA, PA.

CHICAGO: DEPT. AT., 217 N. DESPLAINES ST.

MEGOW'S, Dept. AT., Howard & Oxford Sts., Philadelphia, Pa.

Please send me

- |  |  |
|--|--|
| <input type="checkbox"/> GULFHAWK        | <input type="checkbox"/> MISS STRATOSPHERE |
| <input type="checkbox"/> MONOCOUE        | <input type="checkbox"/> TAYLOR CUB        |
| <input type="checkbox"/> STINSON RELIANT | <input type="checkbox"/> AERONCA K         |
| <input type="checkbox"/> ARROW SPORT V-8 |  |

Money Order for ..... is enclosed.

☐ If you want a catalog, enclose 5c and check here.

Name .....

Address .....

City..... State.....







"Who is behind it?" Bill asked.  
"I can't find out," Sexton said. "But it is some one with tremendous in-

**HEATHE MODEL AIRPLANE CO.** 438 B-11 East 98th St.  
BROOKLYN, N. Y.

"There is no doubt of it," Bill said.  
"I had a great deal of reserve capital  
when I conceived the idea of mass pro-

"Nothing definite," Bill said.  
"What were they doing here?" Sexton asked. "Did you talk to them?"





The fighter version of the Gibson Hawk.

"No," Bill said, and involuntarily he touched the bandage on his head. "They didn't give me a chance. They trussed me so that I would have choked to death if young Sandy hadn't found me. At the same time they were ransacking my bungalow one of my own employees was robbing my vaults. They got your plans and specifications for the Eaglet and your long outline describing your plans and methods of operation."

"You told me that outline would be safe in your vault, Bill," Sexton said. The words were a statement, not an accusation.

"I thought they would be safe," Bill said. "But they did the same thing with me they've been doing with you. One of your own employees, a man planted there for the purpose, must have tampered with the Eaglet you were testing."

"As you said, there is no doubt of it," Sexton agreed.

"They planted some one in my organization, too," Bill said. "He learned how to get into my vault and did it this morning while I was unconscious. I don't even know who it was yet. Scotty MacCloskey is checking now. Hold it a minute." He leaned forward, picked the telephone out of its cradle and asked to be connected with Scotty.

"Young Harwood!" Bill said into the mouthpiece a few moments later. "You're sure? Most of his things are gone, too?"

"There's no doubt about it, Bill," Scotty told him. "That young fellow was clever. I had counted on using him a lot."

"Yeah," Bill said. "He was clever. You've informed the police and checked all airports with word about that black biplane?"

"Everything we can, boy," Scotty said.

"Thanks, Scotty," Bill said, and cut off.

"A young Englishman, an Oxford graduate who had excellent references," Bill said to Sexton.

"Probably forged," Sexton said. "What the hell are we going to do, Bill?" the older man asked.

"Find out who is gunning for you," Bill said grimly. He reached for the telephone again and asked to be connected with Shorty Hassfurther.

"Have you checked on that story about Moose Bliven?" he asked him.

"Yes," Shorty said. "From what I've learned we're on the wrong track. Bliven is supposed to be in China, instructing Chinese pilots."

"You'd better check it further," Bill said. "That bird is like a bone fish. He disappears while you're looking at him."

"The first thing we've got to do," Bill said to Sexton, "is protect you and your plant. How soon will you be ready to start production?"

"It depends," Sexton said, and there was a haunted expression on his face now. "Bill, I'm worried. I've worked over the Sexton Eaglet while I've been turning out larger planes. The Eaglet is the best and cheapest light plane on the market. Eaglets will be as common as the three low-priced automobiles in a few years, if my plan of distribution works. It will change the whole scheme of civilization just the way the automobile did. I have big money behind me, but if they get jittery they'll withdraw their support."

"I know it, colonel," Bill said, and he got to his feet and began to pace back and forth across the room. "What is the name of this trading corporation you spoke about? What do they trade in?"

"The name doesn't mean anything," Sexton said. "They call themselves the International Trading Corp. I don't know what they do. I can't even get any satisfactory reports on them. Nobody knows anything about them."

Suddenly, Bill came out of his chair like a jack-in-a-box. He crossed the room in two long strides and threw back the curtains of a window as the high-pitched scream of a diving airplane prop filled the room. He saw a half dozen grease monkeys frantically running two of his Snorters out on the apron and saw Mort Henderson and Red Gleason dive into the forward cockpits.

The telephone on his desk began one long continuous ring as the first of those pear-shaped eggs came plummeting out of the bomb bay of the diving black ship as it nosed up.

Bill saw dirt and stones and cement and debris mingle together in one great cloud of confusion as the first bomb buried itself in the center of his field, followed by another and another.

A bellow of rage escaped him as he turned and raced out of the room and toward the apron.

#### IV—DEATH

BILL BARNES' EYES raced up to study the wind sock atop the No. 6 Hangar, as his boots pounded on the

hard cement of the apron. He saw that the wind was blowing almost due north and he knew that Red Gleason and Mort Henderson would have to get their Snorters into the air fast or plunge to their deaths in the great, yawning hole the three bombs had made.

He ran out in front of the two ships, pointed a finger down the runway and made an upward motion with his thumb. The hands of Red Gleason and Henderson flipped upward in acknowledgment as they poured soup into their power plants.

Bill ducked off the runway as Red Gleason released his wheel brakes and blasted his tail around. The big red-and-black-and-orange ship broke down the runway like a whippet after a mechanical rabbit. The flaps came down as the tail rose. Then Red bounced it into the air on the very brink of the abyss.

Mort Henderson pointed the nose of his Snorter at exactly the same spot as the retractable gear snuggled up into the belly of Red's ship. He bounced it once, twice, and then took it upstairs.

The deep-throated roar of Bill's Lancer joined the rising wail of the Snorters' props as the big twin-motored, center-wing, cantilever monoplane overhead came around in a sweeping bank to lay the rest of its eggs on Barnes Field.

Bill's throat was drawn into a mass of throbbing muscles and the blood was pounding in his temples as he thumbed the sun and studied the big bomber.

"They'll blow everything I have to hell if they ever get back with the rest of their load!" he said to himself, and there was a half sob in his throat.

He saw the bomb sighter's window in the underside of the big ship's nose and just above and behind it he saw a transparent revolving turret that housed the bow gunner. Behind the pilot's compartment was the rear gunner's cockpit and beneath it was a machine gun mounted to fire downward through a tunnel in the belly of the fuselage.

All those things he saw in the two seconds before he threw himself into the forward cockpit of the Lancer and grabbed at the controls.

Bill wiped the perspiration out of his eyes with the back of his hand and probed the air above him. He saw that Red Gleason was almost level with the black bomber, as it prepared to drop the rest of its deadly cargo. He saw a feathery wisp that was tracer smoke curl between the two ships and saw flame leap from the muzzles of Red's machine guns, to be answered by the chatter of the gun in the bow of the bomber and the belly gun.

Bill flipped the switch on his radio panel and chanted the names of Red



## Aircraft Engine Mechanics Manual

by **C. J. Moors**, Chief Instructor, Department of Mechanics, Air Corps Technical School, U.S. Army. 511 pages, 189 illustrations. \$4.50.



This book covers the same ground as the course given the enlisted mechanics of the Army Air Corps with the addition of much data on types of equipment adapted only for commercial airplanes. It deals thoroughly with all kinds of aircraft engines and their accessories.

Mr. Moors gives all needed data on construction and operation, supplies full instructions for proper maintenance, and shows you exactly how to go about making any necessary repairs and adjustments.

ON FABRIC-WOOD PLANES:

## Airplane Mechanics Rigging Handbook

by **R. S. Hartz**, formerly Lieut. Colonel, Air Corps, U. S. Army; and **Lieut. E. E. Hall**, formerly Editor, "Aircraft Servicing." 267 pages, 104 illustrations. \$3.50.



This book covers in detail the care and handling of airplanes on the ground and in the shop; sequence of rigging steps; how to true up the assembled ship; how to adjust the wings and control surfaces for "hands off" flying; spars and struts; inspection; installing and checking compasses; fabric; wood and glue; metal parts; wire; dopes and doping; folding and packing parachutes. It shows you how to get a plane into proper flying condition and how to keep it that way.

BEST PREPARATION FOR POWERED FLIGHT:

## Gliders and Gliding

by **Ralph S. Barnaby**, Lieut. Comdr. (C. C.) U. S. Navy; Scientific Section, Bureau of Aeronautics. 182 pages, 123 illustrations. \$2.50.



A practical handbook for glider flyers and builders. Gives a detailed, progressive course in flight training, with full information about types of gliders, ground and wind conditions, launching, first flight, maneuvering the glider, and landing. Starts with primary instructions and progresses through secondary training to a full course in soaring. Contains useful data on design principles, structural details, materials, assembling, rigging and aligning.

Fill in, tear out, and mail—

**Sent on 5 Days' Approval**

**The Ronald Press Company**

Dept. M118, 15 East 26 St., New York

Send me the books checked below. Within five days after their receipt I will either return them or send payment in full at the prices shown, plus a few cents for delivery. (We pay delivery charges when cash accompanies order—same return privilege.)

- |  |        |
|--|--------|
| <input type="checkbox"/> Lusk, Aeronautics.....                | \$3.25 |
| <input type="checkbox"/> Moors, Engine Manual.....             | 4.50   |
| <input type="checkbox"/> Hartz-Hall, Rigging Handbook.....     | 3.50   |
| <input type="checkbox"/> Barnaby, Gliders and Gliding.....     | 2.50   |
| <input type="checkbox"/> Munk, Principles of Aerodynamics..... | 3.00   |
| <input type="checkbox"/> Gregg, Aeronautical Meteorology.....  | 4.50   |

Name .....

Home Address .....

City .....

State .....

☐ Employed by.....

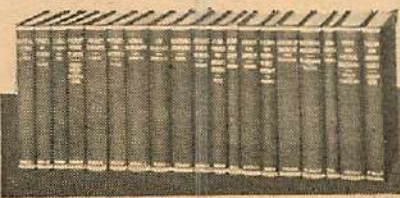
☐ or Reference .....

(Must be filled in unless you send cash)

Address of Above.....

\* Outside continental U. S. and Canada, cash plus 25c per book for shipping.

☐ Check here if you wish a copy of our Catalog of Aeronautic Publications, FREE.



## Can you answer these questions ?

The compass reading is 230°, the variation is 18°E. the deviation is 7°W. Determine the true heading.

What is meant by compression ratio and how does it affect the power rating of an engine?

What would you do to get a plane out of a tail-spin?

What is the purpose of a condenser in the ignition system? In which circuit is it located?

How is the torque of the propeller balanced in rigging a plane? Why is the vertical fin sometimes slightly offset?

What are 8 significant landmarks that are shown on good aviation maps which may be identified easily from the air?

What is the approximate error in the air speed reading for an increase in elevation of 3,000 feet?

If your engine started missing on one cylinder, where would you look for the trouble?

What is the effect of having an adjustable stabilizer too high when landing?

How may a pilot correct for drift without a drift indicator?

What are the four basic cloud forms? What is the approximate altitude at which they occur? What flying conditions do they indicate?

In flying out of a small field, is a small or large propeller pitch desirable?

This book will help you to pass any license test:

# Aeronautics

## A Ground School Textbook

by **HILTON F. LUSK**

Transport Pilot; formerly Dean, Boeing School of Aeronautics

420 Pages, 175 Illustrations, 226 Test Questions, \$3.25



THERE is nothing specially difficult about the above questions, you should be able to answer any of them without hesitation if you are prepared to pass the written part of the government license examinations. They are selected at random from the 226 test questions contained in Lusk's famous ground school textbook, Aeronautics. These questions are typical of those that have been asked in examinations for the Department of Commerce transport pilot's license, with the addition of others to aid you in testing whether you have really grasped the information contained in the book.

From this book you can obtain just the information you need if you are looking for a government license as a pilot in any of the grades, or as a mechanic. Although it is designed primarily for use in ground schools, as well as in colleges and technical schools giving aeronautic courses, it also ideally meets the needs of the man who must acquire his technical grounding in aviation by home study. The 175 illustrations have the component parts of aircraft and instruments lettered so profusely; the explanations are so complete, thorough and are written in such easily understandable language that anyone can readily grasp every subject dealt with.

### CONDENSED OUTLINE

**Principles of Flight:** Explains all the essential aerodynamic factors and their application to airfoils.

**Airplane Construction and Operation:** Principles of construction and materials employed. Methods for working wood and fabric. Welding metal planes and parts. Flying. Elementary aerobatics.

**Propellers:** Theory. Construction and maintenance of wood and metal propellers. Variable pitch propellers.

**Engine Construction and Operation:** Theory. How to determine engine efficiency. Types of engines, construction materials. Fuel systems, carburetors,

ignition systems. Engine operation and maintenance.

**Blind Flying Instruments:** Use of attitude instruments in blind flying. Absolute and relative references. Inclometers. Pitch, roll, turn indicators. Operating principles of gyroscope instruments.

**Engine Instruments:** Construction and operation of tachometers, pressure gauges, thermometers, fuel quantity gauges, etc.

**Safety Appliances:** Parachutes. Aircraft radio, antenna details, shielding methods, etc.; radio range-beacons and markers.

**Aviation Maps and Piloting:** Explains and illustrates various map projections and their use in aviation. Practical hints on piloting.

**Dead Reckoning:** Details of methods of dead reckoning with solutions of practical problems.

**Aviation Instruments and Equipment:** Describes and illustrates each of the aviation instruments found in aircraft and explains theory so you can understand principles on which it operates.

**Principles and Applications of Meteorology:** Effects of winds, storms, visibility in relation to flight.

ENTIRELY WITHOUT MATHEMATICS:

## Principles of Aerodynamics

by **Max M. Munk, Ph. D., Dr. Eng.**, formerly in charge of Aerodynamic Research for the N.A.C.A. 252 pages, 62 illustrations. \$3.00.



Written in simple language without any mathematical detail, this book is a reliable guide to a logical understanding of the principles of aerodynamics. Dr. Munk is a world-renowned authority—no aircraft is designed without some direct or indirect use of theories and methods originated by him. His remarkable book makes crystal clear the basic ideas underlying many of the most complex design formulas. Its 7 parts include: General Aerodynamics. Wing Section Theory. Wing Theory. Experimental Aerodynamics. Propeller Theory. Applied Aerodynamics.

NEEDED BY EVERY AIRMAN:

## Aeronautical Meteorology

2nd Revised Edition by **Willis Ray Gregg**, Chief U. S. Weather Bureau. 440 pages, 126 illustrations. \$4.50.



Covers fully just what you should know about atmosphere and weather conditions. Deals with atmosphere elements, circulation, vertical structure; instruments, observation methods; wind direction and velocity with altitude change; formation, duration, distribution, dispersion of fog; types, altitude, diurnal and annual variation of clouds; ceiling relation to topography; horizontal, vertical visibility; thunderstorms; cyclones, anticyclones; weather forecasting; ice formation on aircraft; airway weather service; etc., etc.

**THE RONALD PRESS COMPANY, Publishers**  
15 East 26th Street ESTABLISHED 1900 New York, N. Y.



and Henderson in the microphone. He was taking the Lancer upstairs with the speed of light as they acknowledged.

"Don't shoot him down," he shouted into the microphone. "Drive him away from the field and force him down. There's a crew of five men in there and one of them will be able to tell me things I want to know. We'll drive the pilot down. I'll force him around with a half dozen shells from my cannon. When he's going away get out on each side of him and keep up a cross fire on his power plant. I'll ride him from above so he can't get upstairs."

Bill brought the Lancer up underneath the bomber and hung it on its props as he got the nose of the big ship in his telescopic sights. The next instant his finger clamped down on the trip of his 37mm. cannon. Three of the six explosive shells he threw at the ship found their target in the tip of the nose. There was a blinding flash as they exploded. The big ship seemed to wallow for a moment and then stagger like a man loaded with Georgia corn. Then the nose lifted and started to turn, as Bill laid down a barrage of one-inch shells in front of it.

The bomber in the nose of the black monoplane had forgotten his mission as those three shells tore his little armored turret to pieces. As Bill rolled level he brought the nose of the Lancer up again and poured another burst of fire into the tail of the black ship with his powerful .50-caliber guns.

At the same time Red Gleason and Henderson rode their Snorters to positions on each side and a little above the bomber, out of range of its rear gun. At intervals they would pour juice into their power plants and race ahead and up until their motors nearly stalled.

The waters of the Atlantic Ocean gleamed blue and green in the sunlight two thousand feet below them as they forced the black monoplane lower and lower. Bill was holding a position directly above it and Red and Henderson were riding it on either side. They had kept pecking at the big ship while its gunners tried desperately to use their guns effectively.

Bill flew low and fired a round directly above the pilot's head. His face turned upward and Bill saw that it was strained and white.

Then his blood froze in his veins as the pilot suddenly yanked the nose of the big ship up underneath Henderson's Snorter. Bill saw the few feet between them close as the bomber plowed into the belly of the Snorter with its two gigantic three-bladed props.

There was a noise such as he had never heard in the air before, as the nose of the bomber buried itself inside the racing Snorter. For an instant that seemed like all eternity to Bill they hung

there in a mortal embrace, seeming not to move.

Flame engulfed them as they began their plunge toward the dancing waters of the Atlantic. A gas tank exploded and then another. Black smoke and orange flame engulfed them again and they became a whirlpool of hell. As a breeze carried the smoke away the two ships fell apart. What had been two airplanes became a thousand pieces of debris plummeting toward the greedy waves of the ocean.

Bill Barnes threw the switch on his radio and bellowed Red Gleason's call letters into his microphone.



The Sexton Eaglet.

"Red answering, Bill," Red said, and his voice was just above a whisper.

"Follow 'em down!" Bill shouted. "Stand by. Henderson may be all right. He may bail out."

But Henderson didn't bail out. What was left of his Snorter plunged into the sea, never to rise again.

For two long hours Bill and Red Gleason cruised, not able to believe what they had seen. Finally Bill admitted defeat.

While they cruised back and forth, ever widening their circle, Red Gleason kept up an almost incessant chatter into his microphone. He knew that most of the things he was saying were inane and inept, but he was trying to ease the strain on Bill's mind.

Red Gleason's face became lined and taut as he heard Bill's replies become more and more monosyllabic as the hope of Henderson's survival dwindled to the zero hour.

"We'd better turn back, Bill," Red finally said. "I only have a little fuel left."

He held his breath while he strained to catch Bill's reply. A lifetime passed while he waited. Then it came.

"Right, Red," Bill said, and his voice was just a whisper. Red watched while Bill brought the Lancer around in a sweeping bank. He could see that he was still gazing down at the licking waves and in spite of the distance that separated them he could see the horrible expression on Bill's bronzed face. He watched while Bill leveled off and dipped

a wing in tribute over the spot where Henderson's Snorter had been sucked beneath the waves. A moment later he brought his Snorter around and rolled the ocean out from under him in his last salute to the brown-eyed bundle of fighting fury that had been Mortimer Henderson.

"This is the end, Red," Bill said a moment later, but the voice did not sound like Bill's. "Henderson is the first flier we have lost. It's the end of our organization. I feel as though I had killed him. His face will haunt me forever. I—" He stopped speaking as his voice broke.

"Listen, fella!" Red snapped. "We can't live forever. Some day each one of us will get it."

"That's what I mean," Bill said. "I'm not going to be responsible for the deaths of any more of our men. That's something I can't take, Red. This is the end of the Barnes flying circus, or whatever you want to call us. We're washed up, through!"

"Hell, Bill!" Red exploded into his microphone. "You're not responsible for Henderson's death. You ought to be—"

But Bill wasn't listening. He had cut off his radiophone and had opened the throttles of the Lancer wide. He was speeding away from Red's Snorter as though it was anchored to a cloud.

## V—BITTERNESS

WHEN BILL BARNES climbed out of the Silver Lancer on Barnes Field his face was a wooden mask of grief and remorse. His voice was flat and toneless as he faced Shorty Hassfurth and Scotty MacCloskey on the apron. Their faces were a mixture of wonder and alarm as they looked at him. They watched him for a moment as he gazed toward the row of hangars as though he had never seen them before. Then their faces blanched as they saw Red Gleason's lone Snorter circling around into the wind for a landing.

"Henderson?" they said, and their voices seemed to shrink away from the question they were asking.

"They rammed him," Bill said slowly. Then bitterness and helpless anger crept into his tone. "The filthy fool at the controls of that bomber cut him in half!" he said. "Henderson didn't have a chance."

"Listen, fella," Shorty Hassfurth said, and the hard-boiled voice of a man who had fought a thousand battles above the seven seas had disappeared. He knew that Bill Barnes needed him more right now than he had ever needed him before. He put a hand on Bill's shoulder and his fingers bit in like steel forceps. "Let's go over to your bungalow and talk things over. Let's take it easy and face the thing the way it has to be faced."



"Send a detail out with Red to check things," Shorty said to Scotty MacCloskey. "Have Tony make the necessary reports. C'mon, guy!" he snapped at Bill.

Bill's head was bent and his eyes were on the apron as he began that long walk around the administration building to his bungalow. He was like a man who had fought a good fight and had lost.

The gray-haired, gaunt-faced Colonel Sexton was still lying on a divan in Bill's living room when they entered. Doc Humphries was sitting by his side with a stethoscope glued against his heart. He said, "The old ticker sounds O. K.," as Bill and Shorty entered the room. Then his eyes grew wide as he saw Bill's face.

"What? What—" he began.

"Let it ride!" Shorty snapped at him. "Talk to Scotty."

Humphries nodded his head and turned back to Sexton. "Just stay quiet," he said. "I'll look in again before long." He gathered up his little brown bag and went out the door.

"What happened, Bill?" Colonel Sexton asked. Bill didn't hear him, or if he did he didn't answer. Nor did he seem to hear Shorty while he told Sexton what had happened.

"They must be desperate," Sexton said slowly, when Shorty had finished. "What kind of men are they? What is their motive? They are worse than the gangsters who have been infesting our cities. How do they dare?"

"They are gangsters," Shorty said. "Their motive is to prevent you from doing what they want to do. They are using the tactics of gangsters. They are using aerial muscle men to warn you that you'd better move on if you don't want to be killed."

"They can't muscle me!" Sexton cried, and his face became dangerously red. "We'll show 'em they can't frighten us, Bill!"

Bill's head came up and he turned his dead eyes on the red-faced Sexton. "We'll show 'em nothing," he said, and his voice was as dead as his eyes. "I'm through. If it weren't for you Henderson would still be alive. They might have killed twenty of my men to-day when they dropped those bombs. That's what they tried to do."

"Hey, fella!" Shorty snapped. "Take it easy!"

"That's what I'm going to do!" Bill snapped back at him.

"You know, Bill," Shorty said softly, "that one or another of us was going to

peek too steep some day." He was resorting to the vernacular he had learned over the Western Front during the World War, when to "peek too steep" meant that a flier had been shot down to never fly again.

"We've all missed death a thousand times by the width of a spark gap," he went on. "It had to come sooner or later. Henderson would rather have died that way than any other way, Bill. He'd have been sore as hell if he'd caught the flu and died in bed."

Bill got to his feet and began to pace nervously back and forth across the room, because, like any man of action, he could think better when he was moving. A knowing little smile twisted the corners of Shorty's mouth as he watched him. He knew what a terrific shock the death of Henderson had been to Bill, but he knew now that Bill was beginning to see beyond that one horrible incident.

"You can't just quit cold, Bill," he said, and he mentally ducked his head as he said it.

"Quit!" Bill roared at him as he whirled on his toes. "Quit! I ought to smack you one in the teeth for that remark. Who said I was going to quit? I'll find the man responsible for Henderson's murder and I'll see that he pays

## CROSS WINDS

1	2	3	4	5	6	7	8	9	10	11
12				13				14		
15				16				17		
18						19				
	20				21					
22	23		24		25			26	27	28
29		30		31		32	33		34	
35			36		37	38		39		40
		41		42			43		44	
45	46					47			48	49
50					51					
52					53			54		
55					56			57		

## ACROSS

- 1—Abrupt change in contour of seaplane hull, to break contact with water.
- 5—Swing of plane nose sideways from line of flight
- 8—Movement of air around an object
- 12—Employ
- 13—Beverage
- 14—Fury
- 15—Best-known Lockheed plane
- 17—Defect
- 18—Adorned
- 19—Airport at eastern end of north transatlantic air route
- 20—Cardinal number
- 21—Set at liberty
- 22—Prefix meaning "in"
- 24—Type of Northrop plane
- 26—Costly
- 29—Measure of length equal to 16½ feet
- 31—Preposition
- 32—Personal pronoun
- 34—Cord pulled to open parachute
- 35—Melody

- 37—Thoughts
- 40—One-thousandth of a meter, abbreviated
- 41—Metal filings
- 43—Initial designation of U. S. army's main air-force division
- 45—Turn about an axis
- 47—Masses of sky fog
- 50—Similar
- 51—French aviation pioneer
- 52—Abrade
- 53—Prefix meaning "new"
- 54—Otherwise
- 55—Narrated
- 56—Nickname of one of Bill Barnes' ex-war pilots
- 57—Killed

## DOWN

- 1—Airship shelter
- 2—Plate of baked clay
- 3—Upright
- 4—Struck with a beak
- 5—Inclosure
- 6—Wing-shaped part
- 7—Personal pronoun
- 8—Raveled
- 9—Cleanse by washing
- 10—Glance invitingly

## Answers for October

T	O	R	Q	U	E	M	O	H	A	W	K
E	W	E	S	O	I	M	P	U	R	E	
M	E	A	N	N	O	S	E	S	A	G	
P	L	E	T	P	E	N	P	P	S		
L	A	T	I	G	E	R	R	I			
A	R	E	P	U	N	M	A	C	O	N	
T	A	M	E	S	T	E	U	G	E	N	E
E	N	E	M	Y	G	A	S	S	U	E	
N	U	C	I	T	E	D	S	D			
R	O	D	T	A	R	S	I	T	L		
A	L	I	A	B	L	E	E	R	I	E	
P	E	N	C	I	L	D	O	I	N	S	
T	O	G	G	L	E	O	R	I	O	N	S

- 11—Covers with water
- 16—Belief
- 17—Enemy
- 19—Basic fuselage structure
- 21—Measure of length, abbreviated
- 22—Period of time
- 23—Negative connective
- 25—Important French plane manufacturing company
- 27—Intention
- 28—Initial designation of common measurement of engine speed
- 30—Let fall in drops
- 33—National bird of United States
- 36—Roused from sleep
- 38—Designation of latest Douglas flying boat.
- 39—Props
- 42—Devoured
- 44—Large stiff feather
- 45—Logs fastened together for transport by water
- 46—Medley
- 47—Lump of earth
- 48—Measured quantity of medicine
- 49—Boil slowly
- 51—Insect
- 53—Letters identifying plane licensed for restricted or non-commercial use



for it if I have to take him apart with my own hands."

"Then you're going to see me through this thing, Bill?" Colonel Sexton asked.

"I'll see you through it because it's the shortest way to find the man I want to find," Bill said. He stood with his feet widespread, glaring at both of them. "Quit! Hell!" he grated.

## VI—REVENGE

THE twin fifteen hundred h.p. Barnes Diesels droned on and on as the BT-4, Bill's enormous carrier transport circled low above the choppy waves of the Atlantic three days later.

A United States navy chaplain got to his feet and took a little prayer book from his pocket as Bill Barnes finished taking his bearings and nodded his head.

"On the bridge, please, every one," Bill said into the interplane telephone. "This is the spot."

He eased the wheel of the big ship until he was circling only two hundred feet above the spot where Mortimer Henderson had plunged to his watery grave.

Before he began his short service, the navy chaplain glanced at the faces of the men and one girl who stood around him. The faces of Shorty Hassfurth, Red Gleason, and Cy Hawkins were carved marble under their coats of tan. The faces of Bill Barnes and Beverly Bates were the faces of graven images, the faces of dreamers who were deep in their flights of fancy. There were tears in the eyes of young Sandy Sanders that he didn't try to wipe away, as he gazed at the grief-stricken face of Martha Henderson, Mort's seventeen-year-old sister. The lined, tanned face of old Seward Henderson, Mort's father, was calm and at peace as he gazed down at the blue-green waters of the Atlantic.

They all stood with bowed heads, each portraying his emotions according to his temperament, as the chaplain finished his litany. It was young Sandy who turned down a window and dropped the six wreaths on the waters below that were from Bill and his five men. Martha Henderson followed him and her finely chiseled chin was held high as she dropped three more for herself, her father, and for Colonel Cyrus Sexton.

"*C'est la guerre!*" Shorty Hassfurth said softly, as Bill eased back on the wheel and took the big amphibian up-stairs again.

Young Sandy followed Martha Henderson back into the main cabin of the ship as Bill laid the nose on Barnes Field.

"You ought to have a very proud memory of your brother," young Sandy said. "He was a gimper if there ever was one."

"I have," she said simply. Adding, "What's a gimper?"

"It's a Wartime expression Shorty and Red use," Sandy explained. "A gimper was a fellow who wouldn't let another down when they were fighting in the air. If he was out on patrol with another plane and a half dozen enemy ships attacked the other fellow he wouldn't duck out and run for home. He would stick along and fight until they both got safe away."

Suddenly, every one in the cabin stiffened into immobility as Bill's loud voice came harshly through the loud-speaker fastened in the bulkhead.

"Battle stations!" he roared. "Shorty in the nose; Bev and Cy in the wing cockpits; Red in the retractable turret; Sandy on the rapid-firer. There are seven ships diving on us. Take 'em if they open fire!"

Bill's five men moved as one as bullets drummed through the tail surfaces of the carrier transport. Bill opened the throttles of the twin Diesels wide and pulled back on the wheel.

"Miss Henderson and her father please stay in the main cabin," Bill snapped. "It is armored."

Young Sandy gave Martha Henderson one last appealing glance before he raced up the steps that led to the bridge and the revolving-gun turret containing an automatic one-pounder.

He whirled the rapid-firer around as the first of the seven single-seaters came within range. They were still too far away for accurate shooting with machine guns, but they were within range of Sandy's cannon. For one brief instant that was enough. He got the foremost ship under his telescopic sights. The breech of the one-pounder burned against his cheek as he clamped down on its trip. He could almost follow the course of the one-inch shells as they sped toward their target.

The leading single-seater, suddenly, became a great cloud of black smoke, streaked with stabs of saffron and crimson.

For the longest thirty seconds Red Gleason had ever known he took the full force of the attack of the six enemy ships. He spun the little turret one direction and then back, as he tried to fight off their desperate thrusts. Burst after burst vomited from his single gun as they came at him from all directions, their guns belching fire and death.

Bill Barnes cursed softly to himself as Shorty reported to him that there were only five of the single-seaters left. Shorty had torn one of them to ribbons with his powerful nose gun.

"A man is a fool to put all his eggs in one basket," Bill said to himself. He was referring to the fact that all of his fighting fliers were inside the carrier transport.

For an instant Bill debated on order-

ing Sandy to take the little high-powered Eaglet, the tiny fighter that was carried inside the transport and after which Colonel Sexton had named his light plane, out to decoy those five single-seaters in where his men could destroy them with machine guns. The thought of Mort Henderson drove the idea out of his mind.

He started to speak into the microphone and stopped as the two wing turrets let go a terrific burst of fire, followed by a dull explosion. He looked back down over Sandy's Eaglet where it hung with its cockpit just above the level of the deck and into the main cabin. He could see both Martha Henderson and her father. There was no expression of fear on their faces.

"She'd probably take the Eaglet out herself if I asked her to," he said to himself. Then he threw the interplane switch on his radio panel and spoke into the microphone.

"Stand by!" he snapped. "I'm going to turn on our oxygen equipment and take us up to twenty-five thousand. They won't be effective at that altitude."

Another half dozen terrific bursts of fire came from Shorty's gun in the nose, and Bill heard Sandy shouting at him from the one-pounder turret above his head.

"Never mind, Bill!" he screamed. "There are only three of them left and they've peeled off."

Bill chalked four more black lines beside Mort Henderson's name. "That's ten of 'em for Henderson," he growled.

He cut his throttles and began to take his bearings. He made a report to Tony Lamport over the radiophone and found that his hands were trembling as he threw the radio key. Twenty minutes later they were circling above Barnes Field for a landing.

Young Sandy tried to wipe some of the powder marks and grime from his face as he went back into the main cabin.

"Gracious!" Martha Henderson said to him, and her eyes were large and round. Sandy grinned at her. "Gracious!" she repeated. "That was the most exciting thing that ever happened to me!"

"Oh, that was nothing," Sandy said, and he shrugged it away with a lift of his shoulders. "Sometimes we run into some real trouble."

"Who were they and what were they trying to do?" Martha asked breathlessly.

"They were trying to shoot our heads off," Sandy said.

"Why?" she asked.

"Bill isn't sure yet," Sandy said. "But he'll find out. It's like he told you and your father this morning. Some competitor of Colonel Sexton is trying to prevent him from putting his light plane on the market and establishing







"Yes, Mr. Barnes. You wanted to talk to me?"

"That's right," Bill said. "I want to talk to you, personally." He glanced at the watch strapped to his wrist. "It's now four o'clock. I'll land at the sky-port near Wall Street in about a half hour and be in your office in forty-five minutes. Is that agreeable to you?"

"It will be a pleasure and an honor, Mr. Barnes," de Sabla purred.

"Thank you," Bill said, and slapped the phone in its cradle.

"Go slip into your Sunday pants," he said to Shorty. He picked up the phone again and told Tony Lampert to warm up the Lancer. "That bird sounded

"I know what you mean," Shorty said. "What are you going to say to him?"

"I don't know," Bill said. "I wish I did."

Juan de Sabla rose behind his gleaming mahogany desk as Bill and Shorty crossed the room, treading noiselessly on the thick, expensive rug.

"Mr. Barnes," he said as he shook hands. "And Mr. Hassfurther. Please sit down, gentlemen." He indicated two deep leather chairs pulled up beside his desk. "This is an unexpected pleasure."

"His voice works on ball bearings," Bill said to himself. And aloud: "It was good of you to see us immediately, Mr. de Sabla."

"I'm afraid I wouldn't dare keep a person with your reputation waiting," de Sabla said smoothly.

"Goose grease!" Shorty said, without opening his lips, and managed to smile. He was doing what Bill had told him to do. He was combing Mr. de Sabla and Mr. de Sabla's office with a fine comb.

"Besides," de Sabla went on, "I've been intending to get in touch with you for several days. I have a client who is interested in you and your work."

"That's interesting," Bill said. His eyes flitted around the magnificently appointed room. "Just what is your business, Mr. de Sabla?" he asked bluntly.

"We do a general commission business," de Sabla said. "Anything that will pay us a fair return. We pick up a load of cocoa here and sell it with a margin of profit for ourselves over there."

"Ever go in for gun running?" Bill asked.

"No." De Sabla laughed easily. "That's a little out of our line. Is that why you came to see me? Certainly a man with your excellent reputation isn't interested in anything as nefarious as gun running?"

Bill knew that de Sabla was laughing at him now, but he continued to smile.

"No," Bill said. "But I remember a man named de Sabla who was once mixed up in grabbing the island of Samerra in the West Indies away from a friend of mine named Morales. This de Sabla was working for a syndicate of wealthy Englishmen who wanted the oil, mining, transportation, and fruit monopolies on Samerra. An Englishman named Chamberlin was the tycoon of the island after they got control. He had a man named de Sabla running guns for him. He was a very smooth lad. I thought he might be a connection of yours."

De Sabla threw back his head and laughed heartily and musically. He seemed to enjoy Bill's little story thor-

oughly. "How did he finally make out?" he asked.

"He was trying to get to Honduras before Morales' men caught up to him, the last I heard," Bill said.

"Very interesting. Very interesting," de Sabla said. "I imagine he must have been in a real hurry if you were after him."

"I said Morales' men were after him," Bill pointed out.

"Oh, yes," de Sabla said. "No. He was no connection of mine. I'm afraid my branch of the family is quite innocuous."

"You say you have been interested in getting in touch with me?" Bill asked.

"One of our clients," de Sabla said. "They are interested in securing your services as a technical adviser to a network of air lines they contemplate establishing in this country. We, in the office here, were of the opinion that such an attempt would be useless because of your connection with Colonel Cyrus Sexton."

Bill studied the man's face with all the concentration of which he was capable.

"What do you know about my connection with Colonel Sexton?" he snapped.

"Nothing that isn't common knowledge to the aviation industry," de Sabla said blandly. "We know you have worked with him on his light plane, the Eaglet, and that you are expected to be close to him if he begins mass production."

"What makes you say 'if'?" Shorty asked softly.

"Because he hasn't begun yet," de Sabla said, as Bill glared at Shorty. "We know he expects to begin at any time. But you know only too well there is always an 'if' present in every undertaking. That is why my principals thought you might be interested in talking to them. They are prepared to be quite generous."

"In other words," Bill said, before Shorty could speak again, "they think I'll sell out Sexton for more money?"

"That may be what they have in mind," de Sabla said carefully.

"You've been buying up parcels of real estate to be used as airports by them?" Bill asked.

"That's right," de Sabla said.

"Have you happened to notice," Bill asked, "that the ones you have already acquired have been near industrial centers and iron and coal mines?"

"No," de Sabla said. "We buy what they tell us to acquire."

Bill was getting desperate now. He had learned nothing and he knew that de Sabla did not intend to tell him anything. He knew he had overturned the apple cart by mentioning the de Sabla who had been one of Chamberlin's men at Samerra. He had never



"Red" Gleason mans the retractable turret beneath the bomber-transport—

very, very smooth," he went on. "He sounded as though he might be taking my watch out of my pocket over the telephone."

"You want me to go with you?" Shorty asked.

"Nothing but," Bill said. "And I want you to keep your mouth shut and your eyes and ears open."

Following his regular custom, Bill checked over his ammunition counters and his two .50-caliber machine guns and the 37mm. cannon mounted in the V of the cylinders, after he had dropped into the bucket seat of the Lancer.

"Button up your ears," he said into the intercockpit telephone to Shorty, and blasted the tail around.

The big sesquiplane sped down the center runway at terrific speed and took off before it reached the spot where men were still repairing the field. The tip of Brooklyn and the bridge flashed under his wings a few minutes later. He spiraled down and picked a spot between two rows of barges to send up two high clouds of spume as he landed in the river. A few moments later the floats of the big ship slid halfway up the face of the inclined turntable.

"Remember," Bill said quietly to Shorty, as an express elevator took them skyward, "to keep your mouth shut and your eyes and ears open."



seen that de Sabla but he had no doubt this was the same one.

"I don't suppose you care to tell me who you've been buying that property for?" he asked.

De Sabla smiled. "You know I won't tell you, Mr. Barnes," he said.

Blood surged red before Bill's eyes as he gazed into that smiling face. He had an almost insane desire to whip his right fist across the desk and smash it into de Sabla's mouth. But he didn't. Instead he smiled a smile that was quite as provoking as de Sabla's, and when he spoke his words were as smooth as honey.

"It couldn't be possible, could it, de Sabla," he said, "that your principals have been interested in me to the extent of robbing my vaults of Colonel Sexton's plans, or bombing my field, or sending a flight of fighters out to shoot us out of the air when you knew you had us all together? It couldn't be possible that you are trying to put Colonel Sexton out of business by killing him and blowing up his plants, could it? It couldn't be possible that you could have some other plan in mind than establishing a network of light-plane fields, could it?"

De Sabla threw back his head and laughed again, but the ball bearings were not working smoothly now. His laugh was harsh and there was something more than a suspicion of a sneer in it.

"You've been dealing in melodrama too long, Barnes," he said. "Jobs like the one you told me about on Samerra have thrown you off balance. You've lost your perspective. You're too suspicious. You see death and disaster in every corner. You want to take it easy or they'll be putting you away in a padded cell."

Bill got to his feet. He had regained his composure now. He could tell by the way de Sabla was acting that he had been right and he knew what he wanted to know. He knew who was putting the screws on him and Colonel Sexton, even if he didn't know for whom he was acting.

"Don't worry about a padded cell for me, de Sabla," he said softly. "Worry about your own. Because I'm going to put you in one. Your kind can always cover up very nicely. You figure out your line of retreat before you attack. But this time you're going to find your line of retreat cut off. You"—Bill pointed his right forefinger at de Sabla and there was no smile on his lips now—"murdered one of my men—Henderson. And you're going to pay for it. I'm going to take you and your whole organization apart with a can opener, to see what makes you tick."

De Sabla's face was livid as he pulled open a drawer of his desk, stuck his hand in it and got to his feet. Bill laughed aloud at him.

"Be careful," he taunted, "or you'll lose your temper and do some of your own killing and get your neck stretched. You don't have the guts to take the gun out of that drawer, de Sabla. And let me tell you this: I know how to get you! You have a man working for you that is more yellow than you are. When I find him he'll talk. Then I'm going to rip you wide open!"

Bill turned on his heels, and, followed by Shorty, walked across the room and through the doorway without a backward look.

## VIII—ARREST

"WELL," Shorty said, when they were out on the street, "that's that!"

"That's that!" Bill repeated.

"We're going to be combing him out of our hair from now on," Shorty said. "Is he the same de Sabla who was working with Chamberlin at Samerra?"

"I'm so certain of it I'm not even going to cable Mike Morales to ask him for a description," Bill said. "De Sabla is playing for big stakes this time. But I'm still helpless, because I don't know what he is trying to do. He says his principal wants to establish a network of air lines with light planes. Hooey! There is something sinister in his scheme or he wouldn't be mixed up

in it. What do you think? Did you see anything or hear anything I missed?"

"Y-e-e-s," Shorty said slowly. "But it doesn't mean much. First, tell me who you meant when you said he had a man working for him who would talk if you could find him."

"Moose Bliven," Bill said. "That was a little childish of me. I'm not even sure Moose Bliven is working for him. What did you see that doesn't mean much?"

"Did you notice the two models standing on a table in the corner?"

"I merely noticed them. That's all," Bill said.

"I was studying them while you were talking to de Sabla," Shorty said. "One of them was a complete model of the light plane the Gibson Aircraft people are turning out, called the Gibson Hawk. They are outselling any other company in the light-plane field by ten to one. You know it's a two-place tandem job that will stand a lot of knocks and is the fastest ship in its field."

"Yeah," Bill said. "I know."

"The other model," Shorty said, "was a duplicate of the Hawk, except that it was more ruggedly built and had a lot more speed and a heavier power plant."

"Art Gibson wouldn't have anything to do with a man like de Sabla," Bill said.

"Wait a minute," Shorty said. "The heavier model had two ports along the engine housing for machine guns and racks in the belly for four twenty-five-pound bombs."

"It did!" Bill said. "Outside of that it was a copy of the Gibson Hawk?"

"Just a little heavier," Shorty said. "Hey! Where are you going?"

"In here to telephone Art Gibson," Bill said as he disappeared into a drug store.

When Bill came out of a telephone booth a few minutes later his face was red and streaming with perspiration. And it was unusually thoughtful.

"Fella," he said to Shorty, "we're nosing into something."

"What did Art have to say?"

"He's gone," Bill said. "He sold out

## Statement of the Ownership, Management, etc., required by the Acts of Congress of August 24, 1912, and March 3, 1933, of Air Trails, published monthly, at New York, N. Y., for October 1, 1937.

State of New York, County of New York (ss.)

Before me, a Notary Public, in and for the State and county aforesaid, personally appeared H. W. Ralston, who, having been duly sworn according to law, deposes and says that he is Vice President of Street & Smith Publications, Inc., publishers of Air Trails, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and

business managers are: *Publishers*, Street & Smith Publications, Inc., 79-89 Seventh Avenue, New York, N. Y.; *editor*, F. Orlin Tremaine, 79 Seventh Avenue, New York, N. Y.; *managing editors*, Street & Smith Publications, Inc., 79-89 Seventh Avenue, New York, N. Y.; *business managers*, Street & Smith Publications, Inc., 79-89 Seventh Avenue, New York, N. Y.

2. That the owners are: Street & Smith Publications, Inc., 79-89 Seventh Avenue, New York, N. Y., a corporation owned through stock holdings by the Estate of Ormond G. Smith, 89 Seventh Avenue, New York, N. Y.; the Estate of George C. Smith, 89 Seventh Avenue, New York, N. Y.; Ormond V. Gould, 89 Seventh Avenue, New York, N. Y.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only

the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

H. W. RALSTON, Vice President,  
Of Street & Smith Publications, Inc.,  
publishers.

Sworn to and subscribed before me this 30th day of September, 1937. De Witt C. Van Valkenburgh, Notary Public No. 16, New York County. (My commission expires March 30, 1938.)



some time ago and they didn't even know where I could locate him. Not one of the old crowd who started with Art Gibson is there any more. I couldn't learn anything except they're not interested in taking orders right now."

"It's funny we didn't hear anything about the sale," Shorty said.

"It's damned funny," Bill said. "But I'm beginning to see a little light. They must be the people who are working with de Sabla. But why can't they go ahead and establish their network of airports in a legitimate manner, without committing sabotage and theft and murder? There is room enough in the light-plane field for as many manufacturers as there are manufacturers of automobiles. There is something definitely screwy about the thing, Shorty. They try to murder Sexton to prevent him from going ahead with his plans and then they do murder Mort Henderson when Sexton comes to us for help. If I could only hang something on them. So far I can't prove anything."

"We're on the right track, though," Shorty said with conviction. "There's a link between the people who bought Gibson out and de Sabla, or he wouldn't have had those two models there."

They turned down Wall Street at the corner of Broadway and Wall and passed the new Stock Exchange Building and the banking house of Morgan & Co. on the other side of Broad Street without speaking again. They were both deep in thought, trying to pick up the tangled threads that passed in review through their minds. They were nearly down to the skyport at the foot of Wall Street, on the East River, when words exploded from Bill's lips.

"Good Lord, Shorty!" he said. "I think I have it! The network of airports to service and sell Gibson Hawks is only a front for what they intend to do with the fighters of which you saw the model. Do you get the idea? What a perfect set-up for some of de Sabla's crookedness! They could—"

Bill suddenly stopped talking as he noticed the large green limousine that had cut in beside the curb and was keeping pace with them. His eyes narrowed as he saw the two men with flat, broad faces in the front seat, who were watching them instead of the road.

Then he saw the single occupant of the back seat rolling the window down. He saw the nose of a submachine gun come peeping over the top not five feet away from him.

All those things he saw in less than a second, and his mind was working faster than his eye. He knew that the machine gun was meant for them, and he knew there was no place to run away from it. They would be mowed down before they could reach the entrance of a building or duck around a corner. For

one awful split fraction of time he stood helpless. Then he did the thing that was characteristic of him.

He put his left foot in back of Shorty Hassfurth and gave him a sudden straight arm on the chin with the palm of his right hand. It was so sudden and so unexpected that Shorty didn't have time to brace himself. He sprawled backward, hit his head on the pavement and lay still.

As he fell, Bill went over him in a long, powerful lunge, with his right hand in front of him. His right hand closed around the muzzle of the submachine gun as it gave its first sharp bark. He jammed it against the side of the window and swung his fist in an arc inside the window. It wasn't much of a blow, because it was more of a jab than a hook. But it was enough. What he lacked in leverage he made up for in speed, as he drew his fist back four inches and let it fly again. It landed flush on the snarling mouth of the machine gunner and stopped the angry chatter of the gun.

The man beside the driver in the front seat was trying to swing around so that he could train the automatic he had drawn on Bill, when a police whistle sounded on the corner and a mounted policeman came galloping toward them.

Bill wrenched the machine gun out of the man's hands and used it as a club as the big, green car suddenly came to life. The tires screamed as the driver threw it in gear and jammed down on the accelerator. The car leaped into action and barely missed the mount of the policeman, who was bearing down on it. He cursed, drew his service revolver and fired two shots at it as it went careening around a corner.

People were beginning to stick frightened heads out windows and around corners as the cop jumped off his horse and accosted Bill with his drawn gun.

"Drop that thing!" he shouted. "I'll let you have it!"

Bill dropped it and stuck his hands out in front of him as a police siren sounded above the din of traffic.

"What the hell is this—a stickup?" the cop snarled.

"I'm Bill Barnes, officer," Bill said quietly. "The men in that—"

"Yeah, an' I'm Mickey Mouse!" the cop said.

"My Lancer is over there at the skyport," Bill snapped. "They'll identify me."

People were beginning to edge closer to them, secure at the sight of a policeman.

"Are you all right, fella?" Bill asked Shorty as he pushed himself up off the sidewalk.

"What the hell happened?" Shorty asked. "I was out cold."

"Listen, officer," Bill said as a police car came to a stop beside them. "Put

us in this car and send us to headquarters. I know the commissioner. I'll explain what happened to him."

"How do I know you're Bill Barnes?" the cop growled.

"He is. I recognize him," a voice said from the police car.

## IX—ATTACK

COMMISSIONER BARTON, a big-boned, stockily built man with a red face that got that way from crooking his elbow instead of from sitting in the sun, glowered at Bill as he unfolded his story.

"I'm glad there is only one of you within my jurisdiction, Bill," he said, when Bill had finished. "There isn't anything I can do for you unless you have something more tangible than a few suspicions. We got your confidential report on Henderson's death and we've kept it away from the news boys, as you asked me to."

"I can take care of this thing myself," Bill said grimly. "There is only one thing I want you to do, and I want you to do that fast."

Barton lifted his eyebrows without speaking.

"Find Art Gibson for me," Bill said. "He ought to know something."

"Do you know where he lived?" Barton asked. "Clubs, church, friends, hang-outs?"

"Let me try the Air Hawks Club first," Shorty said. "Art was one of the founders. It's a hobby of his." He reached for a telephone.

"He's there now," Shorty said to Bill a moment later. "Want to speak to him?"

"No!" Bill snapped. "Tell him it's police headquarters and that there will be a police car there in a few minutes to pick him up and bring him down here. O. K.?" he asked Barton.

"O. K.," Barton said. "That's the first time in thirty-five years I've started to look for some one and found them in the first place I looked instead of the last."

Arthur Benton Gibson was obviously a worried man when he was shown into the commissioner's office. He was a tall man with an angular face and a perpetual stoop from bending over drafting boards. An expression of relief took the place of his anxiety when he saw Bill and Shorty and shook hands with them.

"What kind of a crew of lugs did you sell out to, Art?" Bill asked him.

"I know. I know," Gibson said, and his face became creased with lines again. "I've been worried ever since I did it. They offered me so much money I couldn't afford to refuse it. I had taken their money and signed the papers before I really got suspicious."

"Who are they?" Bill asked.



# SWEEPING THE COUNTRY!



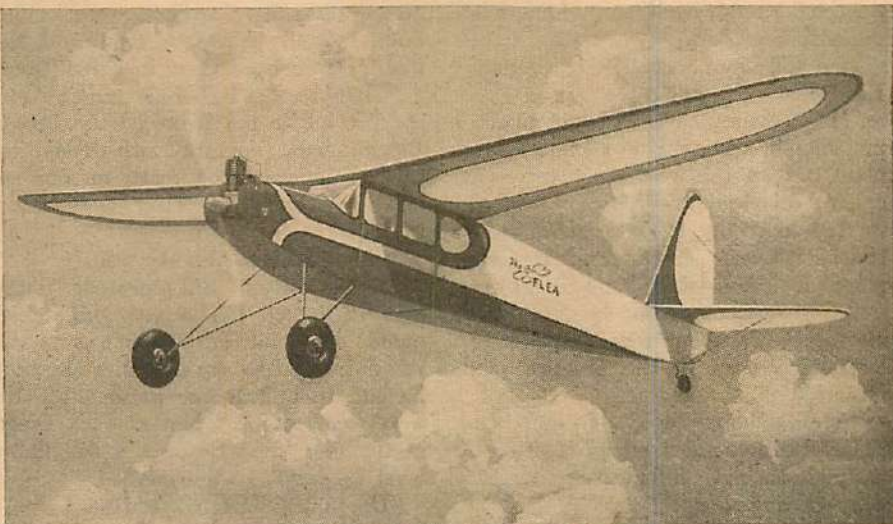
**GAS TYPE**  
Rubber Powered  
**MODEL AIRPLANE**

LOOKS LIKE A GAS MODEL  
FLIES LIKE A GAS MODEL  
SOUNDS LIKE A GAS MODEL

**—BUT \$1.95**  
**COSTS ONLY**

**COMPLETE**  
Including M & M  
Pneumatic Rubber  
Wheels

**POST PAID**  
OR AT YOUR DEALER



Wing Span 36" Weight 4 oz. Length 28"

**FLIES 1/2 MILE (2,500 Feet)**

**KIT CONTAINS EVERYTHING**

required to build this model—100% complete. Completely turned wood cylinder and spark plug made in one piece; all wood parts for constructing crankcase, exhaust pipe, air intake, throttle, etc.; pair of 1 1/2" M & M pneumatic wheels with inflating tube; true pitch 10" machine-cut Balsa wood propeller; all ribs, bulkheads, fairings, and curved parts clearly printed on selected Balsa; strip Balsa carefully cut to accurate sizes; liberal quantities of cement, banana oil, and a bottle of rubber lubricant; brown contest rubber; landing gear wire; washers; tissue; sheet aluminum and brass; motor hooks and all necessary metal for building ratchet motor-hum effect; Balsa balloon tail wheel; correct gauge wire for fork and wing clips, and soft hinge wire for movable surfaces; also a set of the most complete and easily understood plans ever devised, including all information on the construction of the entire model and the dummy gasoline engine. Everything shown in detail and full size. Insignia printed in color on gummed paper ready to attach.

**T** HIS fast climbing, high altitude flyer will give you all the thrills of real Gas Model flying at a fraction of the cost. Get into this new sport by building and flying "The FLEA". Read what this remarkable kit contains and join the thousands of satisfied builders of this new type Model Airplane.

**MOVABLE CONTROL SURFACES ON RUDDER AND ELEVATOR**

**SHOCKPROOF GAS MODEL TYPE LANDING GEAR WITH PNEUMATIC M & M RUBBER WHEELS**

**NEW TYPE BALL BEARING PROPELLER WASHER**

**BROWN CONTEST RUBBER**

**ADJUSTABLE WING WITH NEW TYPE WING CLIPS**

This remarkable model also includes an unusual feature never before attempted in a kit—this is the "Ratchet", a device that creates a continuous sound resembling the hum of a real gas motor. When you see and hear this motor in flight you cannot tell it from a real Gas Model! "The FLEA" has an adjustable wing—movable forward or backward to adjust balance. Held in place on the fuselage with new type clips built into the under side of wing to hold rubber strands which stretch around fuselage.

"The FLEA" is just the model for those desiring to gain experience before tackling a real gas job—Looks like a Gas Model—Flies like a Gas Model—Sounds like a Gas Model—but costs only \$1.95. The biggest money's worth you ever saw! Order your kit today so you, too, can experience all the thrills of real Gas Model flight.

## SELECT YOUR GAS MODEL FROM THESE SCIENTIFIC PRIZE WINNERS!

When you read contest news you will always find at least one of these Models mentioned as a winner. Follow the example of these consistent winners and build one of these Scientific Models.



**REP ZEPHYR**  
America's Finest  
Popular Priced Gas Model!

Easy and Inexpensive to Build and  
A Consistent Contest Winner!

Wing Span 6 ft. Length 56 in.

This is the kit for the beginner or experienced builder and contains pair of 3 1/2 in. PNEUMATIC RUBBER WHEELS, FINISHED HARDWOOD PROPELLER, LANDING GEAR, CRASHPROOF RUBBER, including ribs, bulkheads, wing tips, rudder sections, etc. Bamboo covering paper, colored tissue for decoration and all bolts, nuts, wire, electrical connections, etc. Full assortment of supplies and two LARGE FULL SIZE PLANS showing every detail so you can complete this model quickly and successfully. Finest value ever offered in a gas model—a Record Maker anyone can build. Ask your dealer or send your order direct. Satisfaction guaranteed. Complete kit only

**\$6.95**

Postpaid  
Less Motor



Grand First  
Prize Winner  
I.G.M.A.A. Contest  
at Hadley Field  
May, 1937.

Also First Prize  
Winner at  
Metropolitan  
Gas Model  
Meet, 1937.

**Miss AMERICA**

Wing Span 7 ft. Length 54 in.

This is a reliable, consistent performer and holds its own at every Model gathering. Kit includes 3 1/2 in. PNEUMATIC RUBBER WHEELS, FINISHED HARDWOOD PROPELLER, and is complete with every item required. Ask your dealer to show you Miss AMERICA or send your order direct. Complete kit only

**\$9.50**

Postpaid  
Less Motor

An Exact Duplicate  
of MAXWELL  
BASSETT'S  
Detroit "NATIONALS"

1st Prize Winning  
Gas Model!  
—The FAMOUS

**MISS PHILADELPHIA**

Wing Span 8 ft. Length 57 in.

An absolute duplicate of the Model which has won every major contest for this famous designer. Kit is 100% complete including ready shaped landing and trailing edges with notches cut for ribs, fully finished hardwood propeller, 3 1/2 in. PNEUMATIC RUBBER WHEELS, finished Balsa ribs with notches for spars, crashproof landing gear, flexible wing supports and many other remarkable features. A sensational Model, easy to build with this complete SCIENTIFIC kit. Ask your dealer or order direct.

**\$9.95**

Postpaid  
Less Motor

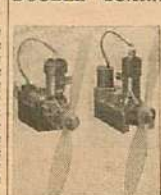
### SCIENTIFIC GAS MODEL SUPPLIES—EVERYTHING REQUIRED



**FLIGHT TIMER**  
Small size; wt. 2 1/2 oz.; easily mounted in model.  
Each .....\$3.00

**BALSA WOOD for GAS JOBS**  
STRIP BALSA 5 ft. Lengths  
1/4 x 1/4 Each 2c  
1/4 x 1/2 " 4c  
1/4 x 3/4 " 6c  
3/16 sq. " 8c  
3/16 x 1/2 " 8c  
1/4 sq. " 6c  
1/4 x 3/4 " 8c  
1/4 x 1 " 10c  
1/4 sq. " 10c  
1/4 x 1 " 12c  
1/4 x 1 1/2 " 15c  
NEEDLE VALVES  
For Cyclone Engines, Each, 50c

### DOUBLE GUARANTEE WITH ALL GAS ENGINES



**BROWN JUNIOR** new 1937 Model "C".....\$17.00  
**BROWN JUNIOR**—Model "B".....\$21.50  
**OHLSSEN** Radial Mounted Engine.....\$18.50  
**MIGHTY MIDGET** Construction Kit (Upright).....\$9.85  
**FINISHED MOTOR**—Now only.....\$14.00  
**GWIN AERO** Construction Kit (Upright).....\$11.35  
**HARDWOOD PROPELLER** FREE WITH EVERY ENGINE PURCHASED

### at MONEY SAVING PRICES

#### TRU-PITCH GAS PROPELLERS

Accurately carved with hole drilled; clear, hardwood, natural finish, 13" and 14" sizes. Lowest price ever for perfect propellers.....Each 99c

#### JACK and PLUG

for attaching booster batteries. Jacks, each 10c  
Plugs, each 10c

#### SCIENTIFIC FINISHES

Clear Nitrate Dope  
Colored Nitrate Dope  
Nitrate Thinner  
Gas Model Cement  
Regular Cement  
Bamboo Paper Cement  
Banana Oil  
3 oz. Bottle .....25c  
1/2 pt. Can .....50c  
1 pt. Can .....75c  
1 qt. Can .....\$1.40

**MODEL DEALERS**  
Get in on this new business! 24 gas model kits and supplies. Order the Complete SCIENTIFIC line at your regular discount or, if you are not already a SCIENTIFIC dealer, write today on your letterhead and get full details.

## SCIENTIFIC MODEL AIRPLANE COMPANY

218-220 A.T.-11 Market Street

"GAS MODEL HEADQUARTERS"

In France: E. Kruger & Co., 9 Rue St. Sebastien, Paris  
In England: H. & S. Norman, 46 Derby Rd., Kirkham, Lancs.  
In Australia: Swift Model Aircraft, 158 Adelaide St., Brisbane, Queensland  
In South Africa: Stratosphere Model Craft Supplies, P. O. Box 3248, Johannesburg

Newark, N. J.

**HOW TO ORDER**  
Add 15c to orders up to \$1.50.  
On orders over \$1.50, add 10% of order. Orders amounting to \$4.00 and over are sent postpaid. All SCIENTIFIC kits and Gas Motors are sent postpaid. All orders shipped same day they are received.



"I don't know," Gibson said. "A man named de Sabla who is head of the International Trading Corp. acted as their agent. Everything seemed to be all right until I learned Moose Bliven was connected with them. That made me suspicious."

"Do you know where Bliven is now?" Bill asked.

"He's running their Western plant, I understand. You know I built a large plant out on the west coast two years ago. I sold that, too," Gibson said. "I wanted to go out there a few days ago to look it over. Homesick for it, I suppose. De Sabla stalled me and I realized that for some reason he didn't want me to see what they were doing there."

"You've been in the Eastern plant recently?" Bill asked.

"A few days ago," Gibson said. "They whisked me through it after I'd pestered them to let me see how they were coming along."

"They're just turning out Hawks?" Bill asked.

"So far as I could see."

"Why have you been worried?" Bill said.

"I don't know," Gibson said. "Except that knowing Bliven was connected with them made me suspicious. Then I began to think things over and realized that I didn't know much about them and de Sabla seemed like a very smooth gent."

"They didn't say anything to you about manufacturing a more rugged and faster ship along the lines of the Hawk?" Bill asked.

"Never heard about it," Gibson said. "Have you? What's the idea of all this, Bill? Have they tangled with you?"

"They have," Bill said grimly, and he briefly outlined the things that had happened.

Gibson stared at him as though he couldn't believe what he was hearing.

"What's the set-up?" he asked harshly. "What are they trying to do?"

"On the surface it looks as though they were trying to beat Colonel Sexton to it," Bill said. "But I'm certain that's only camouflage."

"We could pick this man Bliven up, Bill," Commissioner Barton said. "If Scotty MacCloskey can identify him we can hold him and probably make him talk."

"He would have a cast-iron alibi," Bill said. "Besides, I don't think he would be fool enough to commit a robbery on my field."

Bill stopped speaking as a telephone bell pealed and Barton took his phone out of its cradle.

"It's for you, Bill," he said. "The man you talked to on your field when you arrived here."

"O. K., Tony," Bill said into the receiver. He listened for an instant then pressed the receiver closer against his

ear. "Yes. Yes, Tony!" he said. "What did he say?"

Bill listened intently while the others watched him in silence.

"Right, Tony," Bill said. "I have it. Keep still and have Scotty check four Snorters and have 'em ready on the line. I'll be back there in a half hour."

"That breaks it!" Bill said. "Now we're going to get some action. Moose Bliven made contact with Tony by radiophone from the coast, on our secret wave length. They even knew that."

"Moose Bliven!" Shorty said.

"Moose Bliven!" Bill repeated. "Tony says he talked like a very frightened man. He said he couldn't say the things he had to say over the air, that he had to talk to me personally. He wants me to meet him at San Diego in the morning. He says I will know what he wants to tell me."

"Do you?" Barton asked.

"He's putting me on the spot!" Bill said. "Yet, he's too smart to think I'd fall for anything like that."

"That's what he's counting on, Bill," Shorty said. "He figures that you consider him too bright to try anything as crude as that, so you'll believe he really wants to tell you something."

"They'll gang me on the way out there," Bill finished.

"Exactly," Shorty said. "He thinks it is so simple it will work. You gave de Sabla the idea yourself. He grabbed at the hook."

"I thought he would!" Bill snapped. "It's the first break we've had. If he doesn't show in San Diego—if I get there—I'll find him and I'll make him talk. At least this is something tangible to go on."

"This de Sabla must be a slick bird, Bill, to have you sitting around twiddling your thumbs," Barton said.

"Shorty," Bill said, "I want you to stay here in New York and I want you to know where you can put your finger on de Sabla at any minute."

"We'll help him with that," Barton said.

"O. K.," Bill said. "Art, I want you to stay at the Air Hawks Club until you hear from me. I may need you."

"Right, Bill," Gibson said.

"Can I have a car to take me to the skyport?" Bill asked Barton.

"Yes," Barton said. "Anything else you want us to do?"

"Nothing," Bill said. "Tony Lamport will keep you informed."

He went out of the commissioner's office like a streamlined locomotive.

DUSK was just creeping across Barnes Field as Bill stood on the apron giving last-minute instructions to Scotty MacCloskey. The twin opposed props of the four Snorters and the Silver Lancer were ticking over slowly. The

white-helmeted heads of Red Gleason, Sandy Sanders, Beverly Bates, and Cy Hawkins jutted above the rim of the scarlet-and-black-and-orange Snorters. They were waiting impatiently for Bill's signal to the dispatch tower that would take them on their way.

"Be sure Tony keeps a man on duty all the time," Bill said. "And tell him to make contact with Morton, chief of the bureau of criminal investigation in Washington, and tell him I may want his help to-morrow morning. I have a hunch about this thing now and I think it's going to jell. Keep an eye on Colonel Sexton. He isn't as young as he used to be and that was a nasty wound he got. Tell Tony to keep him informed. He'll be anxious. That's all."

"Good luck to you, boy," old Scotty said.

"Thanks. I'll need it!" Bill said grimly. His arm came up above his head. The dispatch tower acknowledged and the dispatcher began to chant into his microphone. A signal flashed as the first Snorter in line blasted.

Red Gleason released his wheel brakes and opened his throttle. His Snorter gathered speed as he eased his stick forward to bring the tail up, then yanked it back into his stomach. He spiraled swiftly upward, then began swinging in wide circles while the next and the next and the next Snorter took the air to join him.

Bill leveled the Lancer off at five thousand feet and threw the switch on his radio panel.

"Stepped-up column," Bill said into his microphone to his men. "Red to starboard of me, Sandy to port. Bev and Cy on the tail. Three hundred m.p.h. There's a twenty-mile head wind. You all know the layout. Keep your eyes open. Use your running lights. Close formation. We lay over four hours in Chicago for sleep. Let her ride!"

A thousand thoughts rushed through Bill's mind during that two-and-a-half-hour flight to Chicago. During their four-hour stop-over there he tossed and turned in his hotel bed, wondering what "Moose" Bliven was going to tell him. He was still pondering it when he followed the four Snorters back into the air at one thirty in the morning.

As the weather began to kick up west of Cheyenne, Bill made contact with Salt Lake City and then spoke to his men.

"We'd better get another five thousand under us," he said. "We're running into a storm. Watch your running lights and keep plenty of distance between you. Continue at three hundred unless things blow up too hard."

As the fury of the head wind increased they had to use every bit of concentration they could command to keep their course and contact with Bill.



Then an electric storm came roaring at them like a giant monster. Bill checked his bearings while he tried to keep control of the Lancer and give his position to his men.

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

Young Sandy Sanders was fighting his ship like a veteran, using every sense, relying more on his inherent skill and touch than on his instruments.

As a giant hand slapped his Snorter toward the earth he eased it up again and began to talk to it as he might have talked to a horse. Terrific blasts of wind and rain beat against his windshield. His hands were clammy with perspiration. His whole body was wet. He threw his switch as a light burned red on his radio panel.

"Check in all of you," Bill's distorted voice said in his ear.

After they had checked in Bill said, "Hold 'em as you are. Try to keep on your course. There is no place to sit down here. 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 rain around his running lights on his wing tips. He pulled his parachute lever and watched a flare take a dizzy course earthward.

Suddenly, the wind and rain no longer beat at their shields and hatches. It disappeared into the night as quickly as it had come. Bill flipped his radio key and called their names.

All four gave the all-clear signal. A few minutes later they were back in their original formation.

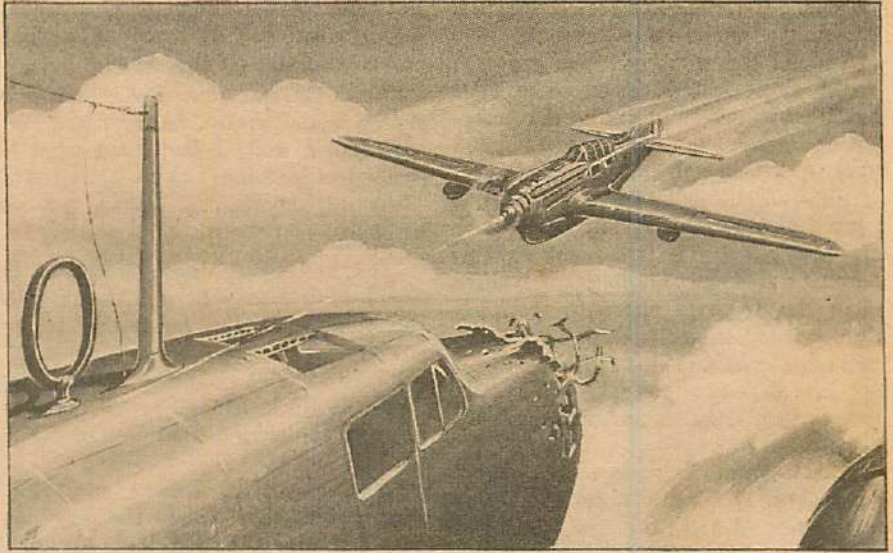
"Take it easy," Bill said. "Hold your course. I'm going to break out the infra-red-ray telescope to take us the rest of the way."

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 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 same ominous sound too many times before to not know what it was. And he knew that the machine guns he heard were not the Brownings set in the engine housing of his Snorters.

The next instant he could feel bullets drumming into the starboard wing of the Lancer; he could feel the big ship shudder under the impact. He yanked the control column of the Lancer back into his stomach as he heard screaming props and thundering motors dive be-



The bomber in the nose had forgotten his mission as his turret was torn to pieces—

neath him. As the nose of the Lancer raced upward he threw his radio key again and began to call his men.

"Turn on your oxygen tanks and get up to twenty-five thousand!" he screamed. "They're coming back!"

"They made a sieve of my Snorter, Bill," young Sandy said.

"Get upstairs!" Bill shouted. "Are you all right?"

"I'm all right," Sandy said, his voice high-pitched and strained. "They came out of nowhere. I think there are six or eight of them. They're climbing to get above us for another attack."

"Watch out for a crash, Bill," Red Gleason said.

"I'll watch it," Bill growled. "I'm going to use my telescope. I'll join you in a few minutes."

As Bill picked up the eight planes racing upward he saw that they were the same type that had attacked the carrier transport over the Atlantic.

Fire and orange flame jetted from the machine-gun troughs along the engine housing of the enemy ships, as Bill eased the stick right and slightly forward and kicked his left rudder pedal. The eight ships dropped away to the right as the nose of the Lancer dropped away in a fast side slip. The Lancer trembled from stem to stern as bullets drove into her tail assembly. Then she was out of their range of fire. Bill switched off his running lights, opened his throttles wide and hung the Lancer on her props to rejoin his men.

"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."

"O. K.," Bill said. "Stay at twenty-five thousand until we're almost ready to make a landing. Same formation. Speed three hundred. Same course."

## X—COMPROMISE

DAWN was creeping out of the east when the Silver Lancer and the four Snorters circled the field at San Diego twice, while they studied the illuminated wind sock and the layout of the airport.

Bill led the way in. He set his brakes, killed his engines, and gave his men instructions over the radiophone before he went over the side of the Lancer.

"We've been gaining time all night," he said. "We're early, but I'm going to see Bliven immediately. Stand by your ships and the Lancer. Get what rest you can. I don't know what comes next. I'll know soon or we'll start a hunt for Bliven."

His face was a thundercloud as he faced the light-haired, blue-eyed Bliven in his suite of rooms at a San Diego hotel. He had only half expected to find Bliven living there. But the desk clerk had taken his name and said Bliven was expecting him. That was his first surprise. The second came when he saw Bliven. He was not the debonair, dashing man Bill had last seen.

"Thank Heaven you're here, Bill," he said, "even if you won't shake my hand! I'm ready to break, Bill. I'm going crazy."

"All right, Moose," Bill said finally. "let's hear it. But you'd better pour yourself a drink before you begin."

Bliven nodded his head and played a tattoo with a bottle against a glass as he poured himself a drink and downed it in one gulp.

"All right, Moose," Bill said again. "let's have it. I know de Sabla got in touch with you yesterday, after I had talked to him, and told you to put on an act to get me out here so he could send out a flock of aerial gangsters to wipe me out on the way. They tried, but they didn't succeed."

"Who tried?" Bliven asked, and Bill could not believe that his surprise was



not real. If it was not real it was the best simulation he had ever seen.

"I don't know who," Bill growled. "Eight single-seaters. The same kind that tried to get us in my carrier transport yesterday. You have a pretty good supply of armed fighters handy, Moose."

"Bill," Moose said, and his face was pasty again. "I had nothing to do with any attack on you last night or this morning. I knew nothing whatsoever about it. I would swear to it if my life depended on it."

"And I wouldn't take your oath if my life depended on it," Bill said. "Moose, you'd better come clean with me."

"That's what I want to do, Bill," Bliven said. "I can't stand this thing any longer. I tell you I'm going mad from worry. De Sabla tricked me into joining him. I didn't know what he was going to do."

"Why didn't you get out?" Bill asked.

"I can't now unless you use your influence to gain me immunity," Bliven said. "I'm an accessory to the fact. I don't want you to think I got in touch with you because de Sabla ordered me to. I didn't try to lay a trap for you. You've got to believe me, Bill!"

Bill, studying him, wondered if for once in his life Moose Bliven was telling the truth. He wondered if Bliven's call to Barnes Field had been coincident with his talk with de Sabla the day before. It seemed too improbable to believe. Yet Bliven was telling the truth or he was the world's best actor. The thought flashed through his mind that de Sabla had ordered Bliven to make the radiophone call on him at Barnes Field and had not told Bliven that he was going to waylay Bill on the way to the coast. That would be in keeping with de Sabla's tactics.

"All right, Moose," Bill said. "Say I do believe you. What do you have to tell me?"

"About this set-up of de Sabla's," Moose said. "Maybe I've been a rat in a lot of ways, but I can't stomach the things he is planning. I went in with him because the thing, as he outlined it to me, at first, sounded right down my alley."

"Not too crooked," Bill said.

"That's right," Bliven said. "Not too crooked. He outlined a plan similar to the one Colonel Sexton intended building."

"Then he isn't acting for any one else?" Bill asked.

"He is the whole works," Bliven said. "Along with his network of light planes and airports he said he wanted to build a heavier and faster ship—a fighter. I've been building the fighters out here in our west-coast plant. He said he wanted something he could sell to foreign countries at war."

"In spite of our neutrality laws, eh?"

Bill said. "That's right down his alley—gun running. And maybe a little crime syndicate on the side?"

"Yes," Bliven said. "But that is only a drop in the bucket. After I had been with him a while I found out what he really has in mind."

"If it made you squeamish it must be pretty bad," Bill said.

"It is bad, Bill," Moose said earnestly. "As I said, I may be a little off color sometimes, but I'm no traitor to my country."

"Traitor!" Bill exclaimed. "Don't lay it on too thick, Moose, or I'll not even pretend to believe what you're telling me."

"You've got to believe me, Bill," Bliven pleaded. "You're the only man who can nip it in the bud. I might have gone to Washington with it but they would have looked me up and thrown it back in my face."

"De Sabla is not building fighters to sell to foreign countries, Bill. He's planning a network of light-plane airports to cover the country. That is what they will seem on the surface. But when the stage is set and he has control of the industrial unions, he is going to arm them. They will become his armies. His network of airports will be a base of supplies and they will be flown by fighting pilots in his fighters. They will seize the industrial centers after his fighters have overcome the army and navy."

"Listen, Moose," Bill said. "You've been drinking too much."

"I can prove it, Bill!" Bliven said. "That's why I sent for you. He has established a training field northeast of here where he is sending his fighters to be assembled as soon as they are turned out. It is also training fighting pilots in the same way they are trained at the army school in Texas. He's working carefully, under cover, getting ready for the day when he will strike. When he's ready he'll take the country. That's why he started to break up Sexton's organization and plans. He was afraid Sexton would get too nosy and find out what he really intended to do."

Bill was about to get to his feet and call Bliven a liar when suddenly another picture flashed before his eyes. He thought of the way Chamberlin and de Sabla and the rest of Chamberlin's crowd had pushed Mike Morales out of control of the island of Samerra. They had not only pushed him out, they had tried to murder him to get control.

The thought came to Bill, with overwhelming force, that Bliven's story might be true. He might even have the backing of other nations. There were a number of them that would like to see such a thing happen in the United States. It was almost too big to contemplate.

"How can you prove all this, Moose?" Bill asked.

"I can tell you how to find his training field. Then you'll believe what I'm telling you. You'll see on what a huge scale he has planned. You'll see hundreds of those two-place fighters and hundreds of men being trained to do combat work in them," Bliven said. "I'm telling you the truth, Bill, so help me!"

"You're telling me the truth or you're setting the stage to annihilate me and my men when they go to look for this mythical field," Bill said. "You're a rat, Moose. But you might have a semblance of decency left in you."

"I have, Bill! I have!" Bliven pleaded. "I'll tell you just how to find his training field. Then you can handle the thing your own way."

"You'll tell me nothing," Bill said grimly. "You'll come with me and then, if you've laid a trap for me, you'll get a dose of your own medicine!"

Bliven hesitated for a moment. Then he nodded his head vigorously. "Right, Bill," he said. "That'll prove I'm on the up and up. When do we go?"

"Now," Bill said.

## XI—DOUBLE-CROSSED

ALL FOUR of Bill's men climbed out of the cockpits of their Snorters when Bill returned to the airport with Moose Bliven in tow. But they didn't speak to Bliven. They just looked at him.

Bill told them what Bliven had told him and when he had finished Red Gleason exploded. "I wouldn't trust that snake, Bill!" he said vehemently. He spoke as though Bliven had no ears.

"If they jump us they jump him," Bill said. "Where do we go, Moose? What's our course?"

Moose gave it to him. "It's back of the San Bernardino Mountains," he said. "There is no means of getting in and out except by air."

"How did you get your equipment in there?" Bill asked.

"Transports," Moose said. "They're also bombers."

"All right, men," Bill said. "I'll take the point of a V. Be ready."

He motioned for Bliven to climb in the front cockpit of the Lancer. "Be careful," he said, "you don't throw the switches for the machine guns and the automatic cannon. You might injure one of my own ships if you got careless. Just to keep you careful, remember I'll have an automatic handy that will smash your spine with one shot."

Bill climbed in the rear cockpit, pulled a white helmet out of a locker, handed it to Bliven and showed him how to plug in the connections for the radio and intercockpit phone. "Leave the radio switch alone," he said. "All you'll need is the intercockpit phone."



Bill's nerves were dancing as he took the Lancer off the field and took the point of a stepped-up V. He knew he was going into danger, but he was used to that. It was the uncertainty that made his nerves scream. He told his men to follow him up to twelve thousand feet and keep their eyes open. He threw his radio switch, but saw that the red light on the panel still gleamed red. He spoke to Bliven over the inter-cockpit phone and got no answer. He stood on his toes and saw that Bliven was turning the master-tuning and volume and wave-length controls on the radio. He threw his own switch on again and listened. He heard Bliven get an answer to the call letters he was chanting.

"This is Bliven speaking to KRDH," KRDH," Bliven said.

"This is KRDH. This is KRDH," a voice said. "Go ahead. Go ahead."

"Get this fast, KRDH," Bliven said. "I can't repeat. I'm in Barnes' Lancer with him, leading four of his Snorters to the dry lake. Don't attack until after I have shown him the field. I have an adjustable seat pack and will bail out after I have allayed his suspicions. Then take him. Do you get it?"

"KRDH understands," the voice said. "How soon will you be here?"

"Thirty minutes," Bliven said. "Signing off."

Bliven flipped the key and the red light went out on Bill's panel. He smiled grimly to himself. Now he knew. He knew that Bliven hadn't been lying about de Sabla's training field and his intentions. Bliven hadn't told him anything de Sabla hadn't told him to tell Bill. He had been acting all the time to be sure that Bill would walk into the trap they had laid for him. They were so sure of destroying him and his men that they didn't worry about what he knew.

Bill made up his mind quickly what he would do. He would let Bliven point out the field to him and then watch him like a cat watches a mouse, so he would have no opportunity to bail out. While he was getting back to San Diego he would make contact with Morton, chief of the bureau of criminal investigation in Washington, and lay the whole story before him. It was something he, Bill, didn't dare touch. It was too big for him to put his finger in. It was a job for the government to attend to. After he had actually seen the training field he would instruct his men to pour in the soup and get back to San Diego.

The Lancer bored on and on through the clear California air while Bill watched Bliven like a hawk and speculated on the villainy of men like Bliven, who worked twice as hard making money as crooks as they would have to work making money honestly.

Suddenly he was conscious of Bliven's white face staring back at him from the front cockpit. Then he forgot him, as a gun barked below him. The Lancer bounced as a wisp of white smoke appeared in the air to his left. At the same instant he was aware of the roar of twelve diving fighters, as they came out of a bank of heavy cumulus clouds. He rolled the world out from in under him as he threw the control column forward and to the right and kicked his left rudder.

He saw his four Snorters toss their tails in the air and drop on the twelve rugged little fighters that were a heavier edition of the famous Gibson Hawk, after they weathered that first frightful storm of lead and death.

Then the world exploded all around the Lancer. Bill was aware that Bliven



Juan de Sabla

was screaming at him, but he paid no attention. He realized that Bliven was being double-crossed by the men in command on the training field. They had listened to Bliven's instructions, but they had not waited for him to point out the field. They had attacked as they had first planned, in spite of the fact that they would probably destroy Bliven. That, he reflected, grimly, is the way of their kind.

He reached in front of him and turned a switch, which made the three twenty-five-pound bombs in the belly of the Lancer ready for release. Anti-aircraft shrapnel was exploding all around them now. But he didn't yank the nose of the Lancer up. He saw four of the black fighters leave the other eight and dive on his tail. He brought the Lancer over on its back as he slammed the overhead hatch above Bliven's head and locked him in. He rolled the Lancer level and stuck the nose down again, pointed at the flashes of fire and smoke that came from the guns on the ground.

His bomb sights were directly on them when he pulled his release lever.

Two grayish darts sped out of the bottom of the Lancer, their blunt noses taking a course straight for their target.

The Lancer bounced upward as the first drove into the ground crew of the aircraft gun, and then the second. As the two bombs detonated, debris that was made up of men's bodies, steel, wood, and fabric spewed in all directions. Black smoke welled out of the earth with long, orange tongues licking through it. Men ran and suddenly toppled like tenpins. Machine-gun bullets came ripping up through the belly of the Lancer from below, as Bill yanked the control column back and hung it on its props.

Five thousand feet above him the air had become a deafening, bewildering bedlam. Tracer smoke, white and yellow, floated through the air and dissolved, as his four Snorters tore like four berserk bulls through the careful alignment of the enemy ships.

Bill took the Lancer above the fight, while he tried to figure how he could make use of his own guns to aid his men. He could not use them unless he got in the front cockpit, and he could tell by Bliven's white, terror-stricken face that he would fight like a maniac if he tried to get up beside him. He could not bring himself to shoot the man in cold blood.

He saw Red Gleason whip his Snorter through the roaring heavens with the reckless abandon of a man gone mad. Black planes skidded desperately out of his way to escape the lightning acrobatics he used to bring them under his sights. He saw a black plane zoom and go far over on its side, its rudder biting into the air as it swung in a tight circle.

Red Gleason stuck on his tail, and the first burst from his guns cut the rudder from its post. As the black ship slipped, Red smashed its center with a deadly fire. The pilot flailed the air with his arms as the ship stuck its nose down and began a dizzy spin to its death.

He saw a black fighter hurtling down on Bev Bates from the top of the fight and saw Bev kick his Snorter out of range. Then he came up in a tight loop on the tail of the black ship and around harder in a tight vertical. His bullets carved a line along the fuselage. They drove into the engine block until oil and then fire came spurting out to lick back into the pilot's face.

He saw young Sandy dart in to follow a black ship that was trying to get away from Red's devastating fire. He tore in with a reckless abandon that sent enemy ships dodging. His fingers came down hard on his trips as he got the black ship under his sights. It rolled off on one wing as his bullets pumped into it. The pilot shot out of



the cockpit, turned slowly over and over as he dropped beside the falling plane.

Bill saw Sandy come over in a snap roll and return to the fight. A minute later he brought his tricolored Snorter around in a flashing Immelmann, as two ships charged at him. He drew a line along the fuselage of one of them as he half rolled his ship back to a level position. The black ship wallowed, and the nose dropped as the pilot fought the controls.

He, suddenly, became conscious of Bliven again, as the man twisted in his seat and screamed into the intercockpit phone. Bill could not hear what he was saying because his words were running together in an unintelligible jumble. But he looked downward as Bliven pointed toward the earth, and saw that another dozen fighters were being rolled out on the apron in the dry lake below. He knew he must destroy them before they got off the ground, if his men were to survive.

The twin props of the Lancer whined and sobbed in protest and a gale screamed and cursed along the cantilever wings, as Bill stuck the nose down in a vertical power dive. Down and down the big ship roared, gathering speed constantly until it reached terminal velocity and it seemed it must separate in a million pieces and dissolve.

The air-speed indicator was jammed as he began to ease the stick back above the field. Men scurried away in every direction beneath him. For a moment it looked as though the Lancer would plunge directly into the center of the dozen fighters warming up. Then the nose eased up as Bill was only five hundred feet from the ground. He took a quick sight and yanked back on the bomb-release lever again.

The Lancer laid its last twenty-five-pound bomb right in the center of the twelve black fighters. Bill fought desperately to regain control of it as it whirled upward and yawed wildly. A moment later he took it upstairs again. He saw that there were still eight of the black fighters aligned against his men and he knew that they must be desperately tired from fighting three-to-one odds.

It was then that he made up his mind. He leaned forward with his heavy automatic in his hand and brought the flat side down on Bliven's head. Bill locked the controls as Bliven's head slumped forward. He climbed over the rear-cockpit instrument panel, released Bliven's safety belt and snaked him back into the rear compartment. Then he climbed back into the forward cockpit and took the Lancer into action.

Four of the black ships peeled off and tried to get him in the vortex of their fire, as he roared into the battle. For

a moment he bided his time while they wheeled around and around him in an ever-tightening circle.

Suddenly, he brought the nose of the Lancer up until it nearly stalled. At the same instant he opened his throttles wide and brought the nose down in a climbing turn and got one of the ships under his sights. He saw the terror in the eyes of the pilot of the black fighter as he tripped his two powerful .50-caliber guns. He, literally, tore the ship to pieces as he added the fire of his 37mm. cannon. The other three ships scattered to escape the flying debris.

Then Bill was suddenly aware that machine guns and sobbing motors were no longer making the morning air hideous with their noise. He scanned the air all about him. A mile to the east he saw three of the black fighters racing away with four Snorters on their tails. The three ships that had been trying to destroy him were circling down for a landing on the training field. He threw the switch on his radio and shouted into the microphone.

"All right!" he roared. "Sandy, Bev, Cy, Red! Let 'em go. We've got to get back to San Diego to report to Morton. Our job is done!"

Suddenly, something slammed him on the side of the head. For an instant he almost lost consciousness. Then he saw Bliven's feet lashing out at his head and he knew what Bliven was trying to do.

Bill tried to slide the overhead hatch back as Bliven's feet disappeared and his head rose above the edge of the cockpit. He locked the controls and dived backward as Bliven stood on the bucket seat and went head first over the side.

He looked over the side and watched to see his parachute open. Then, as he plunged on and on toward the earth, Bill saw he had no parachute. He saw him strike the earth and flatten out. The horror of it made him sick. He wondered if Bliven knew he had not attached his seat pack when he went over the side.

"All right!" he said again into his microphone. "V formation at ten thousand to get over the mountains. Is every one all right?"

They all checked in.

"Speed three hundred," he said. "That and what will follow pays our debt to Henderson."

## XII—REPORTS

A FEW MINUTES LATER Bill made contact with Tony Lamport on Barnes Field, Long Island.

"Listen carefully to what I tell you, Tony," he said.

"O. K., Bill. Go ahead," Tony replied.

"Did you get in touch with Morton?" Bill asked.

"Yes. He's waiting now to hear more from me."

Bill gave Tony an account of what had happened since they had left Barnes Field the night before. "Relay that on to Morton," he said. "Tell him he had better work fast. It's his job now. Tell Shorty to keep an eye on de Sabla every minute until Morton wants to put a finger on him. I think we can hang him for Henderson's murder. I don't want him to slip away."

"Shorty won't let him slip away," Tony said. "Is it all right to tell Colonel Sexton that you've cleaned things and he'll be able to go ahead? He has been sending a boy over to me every few minutes to find out about things. He's worried. Good news will help that wound of his."

"Tell him he doesn't have to worry any longer," Bill said. "If Morton wants to make contact with me he can reach me in San Diego. We'll be there in a few minutes. I'll get in touch with you again in a few hours. We all need sleep. We'll be back to-morrow night. Signing off."

"Signing off," Tony said.

"Hey, Bill!" Sandy's excited voice said in Bill's ear, as Tony's voice died away. "Do you mind if I don't go on to San Diego? We refueled this morning so I've got plenty left. I'd like to start on East now and pick you up at Omaha, Nebraska, to-morrow."

"Omaha!" Bill said impatiently. "You forget Omaha, Nebraska, kid. What you need right now is a flock of sleep."

"Why I'm fresh as a daisy, Bill, and I'm sure they didn't put more than three or four slugs through my Snorter," Sandy said. "I'll pick you up at Omaha, eh?" His voice was more than a little bit cajoling.

"No!" Bill roared. "What the hell do you want in Omaha?"

"Nothing," Sandy said sweetly. "I'm just going to pick you up there. I'm going to hop from here to a little town called Silver Nails, in Missouri. I promised Mort's sister, Martha, I'd drop in on her sometime. I'd like to tell her about things."

"I bet you would!" Red Gleason broke in. "And, boy, will you tell her about yourself!"

"Nuts to you, you red-headed oaf!" Sandy said. "What about it, Bill?"

"O. K.," Bill said wearily. "We'll see you at Omaha to-morrow."

"Toodle-oo, toots!" Sandy said to Red.

His Snorter came up in a climbing turn until it nearly stalled; then the nose dropped as he reversed his direction. In three minutes it had disappeared in the haze to the east, as Sandy laid the nose on Silver Nails, Missouri.



# LIGHT PLANES

(Continued from page 9)

of the club logged a total of 7½ hours in the air in their Cub "Flivverplane" in a single day. Fifteen students took part in this flight, which kept the plane in the air three-quarters of the entire elapsed time. The Cloudhoppers are among the most active chapters of the National Intercollegiate Flying Club of the U. S.

At present, the Akron chapter has 43 members, but judging from the activity and enthusiasm more and more students will undertake this extra-curricular activity. During the first 49 days of operation, 104 hours in the air were logged by the combined membership.

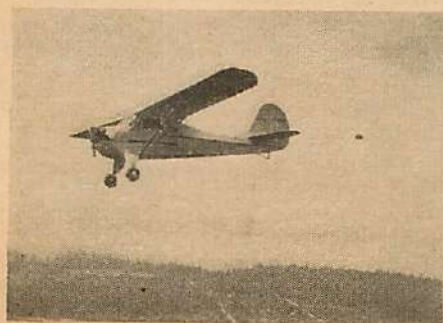
The 1937 National Air Races granted recognition to light planes in a most interesting event, which was based upon speed and on flying judgment. Every precaution was taken for the safety of the contestants. It was possible for a plane with a cruising speed of 65 miles an hour to compete on a par with a plane the cruising speed of which was 110 or 130 miles per hour.

This recognition and the essentially interesting conditions of the contest were such that this department will attempt to present an article covering it next month.

AS is always the case when a new movement begins to reach the point of attaining popular favor, a crop of new light planes is beginning to spring up in experimental trials.

Some of these new planes have turned in very interesting performances. Some of them are, of course, too revolutionary in design to admit of any judgment until they have logged a good many flying hours under varying conditions.

It is, nevertheless, true that each time AIR TRAILS has presented a picture of a new, tiny, reasonably priced plane, the editorial offices have been flooded with inquiries as to the availability of the planes and the actual time at which production is apt to start. In many cases production is a long way in the future, but as the months of 1937 roll



The Aeronca Model K in flight is a picture of beauty and reliability.

## WILL YOU BE ONE OF THE LUCKY 12 to win a prize in our new BIG CONTEST

1st PRIZE—5 tube midget radio set, complete.  
2nd PRIZE—Your choice of \$3 worth of supplies.  
Next 10 PRIZES—Your choice of any \$1 kit in our stock.

All you have to do is write 25 words or less on "WHY I LIKE TO BUY FROM IMPERIAL"

Make your letter as short as possible. Write your name and address plainly on the letter. Neatness and penmanship don't count. It is what you say that matters.

ALL ENTRIES MUST BE ACCOMPANIED BY AN ORDER FOR \$1 OR MORE.

Contest closes Oct. 31, 1937. Enter today.

### 24 HOUR SERVICE

18" Balsa 1/16x1/16, 100, 5c 1/16x3/16, 35 for 5c 1/16x3/16, 18, 5c 1/16x3/16, 15 for 5c 1/16x3/16, 5 for 5c 3/32x3/32, 30, 5c 3/32x3/32, 30 for 5c 3/32x3/16, 12 for 5c 3/32x3/16, 10 for 5c 3/16x3/16, 8, 5c 3/16x3/16, 6 for 5c 3/16x3/16, 3 for 5c 1/8x3/16, 1 for 5c 1/8x3/16, 4 for 10c 1/8x3/16, 8 for 10c 3/32x2, 7 for 10c 3/32x2, 6 for 10c 3/16x2, 3 for 9c 3/16x2, 3 for 10c 3" sheets or 36" lengths, double above prices; add 10c packing charge for 36" lengths. 12" Sheets 1/16x2 10 for 10c 3/32x2 8 for 10c 3/32x2 7 for 7c 3/32x2 3 for 7c 18" PLANKS 1x1 5c; 1x2 6c 1x1 3/4 9c; 1x2 10c 1x3 15c; 2x2 18c 2x3 23c; 2x6 39c 3x3 40c; 3x6 75c BAMBOO PAPER 2 for 15c	NEW! PLASTIC Balsa Lightest, strongest material made for cowlings, stream-liners, repairing, etc. Large can 25c TISSUE, AA All col., doz. 19c Silver, doz. 15c Superfine, wh. 5c WHEELS, wh. pr. 3c Brch B15a Cdu 3c 3/4 .61 .62 1 .03 .05 .07 1 3/4 .04 .08 .10 1 3/4 .07 .10 .16 3 1/4 .15 .30 PINE WHLS., pr. Both sides alike 3/4 4c; 1" 6c 1 3/4 8c; 2" 12c NOSE BLOCKS 2x3x1 .....1c 1x2x1 .....1c 2x2x1 .....2c 3x3x1 .....3c 3x3x2 .....8c 3x3x3 .....10c WASHERS 1 doz. 1/4 or 3/4 1c THRUST BEARINGS Small, doz. 15c Large, doz. 15c BUSHINGS 1/16 ...4 for 1c	INSIGNIA 24 and stripes 5c RUBBER 1/16 sq., 20 ft. 5c 3/4 flat .15 ft. 5c Skein .....50c 3/16 flat 12 ft. 5c RUBBER Large bottle 10c REED 1/32-1/16 2 for 1c 3/32-3/4 1 ft. 1c PROPELLER BLOCKS 1 3/4 x 3/4 5c-5c 1 3/4 x 3/4 0-5c 5x1 x 7 4-5c 5x1 x 8 3-5c 3x1 1/4 x 10 3c ea. 3x1 1/4 x 12 3c ea. 1 1/4 x 12 4c ea. 1 1/4 x 15 7c ea. SHEET ALUM. .0004x11 1/2 2 sheets 3c .005 in. 6x6 5c .010 in. 6x6 6c .015 x 6 6 8c 1/32 x 6 x 6 15c CLEAR DOG OR THINNER 5c per oz.; large bottle, 8c; 1/2 pt. 30c; 1 pt. 45c WOND WATER SPRAYER 15c
--	--	--

The winner of our First Contest: JOHN KINNACH, 1288 Linden Ave., MEMPHIS, TENN. who submitted 2554 words on the letters in IMPERIAL MODEL

### FREE POSTAGE

on all orders in U.S. east of Miss. for 75c or over. West of Miss., add 10c. Under 75c, add 10c. Canada, U.S. possessions, and foreign, over \$1.00, add 15c. Foreign under \$1.00, add 15c. No C.O.D. No stamps. SEND 2c POSTAGE FOR CATALOG

Your choice of one (only) of these FREE OFFERS with an order of \$1.00 or more

1. Large bottle clear cement and 60 1/16x1/16 x18 balsa
2. 50 ft. 1/8 flat rubber
3. 3 sheets silver tissue
4. Membership Pin in IMPERIAL MODEL CLUB which entitles you to 5% discount on orders of \$2.50 or more

Gas Model Catalog, 3c

20 IN. FLYING PLANS 10c-3 for 25c  
Sparrow Hawk, Boeing Trans. 247, Spad Chass., Vought Corsair, Curtiss Swift, W. Waco Cabin Biplane, Douglas Dolphin, Boeing P12, Fokker D-VII, S.E.5, Goshawk, Gee Bee, Boeing P26A, Monocoupe, Northrop Gamma, Fairchild 24 Cabin, Corben Super-Ace.

### SELECT ANY 1 OF THE ABOVE PLANS in 20" FLYING KIT POSTPAID 35c

COLORED DOPE 6c per oz.; large bottle, 10c; 1/2 pt. 35c; pt. 60c CLEAR CEMENT 5c per oz.; large bottle, 8c; 1/2 pt. 35c; 1 pt. 55c PROPELLERS Mach. Paul-O Cut Win 5" 4c 6" 5c 7" 6c 8" 7c 10" 8c 12" 10c 15" 15c BAMBOO 1/16 sq. x 12, 36, 5c 1/16 sq. x 15, 42, 10c DOWELS 1/16x3 .....5c 3/16x3 .....2 for 5c 3/16x4 .....2 for 5c 6-8-10-12-14 1/32 .....2 ft. 1c WOOD VENEER 20x30 .....1 for 10c 1/2" or 1" pks. 5c	CELLULOID 6x8 .....18c 12x16 .....18c 12x16 .....18c PROP. SHAFTS REAR HOOKS doz. ....8c CAMEL'S HAIR BRUSHES Small 3c; Lge. 5c Extra large, 8c NOSE PLUGS 3/4" .....12 for 8c DUMMY RAD. ENGINE (Cellu.) 1 1/2" d. 15c; 2" d. 20c 1 1/2" d. 25c ENGINE AND COWL (Cellu.) 1 1/2" dia. ....15c 3" dia. ....20c 3" dia. ....25c CELLULOID PATTS. per in. 3/4" to 1" .....18c 1 1/2" to 1 3/4" .....33c ALUM. TUBING 1/16, 3/32, 1/4 3/16 or 1/2 ft. 7c 3/16 or 1/2 ft. 10c MODEL PINS 10c; 15c; 15c TAIL LIGHTS 10c; 15c; 15c	SANDPAPER Doz. sheets, 5c MODEL STANDS Sm. 15c; Lg. 25c METAL 2 blades 3 blades 1 1/2" .....5c 2 1/2" .....10c 3 1/2" .....15c 4 1/2" .....20c 5 1/2" .....25c ALUM. COWLINGS 1 1/2" 15c; 2" 18c 2 1/2" 25c Specify whether anti-drag enclosed BOMBS 3/4" .4c 1 1/4" .7c 3" .12c 1 1/2" 10c 1 3/4" 15c PURSUIT MACH. GUNS 3/4" 14c or 15c each 5c GUNS WITH RING MOUNT 1 1/2" 10c 1 3/4" 15c WING AND TAIL LIGHTS 10c; 15c; 15c
---	---	--

Dealers: Send for Wholesale Price List  
IMPERIAL MODEL AERO SUPPLY  
416E McDONALD AVENUE BROOKLYN, N. Y.

toward a close, it appears that 1938 will dot the sky with planes from more than a dozen factories.

To restate in a small way what has already been said in more or less detail, the ideal flying club is comprised of approximately 20 members, so as to permit sufficient time in the air for each member.

The initial costs vary from \$25 to \$100 per member, depending upon the type of equipment purchased and the local conditions, including hangar rental and so forth. By calculating carefully the overhead and upkeep on the plane, it is possible to adjust the monthly dues to a very reasonable figure and to arrange the flying time costs somewhere between \$1.80 an hour and \$3.50 an hour, including the cost of the instructor, mechanics, overhaul, depreciation and upkeep.

The creation of a club in every community will mean that pilots' licenses will no longer be confined to those who desire to fly commercially, but will be extended to include the business man who desires to make short trips by air instead of by automobile, and also the man who wants his pilot's license from a purely sporting standpoint.

The appearance of flying clubs in a dozen high schools throughout the nation, as well as the rapidly expanding circle of clubs associated with colleges, is a very important item in this development. But there is no reason why it should be necessary for an institution to be associated with such a club. Initiative is the answer.

Any group of from 12 to 20 men who are interested in aviation can now obtain safe equipment reasonably; and can attain licenses and experience just as reasonably as they could have learned to drive a car at the turn of the century. Organization lowers cost barriers.

If you are in doubt as to the type of equipment you desire, get in touch with any of the manufacturers listed in the AIR TRAILS Light Plane Survey in the July, 1937, issue.

These manufacturers will be glad to supply you with data concerning their own planes and you will be in a position to make your own comparisons and your own choice. If there are any questions which you feel the editor of this department could answer, do not hesitate to write. We need a strong flying movement in America, and I want to help to build it.



## MODEL DESIGN

(Continued from page 55)

crowding at the bottom, less density at the top because of reduced molecules there.

Adhering to the idea of air molecules being small rubber balls, we can explain the mechanics that occur when a wing is moving through the air. Laboratory wind tunnel tests have shown the degree of lift, up or down, on a particular spot on an airfoil's surface. These forces are graphically illustrated for your comparison. Note that the strength of the lift, as well as its point of concentration on the wing section's upper surface, varies with the change of angle of attack. The graphs show the variation in lift, but the question is: how did they come about?

To explain we must again imagine the air molecules and follow their actions as they approach the moving wing and pass around it. Moreover, we must review the facts of air molecules and air itself.

Air has body and weight and behaves like a fluid. Once started this fluid tends to keep in motion, and in doing so disturbs the surrounding air. The reaction of the air molecules on the wing is as follows: actually the molecule is at rest and it is the wing that is moving. In a wind tunnel the wing is at rest and the air is moving. For practical reasons this is necessary. The action is the same, but it is simpler for explanation purposes to have the molecule at rest. As the wing moves forward it forces each impeding molecule out of the way. The secret of flight lies in the fact that in displacing the air molecules from its path the wing is forced upward by the resulting reaction; each molecule is made to exert this upward pressure. This is accomplished by setting the wing at an angle.

If you assume that the molecule is in a fixed position you can easily duplicate the generation of lift by the experiment in the illustration. The molecule, however, is free to move in any direction. In the case of the inclined wing the molecule is forced downward, coming in contact with other molecules which resist its passage and retard its movement until it reaches a stationary point. We know that the instant the molecule becomes stationary the wing is forced to climb up and over it. Naturally, a single molecule cannot support the weight of the wing, but, if we were to multiply the resistance of each molecule to its neighbors by the millions of other molecules affected, the existence of a stationary point for the wing to work on is evident.

Keeping the above explanation in mind, the difference in strength of forces, as shown for the bottom of the airfoil, can be explained. The reason

that the forces are greater at the bottom is that the molecule is given its greatest blow when it comes in contact with the wing. Strike a golf ball and it tends to stop the club, the resultant reaction giving the ball an approximately horizontal flight. However, the air molecule is forced downward, its reaction being converted into lift by the time that it passes beneath the trailing edge. If the trailing edge is given a farther downward swoop, the passing molecule will again be struck downward, resulting in a further increase in lift. Thus it is that the undercambered sections are responsible for more lift. Actually, the forces shown in an upward direction are equivalent to the power required to force the air downward. The air on the bottom of the wing is in a state of compression since the angle of the wing causes the crowding of molecules. With this compression on the bottom all that is needed is a reduction of pressure on top and an ideal lifting condition will result.

The upper, curved camber produces this reduction of pressure by forcing each passing molecule to travel a greater distance to keep up with those traveling beneath the wing. By traveling faster the space between them is increased and the pressure of each on its neighbor reduced. With this reduction of pressure it is a natural action for those molecules crowded beneath the wing to force it upward. It is hard to believe that the pressure is lowest at the front when the section is angled; the molecules here have an upward swing and should be in a compressed condition. The explanation is that the leading edge greatly increases the speed of the passing molecules; behind this high point there is an abrupt drop which the air must fill. In its hurry to do so it is drawn rapidly by the leading edge. The accelerated air slows down as it approaches the trailing edge. Those of you who have studied physics will remember that the higher the velocity, the lower the pressure.

Imagine an army approaching a hill. They are safe when protected by the crest, but the moment that they are over it they must clear it fast and at the same time cover the other side. Imagining that each dot on the illustration represents a soldier, note the crowding at the base of the hill when moving at normal rate. Then, note the thinning in the ranks as they skim over the hill and the reconcentration when again on the level. These conditions exist when the wing is set at a normal angle. If this angle was increased a greater lifting force would be obtained, but at a greater expenditure of power.

This condition of increasing the wing angle and increasing the lift and power required ceases at approximately a twenty-degree angle; beyond this angle the wing begins to waver. A glance at the drawing will show the condition of

the air as the wing stalls. Note its turbulence as it curls back. Once the smooth air flow is gone the pressure on the top of the airfoil is reduced. The only lifting factor now left is the lower portion, but the turbulent air above the wing acts as a gigantic air brake. It is nearly impossible to force the wing through the air with normal power while in this condition.

While racers appear to climb almost vertically, it must be remembered that their excessive power really allows them to fly at an angle of attack which is still normal because the flight path of the ship is actually upward. The model flight path is nearly horizontal, regardless of the angle the ship may assume. Relative wind is a vague term to most of us, so a further explanation is necessary.

The relative wind is the direction of the air stream which reacts on an airplane at any given moment. Ordinary ground wind has no influence on the ship when it is in the air. Air is one body and moves as a mass. If enclosed in a gigantic bowl, the plane could be traveling at maximum speed but would still be losing ground if the bowl should be moved backward at a greater speed than that of the plane; if moved at an angle the plane would seem to be drifting. Once in the air the direction of the wind has little effect on the angle of attack. Only when there is a sudden change of air direction—a gust or down current for example—does the wing encounter a different angle of attack.

At a zero angle of attack there is no compression on the bottom if it is flat, but the upper curve still provides a reduction in pressure and atmospheric pressure does the pushing up. If the airplane goes fast enough the lift at this setting will keep the plane in the air. In fact, the modern high-speed airliners use sections with slightly upturned trailing edges. Should you wonder how they can manage to keep flying, remember that speed is the answer; it is merely a matter of striking as many molecules of air in the minimum amount of time.

The setting of the airfoil may be at a negative angle. From the foregoing discourse you will readily understand what happens. The leading edge, being at a severe negative angle, creates a downward compression pressure. The lower camber is also so set as to produce a reduction of pressure which pulls the airfoil down. The upper curve still has small traces of pressure reduction, but it is inconsequential. This wing setting in flight may result from a positively set tail which tends to nose the ship down or when the ship hits a disturbing gust. However, the upper surface continues to lift when the wing is set at a comparatively small negative angle.

These explanations are not couched in scientific terms, but the actions are explained by easy-to-understand examples.



## MURDER AT 30,000

*(Continued from page 12)*

mask lined with fur into which fitted their oxygen masks, completed their equipment. Their goggles were coated on the inside with anti-freezing gelatine that would prevent ice from forming inside them up to minus sixty degrees Fahrenheit.

"Your little Beatrice would never know you now," Varney said as he started to put on his mask.

"She evidently doesn't want to know me," Charlie snapped.

"Listen, guy," Varney said. "What's on your mind? Is Bee—"

"Let's not mention her," Charlie said.

"But hey! Listen!" Varney began.

"Get on your mask!" Charlie snarled, "or you won't be able to get it on."

A moment later they "cracked" their oxygen flasks and inserted the tubes in their masks. The bag had begun to climb again.

They could communicate with each other only by motions. But Varney Beach knew, without words, that something was wrong. He knew for the first time that Charlie Martin was no longer his friend.

He determined to watch Martin's every move. He knew that Martin, like himself, had a heavy automatic in a holster underneath his leather suit.

He looked at his compass and saw that a new current of air was carrying them in a northerly direction. For a moment he considered valving the gas out of the huge bag and taking it to earth. He made a motion toward the gas valve cord and felt Martin's gloved hand close over his wrist. He looked through Martin's goggles into his flaming eyes and dropped his arm to his side. He was certain now that Martin had some deadly plan in the back of his mind.

The sun was riding on the crest of the hills to the west as the northerly wind increased in volume and the altimeter climbed to twenty-five thousand feet. The air was becoming more and more thin and they were gulping oxygen into their lungs through their tubes. As the sun disappeared, to leave a panorama of purples and mulberry shades, a gale caught them again.

Martin released the sand from two more sand bags but the lessened weight did no good. The bag plunged down and down seeking equilibrium. They were at fifteen thousand feet and the night was as dark as the inside of a dungeon when Martin ripped off his oxygen mask.

"What the hell's the matter with us?" he snarled. "She doesn't have any lift."

"Cold air," Varney said. "We're going north fast. If we can keep her in

the air we'll win this race without half trying."

"To hell with the race!" Martin said. He had only one thought in his mind and that was to eradicate Varney Beach. He had entirely forgotten the race.

Throughout the long night they took turns standing two-hour watches. Varney, however, never closed his eyes when it was his turn to curl up on the floor of the basket. Instead, he watched Martin.

When dawn crept out of the east they had only four thousand feet under them and the current of air that had picked them up at nightfall was still carrying them north. Tiny lakes sparkled in the verdant foliage beneath them. They knew they were over Canada—somewhere. They had no maps to tell them their exact location, and they passed above no towns.

"How far would you judge we've come?" Varney said to Martin.

"I can't judge," Martin said.

"We ought to pick up a small city or town soon," Varney said. "Then we'd better make a landing."

"That's right," Martin said sourly.

But they didn't pick up any small cities or towns. After a bit, even the houses disappeared and they were over a forest of hills stretching on and on interminably. They noticed that it was becoming more and more cold and the cold was contracting the hydrogen in the bag. They dropped their drag rope over the side to stop the sway and studied the country below them. After a time they both knew they had passed over the last of the settled regions of northern Canada.

"We're in a jam, fella," Varney Beach said. "About the only thing we'll find up here will be Indian trappers. Keep your eyes open for any sign of human life. We've got to land."

"In those trees?" Martin sneered.

"We'll never get out of here if we don't get down quick," Varney said. "We're riding a fifty-mile wind. The country is becoming more and more wild."

"All right, smart guy," Charlie snarled. "Let's see you sit her down."

"Listen, Charlie," Varney said. "What the hell is biting you? You've been as sour as a vat of vinegar ever since we took off. We're in a tough spot, guy. The only way to get out is to work together. They'll find our bleached bones up here if we don't."

"What if they do?" Charlie Martin wanted to know.

Varney studied him for a moment through half-closed eyes. Then he shrugged his shoulders and reached for the gas valve cord. He opened the

valve a half dozen times for short intervals. The big bag suddenly began a downward race.

"You're going to land all right!" Martin shouted. He jumped for the sand-bag rack and saw that all the bags were empty. He ripped the rack itself loose and threw it over the side to lessen the speed of their descent. The loss of gas, flapping of the slack balloon and its failure to parachute, added to their momentum.

The side of a mountain was racing toward them as Varney threw out the oxygen cylinders.

The drag rope whipped in the tops of the trees, rested on them for an instant and gave the bag enough additional lift to clear the tip of a rocky ledge.

"Rip her!" Varney screamed at Martin as the trailing drag rope lessened their speed.

Martin leaped for the rip cord and ripped the panel out of the side of the big bag with one powerful jerk. The imprisoned gas rushed to freedom when they were sixty feet above the ground. The wicker basket seemed to drop out from under them as it plummeted toward the tops of the trees.

"Up on your toes!" Varney shouted.

The basket whipped the top of one tree and was dragged into the next by the momentum of the collapsed bag.

The world became a black void to Varney Beach as they crashed into the next tree. His face was flattened against the rim of the basket and he hung half in and half out of it.

Martin picked himself up off the floor of the basket and tried to drag Varney back inside. But his strength was not enough. He wiped the blood out of his dazed eyes and saw that they were hanging thirty feet above the ground and in such a way the basket might be dislodged at any moment. He sat down and tried to gather his thoughts. His eyes roamed around the basket and the sight of Varney Beach brought his senses back. He tried to rise again so that he wouldn't cause the basket to sway loose and drop to the ground.

There was murder in his heart as he pulled at Varney's inert body. Both blood and perspiration were cascading down his face as he managed to snake him back inside the basket. He saw there was a lump half as large as an egg on the right side of Varney's head.

"I wonder how she'd like you if she could see you now?" he asked the unconscious form beside him. "This is just what the doctor ordered. I'll tell 'em you were killed when we crashed," he went on as he dug his automatic out of its holster.

"But I won't shoot you, pretty boy," he raved. "I'll just crush your face in and nobody can call me a liar."

He took his automatic by the barrel



and measured Varney's head with his eyes.

He raised the butt of the automatic level with his shoulder when Varney's eyes opened. The injured man groaned, stared into Martin's face an instant, then slumped again.

Martin could feel cold, clammy perspiration oozing all over his body as that one glance made him realize what he was about to do. His hands began to tremble so that he could hardly hold the automatic. He shoved it back into its holster.

"I'll get him down on the ground and do it," he told himself. "Then I'll say he fell out of the basket."

The next time Varney opened his eyes he spoke to him. He had decided by now to tell Varney why he was going to kill him. He had decided that there would be no risk in shooting him and burying the body. No one would ever be able to get in there to find the grave.

"Do you know where you are, Varney?" he said as Varney's eyes flickered open and rested on his face.

"I know now," Varney said through lips that were cracked and bruised. "It took me a long time to figure it out. Things are still a little hazy. I must have taken a terrible crack on the conk."

"You did," Charlie said. "I'm going to try to patch your face up a bit."

Varney licked his lips with his tongue and said, "Do you have any water? My mouth and lips are parched. I wish Bee was here."

He began to laugh, then stopped abruptly.

"My lips feel as though they were all smashed," Varney said.

"They are," Charlie snarled as he opened a canteen. "You stuck your face into the rim of the basket as we crashed."

"Bee could fix up my lips for me," Varney said.

"I'll fix them for you," Charlie said. "You remember the last time I drove East and then made the trip back home without a stop?" Varney asked.

"I remember!"

"Bee fixed my lips for me that time," Varney said.

Charlie was gazing at him with the eyes of a madman now.

"How did she fix 'em?" he asked quietly.

"Ha! Ha!" Varney said. "It was funny. It was funny you didn't notice it."

"Notice what?"

"The red lipstick on my mouth," Varney answered. "My lips felt the same

way they do now after that long drive and I told Bee about it. She said she could fix 'em."

"She fixed 'em, did she?"

"No," Varney said. "I did it. She told me to go in the bathroom and get some white pomade or something to rub on 'em. I didn't bother to light the light in the bathroom—just fished around until I had what I thought was the pomade. I rubbed it on my lips and they felt better immediately. I didn't notice until I got home that evening that I had rubbed red lipstick instead of white on them. I looked like a gal from the front row of the Follies."

"You did, eh?" Charlie whispered. He was trembling with relief.

"Hey, fellah!" Varney said, and he tried to lift his head from the ground. "What the hell's the matter? You're the one who ought to be lying down here. I'm O. K. now."

"Right, guy!" Charlie said, and there were tears in his eyes. "I—I'll get hold of myself in a minute. Just the jitters. We'll have to find some Indians to help us get out of here. But we'll make it, fellah."

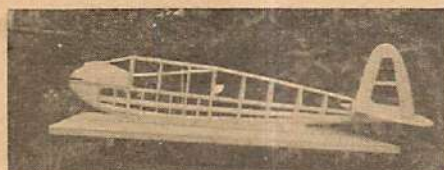
He reached for Varney's hand and shook it.

"Sure, we'll make it," Varney said.

They were friends again.

## INSPIRER

(Continued from page 48)



Those who are particular about design will be pleased with the fuselage lines.

rapid strokes when applying dope. After the pores of the silk have been filled, add several more coats of full-strength dope for a smooth, shiny appearance.

When doping the tail surfaces be sure to weight down the edges to prevent warping. Dope only one side at a time, keeping the edges of the stabilizer pressed against a flat surface.

Use pigmented dope for decorations. Enamel finishes look attractive, but their appearance is offset by the increase in weight. Enamel finishes are likely to add as much as  $\frac{1}{2}$  pound to the model's weight. The original model has a red-orange wing and tail surfaces. The completed model was rubbed down with fine sandpaper and given a coat of clear dope to give it a glossy appearance.

### FLYING

The model should balance about  $\frac{1}{3}$  back from the leading edge of the wing. The battery box can be shifted to obtain

this balance. The tail is set at zero incidence—both elevator and rudder. The tail is attached with rubber bands stretched around the fuselage and over the top of the elevator and anchored to the fuselage at the hook in the extreme rear. If changes in the rudder setting are necessary, they can be made by shifting the whole tail unit.

The wing is attached to the fuselage with rubber bands. The necessary incidence of the wing is built into the fuselage, so the wing can be mounted flat atop the fuselage. Check the accuracy of your construction. The front of the wing should be  $\frac{3}{16}$ " higher than the rear.

If the model circles too lightly to the left or right with full power, a slight change of the rudder will remedy it. Check your wing carefully, to make sure it is free from warps, before you change the rudder. The original model had a slight amount of downthrust. But this was later removed and did not affect the flight to any noticeable extent. The model circled with torque in wide circles.

No washin or washout is used. They seem to have the same fatal effect as a warped wing. They prove to be too sensitive for gas models and a straight wing is to be preferred. All adjustments can be made by offsetting the thrust line and by changing the rudder setting.

In case your wing has developed a

warp, it can be removed in the following way: dope the warped portion and hold the wing in a twisted position, to take out the warp while the dope dries. 2 persons are needed for this operation.

### PERFORMANCE AND SPECIFICATIONS

The model was almost lost on its first flight. And later the same day it turned in 6 flights without any adjustment. The highest time was about 6 minutes, with 1-minute motor run. The average for the 6 flights was about 3 minutes, with an average motor run of 40 seconds.

The model weighed about 4 pounds.

Wing . . . . .	16 ounces
Tail . . . . .	3 "
Motor (complete) . . . . .	19 "
Fuselage . . . . .	24 "
Total R. T. F. . . . .	3 pounds, 14 ounces

### MATERIAL

#### Wing

2 pieces—leading edge— $\frac{1}{4} \times \frac{1}{4} \times 36"$
2 " —trailing edge— $\frac{1}{4} \times 1 \times 36"$
2 " —front spars— $\frac{1}{8} \times 1 \times 36"$
2 " —rear spars— $\frac{1}{8} \times \frac{3}{4} \times 36"$
8 " —sheet balsa— $\frac{1}{8} \times 3 \times 36"$
1 small piece birch plywood for joining wing halves.
2 pieces—wing tips— $1\frac{1}{2} \times 3 \times 12"$

#### Tail Surfaces

3 pieces—sheet balsa— $\frac{3}{16} \times 3 \times 36"$
3 " —sheet— $\frac{1}{16} \times 2 \times 36"$

#### Additional Items

$\frac{1}{4}$  pint of cement, 1 quart of dope, 2 ounces trimming color, pint of colored dope, 3 yards of silk or bamboo paper.



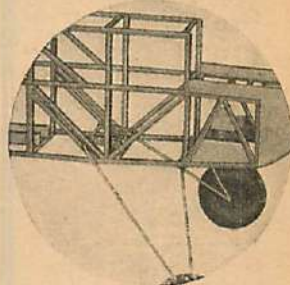


# AIR CHIEF

## IDEAL'S I.G.M.A.A.

### TROPHY WINNING

#### GAS MODEL



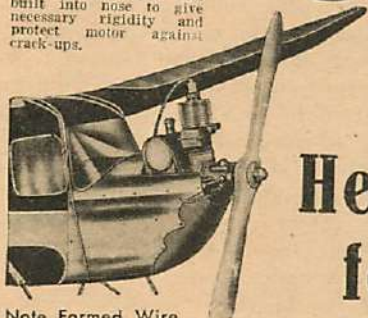
**FLEXIBLE SPRING  
SHOCK-PROOF  
LANDING GEAR**

Landing shocks are softened by this specially constructed spring landing gear anchor. Should wheels receive a severe shock in landing it will be taken up by the special spiral springs anchored inside of fuselage, which permit the landing gear to slide backward, thus eliminating damage. All shocks are softened by these springs instead of being transmitted to the fuselage itself.

#### DOUBLE DIHEDRAL OF WING INCREASES FLYING STABILITY

Wing is constructed in three sections—center section and two end sections. Center section frame work constructed of hard, strong Bass wood; ends and tips of Balsa. Dihedral is constructed between center and end, and additional dihedral designed into extreme tips of wing, thus securing the double dihedral which all builders agree is necessary in large models.

Note engine mounting with high thrust line. Solid balsa block shaped and built into nose to give necessary rigidity and protect motor against crack-ups.



Note Formed Wire  
Hooks Holding Rubber  
Strands Over Wing.

61 in. WING SPAN  
LENGTH: 39 in.  
WEIGHT: 2 1/4 lbs. (without motor)

## Here's the Gas Model You'll Want for Sport and Contest Flying!!

### PRIZE WINNING MODEL BY STEPHEN KOWALIK

Winner of Junior Motors Trophy  
for Consistency in Flight.

This is the actual model, designed by Stephen Kowalik, which took first place in the I.G.M.A.A. Contest, May 9th, 1936, for greatest consistency of flight with the greatest time for any three official flights—average six minutes for each of three flights using 5/16 oz. gas. Nearest competitor averaged three minutes per flight. This same design took 5th, 6th, 7th and 9th places in the same contest. Stephen Kowalik has designed this duplicate of his Trophy Winning Model so you can build an exact duplicate for yourself!

### GAS MODEL EQUIPMENT NECESSARY ITEMS at LOW PRICES

**STREAMLINE TUBING FOR GAS MODELS**  
Perfectly and Accurately shaped. Just right for landing gear struts, wing struts and motor exhaust stacks. Made in Brass and Duralium in five sizes as Listed Below.

Size	Brass	Dural
1/4" Size, per 6" Pce.	\$0.12	\$0.16
5/16" Size, per 6" Pce.	.13	.18
3/8" Size, per 6" Pce.	.14	.21
7/16" Size, per 6" Pce.	.17	.24
1/2" Size, per 6" Pce.	.18	.26

(Add 10% extra for postage)



**IDEAL  
TRUE  
CUT  
KNIFE**

Razor edge blade securely fastened in long, easy-grip handle. Sharp point cuts Balsa like butter; follows intricate curves easily, fine for any cutting purpose. Each—15c Postpaid. Extra Blades—three for 10c



#### BATTERY CASE

Gas Model Battery Case Most convenient holder for round flashlight batteries. 6 in. long, 1 1/2 in. diameter; metal screw caps on ends with terminal fittings for connecting wires securely soldered in place. Coil spring included for inside of case. Weight 2 1/2 oz. Each 35c. Postage 5c extra.

#### LANDING GEAR STRUTS

Efficient Flight Timer Adjustable from 0 to 45 seconds. Not affected by dampness. Easily installed and positive operation. Size 1 1/2 x 3/4 x 1 1/16. Weight 1 5/16 oz. Vibration-proof, accurate. Price \$2.00. Postage 5c extra.

Ready formed of 3/32" wire, two sections joined together as illustrated. Threaded ends complete with nuts ready to mount and attach wheel. Suitable for any gas model. Complete..... 50c



#### Build This 24 Inch Model Ship CUTTY SARK

The celebrated sailing ship with an unequalled record for speed. Building it is easy and real sport for all model airplane builders. Construction Kit contains Fully Carved Wood Hull, Balsa Decks, Life Boats, Anchors, Bits, Chocks, Steering Wheel (all of Cast Metal) Chains, Masts and Spars, Sail Cloth Rigging, Colored Lacquer, Sand Paper and Full Size Plans with instructions. Complete Kit..... \$2.00

Postage 15c extra

Kit contains all the above special features which can be incorporated into this model, including selected Bass wood strips for fuselage and wing center section, all necessary hardware, rubber strands, gas model cement, bamboo covering paper, etc. 2 sheets are included reproducing every detail of the Model in Full Size Pattern-Plans with detailed instructions for building the entire model, so easy anyone can follow them. This Kit is absolutely complete with every feature mentioned above. Compare with any Kit on the market and convince yourself of its dollar for dollar value.

Price.....

Send for Catalog of Model Airplanes and Boats... 10c

**MODEL AIRPLANE DEALERS:**—We have delayed bringing out a Gas Model until absolutely sure the model kit we presented would represent the utmost value possible to produce for the money. Here it is! Write for dealer discounts and get full particulars on this opportunity for profit!

**IDEAL AEROPLANE & SUPPLY CO., INC.**  
17 West 18th Street, New York, N. Y.

Pacific Coast Branch:  
Model Boat and Aircraft Co., 1356—5th Ave., San Diego, Calif.  
South Africa Distributor:  
City Book Agency, 70 Von Brandis, Johannesburg, S. A.

### COMPLETE KIT FOR ENTIRE MODEL

**\$6.00**  
WITHOUT  
MOTOR

Ask Your Dealer or  
Order Direct Postpaid



## BATTLE CRUISER

(Continued from page 25)

compartment. The tail wheel disappears into the bottom of the fuselage. All are operated electrically. An auxiliary power plant driving nine electric motors furnishes the energy actuating these units as well as the engine starters, lights, and radio. This relieves the main engines of the extra load and permits their full power to be concentrated on the task of driving the propellers. This independent power source has another advantage: it permits continued radio transmission on the ground with one or both of the main engines inoperative. The value of this feature is apparent in case of forced landings.

The wings of the new fighter are of full cantilever construction and are fitted with flaps to slow down the landing speed. Integrally built fuel tanks occupy the space between the spars outboard of the motors and eliminate the fire hazard caused by carrying gasoline in the fuselage or engine nacelles. Landing lights are recessed into the leading edge of the wings, well out toward the tips.

The performance data on the Bell XFM-1 is, of course, a war-department secret. However, considering the new fighter's size, design and horse power, I should say that she will do close to 300 m.p.h. Her service ceiling is said to be well over 30,000 feet, and I imagine she lands at around 55 or 60. After passing the usual experimental tests given by the Material Division at Wright Field, the XFM-1 will be assigned to G. H. Q., at Langley Field, for extended service tests. A complete new set of tactics will then have to be devised to meet the unusual combat

possibilities of this radical fighting machine.

During wartime operations, the Bell's job will be to escort our new "Flying Fortresses" on long-range bombing missions and to intercept and destroy enemy ships of the same type. The new fighter is very well fitted to perform these duties. She has an edge in speed of at least 50 m.p.h. over the fastest of the big egg-layers. This is a vitally necessary advantage if she is to overtake and maneuver around her huge victims. In the event of failure in her first attack, the Bell must be able to recover altitude and once more overhaul her quarry in order to successfully complete her mission.

The tremendously powerful armament carried by the XFM-1 is intended to counter the current practice of mounting a long-range cannon in a turret atop the latest bombardment planes. These cannons enable a squadron of raiding bombers to throw a veritable barrage of high explosive shells at attacking formations of pursuit ships. Unless the attacking single-seaters are armed with weapons of similar power, they can be shot out of the sky before ever coming into machine-gun range of their objective. The Bell Fighter mounts two such cannon, plus four machine guns. The concentrated fire of so powerful a battery should prove deadly at both long range and short. In action against hostile single-seaters, the wide-angle, flexible mounting of the guns permits fire against several targets at once. This, coupled with the caliber of the main battery, makes the Bell a terrible antagonist.

Altitude has been called the key to success in aerial combat. During the World War a ceiling of 10,000 feet was considered pretty good. To-day, fight-

ing at 25,000 feet is commonplace and many pursuit ships far exceed this figure. England's Gloster "Gladiator," for instance, attains a service ceiling of 32,000 feet and the French Dewoitine-513 climbs 37,000 feet above sea level. Gossip says the new Bell Fighter has a combat ceiling of nearly 8 miles! If this is so it is largely due to the excellence of the army's exhaust-type supercharger developed during the past three or four years. These air-pressure "builder-uppers" have been thoroughly proven in service on the Consolidated two-seater fighters and the army's new stratosphere Lockheed. In order to permit the crew of the XFM-1 to fly and fight freely in the freezing, rarefied air of high altitudes, all compartments are sealed and provided with a continuous circulation of warmed air of proper density. This is supplied either by separate superchargers or through the introduction of oxygen.

Short cruising range has always been the Achilles' heel of the single-seat fighter. Three hours of flying is still about the limit of most modern pursuit planes' capabilities in this respect. The Bell, however, is a winged horse of another color. She is a big ship compared to the conventional pursuit job, approximating the Lockheed transport in size and carrying power. This means that the new fighter is capable of taking off with an enormous load of fuel. It has been whispered that she is able to fly non-stop from coast to coast, or even to Hawaii. This great cruising radius was deliberately designed into her in order to fit the fighter for her duties as escort on long bombing raids. Another advantage it provides is the ability to fly far out to sea and intercept attacking air fleets before they come within striking distance of our shores.

## HEINKEL He51

(Continued from page 56)

### MODEL BUILDING DIRECTIONS

Material sizes are listed in the Bill of Material. Refer to it when necessary.

Square a soft balsa block to the required outside dimensions of the fuselage. On its largest side mark the body profile and cut away the surplus wood. Draw the top outlines of the fuselage and again trim away the excess balsa. Using the cross sections given, shape the fuselage to its final contours and carve a slight cockpit declivity. Sand to a satin finish.

Pencil the tail outlines on soft sheet balsa, trim, streamline and sand. The stabilizer, if made in one piece, must be countersunk into the fuselage. If made in two pieces, headless pins will afford sufficient support.

Having outlined the wings on soft sheet balsa, trim and shape in accordance with the rib sections given. Sand



Richtofen, after whom the crack squadron is named.

to a smooth finish. The bottom wing panels are attached over headless, countersunk pins. The pointed, center-section struts are inserted and after the top wing has been fastened in position the model is inverted. The outer struts are

shaped from  $\frac{1}{16}$ " sheet. They are worked into position while the model is held inverted.

The wheel legs and pants are carved from block and sheet balsa scraps. Assemble the landing gear to the model while held in the inverted position.

Check alignment of flying surfaces and landing gear before painting.

### PAINTING THE MODEL

Give the entire model a coat of white shellac, clear varnish or clear dope to fill the pores before painting. The top coat is white. Either an enamel dope or lacquer should be used.

Mount the propeller on a pin, free to turn.

### BILL OF MATERIAL

- 1 block 6x1 $\frac{1}{2}$ x $\frac{7}{8}$ "
- 1  $\frac{3}{16}$ x3x24" sheet balsa
- 1  $\frac{1}{16}$ x2x12" sheet balsa
- 1 vial cement
- clear dope or varnish or white shellac
- paints, sandpaper, etc., as required
- 1 pair wheels



## CHINESE FLYING

(Continued from page 36)

there is very little reasonable doubt of this fact. Here is the reason why many a seasoned air traveler quakes at the thought of seating himself in a plane to be flown by an oriental pilot. They know what they are supposed to do, but seldom do they develop the continuous place awareness, the almost infallible feeling for position in space, that would tell them, without deliberate thought, precisely when to make the correct motion. I might say that they calculate where they are, and after doing this they rapidly form a conclusion as to what to do about it. With the expert pilot these two actions are simultaneous, and almost as if instinctive.

All visual perception of distance is dependent upon perspective. Stand in the center of a room and estimate the distance to a wall, and you are exercising your sense of perspective. Lacking that sense entirely, you would never be able to calculate any distance with certainty merely from the colors and shapes of objects. Lacking it only to a certain degree, you would be just that much less competent to perceive distances and deal with them. It is this deficiency which causes many Chinese to "pancake" their planes with a frequency that would soon find an American pilot, in America, out of a job.

A friend, to whom I happened to mention this curious failing of the Chinese, suggested that it would be possible to find abundant evidence of the same ignorance of perspective, or disregard of it, in Chinese art. Perhaps this is true. Chinese painting is very often fine decoration, but it is not very often anything more. There is ingenuity in it; there is feeling; there is craftsmanship—but there is, predominantly, a lack of depth-consciousness in the conception that points to a basic inability of the artist to perceive distance accurately. Apparently, the members of the race who fly rather than paint have this same inability, and take it into the cockpit with them.

At least this seems a plausible thought to me, and not unlikely the direct cause of many a Chinese field having been strewn with the wreckage of a fine ship which had been taken off in good condition. That the fault is in the men, and not in the ships or in any feature of training, was brought home to me through my acquaintance with a young Chinese, born and raised in California and thoroughly educated to the air in a school of thought and practice second to none. All his technical knowledge never took him beyond the dangerous half ability of the novice in so far as handling a plane in the air is concerned, nor did long experience teach him to fly with perfectly coordinated control.

Nobody knows exactly to what extent bad flying is characteristic of Chinese military pilots. Nobody knows, in fact, very much of anything about military aviation in China, with the exception of the men who constitute it. Secrecy concerning all phases of military aviation is so intense there that the nonmilitary plane is not permitted to land at a government airport—even in extreme emergency. To my knowledge one unfortunate commercial pilot disregarded this regulation and set his Curtiss Condor down on the military field at Hangchow, for what seems the sufficient reason of saving his skin. The result was that the plane was not permitted to take off from the field, but had to be dismantled and shipped out in crates under government supervision.

Some news gets through even the most rigid censorship and the most inflexible guard. When a large detachment of the Central Government air force was assigned to duty in the bandit-suppression activities of the early part of 1935, it became known that in their haste to return to Chungking, the pilots on several expeditions dropped their "eggs" on their own troops. The field at Chungking is used by both military and commercial planes, and there is ample opportunity there for the outsider to watch military planes being set down regularly in a manner of which a novice would be ashamed. The "landing" made at an altitude of ten feet is by no means uncommon. And at Fei Chi Chang I have seen a Chinese pilot bring his fighter down and "undershoot" a field having a two-thousand-foot runway, smearing the ship and himself all over the field.

From what I have seen of the Chinese air force in action, I think it is not unfair to say that a man who respects good equipment will invariably be all but nauseated at witnessing their mistreatment of it. Though I cannot vouch for the story personally, I have heard, on good authority, that the plane I saw destroyed at Fei Chi Chang, with its pilot annihilated, was one of thirty-five new fighters sent into Szechuan at about that time, and that on their departure not long after this incident only five were suitable for service.

In the event of a serious war involving a western power, it is my belief that the air force of China would be revealed as one of the most ineffectual now functioning. It is not such because its planes are inferior, nor because of mismanagement from the ground; but for the simple and yet adequate reason that nature did not intend the Chinese to fly.

It is not absurd to think that their handicap may be overcome in time. Meanwhile, though no one can say just how much of the military aviation of China is being directed by imported minds and hands, I am confident that her commercial transport will for the most part be left definitely to foreigners.



AT LAST! Here is the greatest companion book on Aviation ever published in America. **AVIATION WONDERS OF THE WORLD** is simple, practical, comprehensive and pictorial! It covers everything in Flying. **31 Chapters** on Airplanes, Airships, Gliders, etc. Written in simple, non-technical language by world-famous aviation authority. A combined handbook, album and encyclopedia. **Heavily illustrated, including almost 100 FULL PAGE ILLUSTRATIONS** and numerous smaller pictures.

### This Great Book Contains These 31 Chapters

- 1—History of Aviation
- 2—Types of Aircraft
- 3—Description of Aircraft
- 4—Airplane Parts
- 5—Airships
- 6—Glider
- 7—Parachutes
- 8—Flying Instruments
- 9—Navigation Instruments
- 10—Engine Instruments
- 11—Aircraft Engines
- 12—Aerial Navigation
- 13—Formation Flying
- 14—Aerial Bombing
- 15—Air Stunts
- 16—Cataapults
- 17—The Stratosphere
- 18—Learning to Fly
- 19—Airplane Marks
- 20—U.S.A. Airplanes
- 21—English Airplanes
- 22—French Airplanes
- 23—German Airplanes
- 24—Italian Airplanes
- 25—Spanish Airplanes
- 26—Russian Airplanes
- 27—Japan Airplanes
- 28—Seaframes
- 29—Aviation Records
- 30—Historical Flights
- 31—Future Aircraft

### A Wonderbook of Flying

Here is everything you want to know on Aviation. Separate Chapters on Learning to Fly, Airplane Parts, Flying Instruments, Aerial Navigation, Aircraft Engines, Parachutes, etc. Other Chapters on Air Stunts, Formation Flying, Aerial Bombing, Stratosphere, etc. Chapters 7 to 18 practically comprise a flying course for beginners and average students of aviation.

### America in the Air

**AVIATION WONDERS OF THE WORLD** covers every important type of American plane! Amphibians, racing planes, autogiros, passenger airliners, trans-oceanic flying boats, training planes, naval and army aircraft, etc. All types explained with detailed information showing dimensions, power plants, weights, performance, etc. Each of the 42 most important types of American planes carries a **FULL PAGE illustration!**

### See Foreign Air Fleets

**AVIATION WONDERS OF THE WORLD** shows you the most sensational of all foreign planes. Attack bombers, multi-seat fighters, military transport planes, reconnaissance craft, freight carriers, long-range seaplanes, racers, pursuit and interceptor planes, etc. See the civil and military aircraft produced by England, France, Germany, Italy, Spain, Russia and Japan. Many of these are fighting in the present wars in Spain and China. The most amazing types are reproduced in **FULL PAGE illustrations**. All planes are described in pictures with detailed specifications.

### Chockful of Information

**AVIATION WONDERS OF THE WORLD** is fact-filled from cover to cover. Its 256 pages, bound in full cloth, include fascinating chapters and Pictures on History of Aviation, Aircraft of Future, etc. Answers all questions on speed records, distance and height statistics, historic flights of all kinds, epoch-making airplanes, etc.

## SEND NO MONEY!

Send name and address only. We will ship book at once. On Delivery, pay postman only \$1 plus a few cents postage. Or send \$1 now and save mailing costs. Money back within five days if not satisfied. (No foreign orders filled at this low price.)



## FREE OFFER

METRO PUBLICATIONS, Dept. 5311  
70 Fifth Ave., New York  
Send **AVIATION WONDERS OF THE WORLD** for free examination. On delivery I will deposit with postman \$1 and a few cents postage. If not satisfied I may return book within 5 days and my \$1 will be refunded.

Name .....  
Address .....  
City ..... State .....  
CHECK HERE if you want to save postage. Enclose \$1 with coupon & we will ship prepaid.



# MODEL MATTERS

(Continued from page 60)

## Stick Type (Senior)

1. Wallace Simmers, Chicago, Ill.	17:03
2. Walter Huguelet, Chicago, Ill.	12:02.2
3. Vernon Sears, Tulsa, Okla.	11:1
4. Robert Guilfooy, St. Louis, Mo.	9:56.6
5. Robert Hoffman	6:52
6. Richard O'Barski, Chicago, Ill.	5:06
7. Bruce Luckett, Tulsa, Okla.	4:33
8. Leo Wicklenshi, St. Louis, Mo.	2:41
9. F. J. Burgess, St. Louis, Mo.	2:29.5
10. Roy Marquardt, Burlington, Ia.	2:12.8

## Amateur Sweepstakes

1. Fred Zaiser	2:50.5
2. Herman Seltzer	1:25
3. Albert Maginot	1:16.1
4. John Dequarh	1:05
5. Morton Fitzpatrick	1:03.2
6. Fred Lakowski	1:02.6
7. Rishant Alda	1
8. Tony Schott	.76
9. Elmer Kenradi	.73.2
10. Gilbert Wehrenberg	.49

## Gasoline Event

1. Ray Marquardt, Burlington, Ia.	23:
2. Chester Peterson, Parks Air College	21:19
3. Ray Podolsky, St. Louis, Mo.	16:17.8
4. Charles Bleitner, St. Louis, Mo.	11:23
5. Bud Faulkner, Chicago, Ill.	9:31
6. Eldredge Kelsey, Brighton, Ill.	6:27
7. DeWitt Ross, Jr., Tulsa, Okla.	6:15
8. D. Franklin Farrar, Nashville	5:56.7
9. Harold Zabloudil, Burlington, Ia.	5:42.9
10. Louis Sutter, St. Louis, Mo.	4:37.2

## Stix-Baer & Fuller Grand Awards

Roy Wriston, Tulsa, Okla.

## Two-trip Winner on Chicago & Southern Airlines

Arthur Beckington, Rockford, Ill.  
Richard O'Barski, Chicago, Ill.

## Fuselage Type (Senior)

1. Charles Belsky, Chicago, Ill.	8:45
2. Harold Foester, St. Louis, Mo.	2:51
3. Roy Marquardt, Burlington, Ia.	2:51
4. Richard O'Barski, Chicago, Ill.	2:09
5. Bob Christie, Tulsa, Okla.	1:52
6. Wm. Elliot, St. Louis, Mo.	1:50
7. Paul Bowlin, St. Louis, Mo.	1:46.3
8. Wallace Simmers, Chicago, Ill.	1:46
9. Milton Huguelet, Chicago, Ill.	1:43
10. Lambert Frenzels, St. Louis, Mo.	1:26.2

## Mississippi Valley Contest

St. Louis, Mo.

Two new world records were set by Roy Wriston, 23, of Tulsa, Oklahoma, during the 1937 Mississippi Valley Model Airplane Contest held at the Arena and at Parks Air College in St. Louis, Missouri, Saturday, August 28th and Sunday, August 29th. Wriston set a new world record in Class "A" R. O. G. Stick Type, when his plane stayed in the air for 10:15 during the Indoor Meet. The former record was held by Joe Matulis of Chicago (9:59), who took part in the Mississippi Valley Meet also. Wriston's other record was in the Open Indoor Fuselage event, in which his plane set a new mark at 40:44.9. Readers will recall Roy Wriston as the designer of the "Diamond" in the October issue.

The 223 boys from 14 States that entered the 6th Annual Meet were favored with fine weather conditions. Bob Sommers, who acted as contest director for the first time, did a very successful job. Ralph Kummer and Dick Courtial, older members of the Stix, Baer & Fuller Model Airplane Club, acted as his assistants, while Hanns Kolmar handled the publicity of the meet.

2,500 watched the outdoor events held

at Parks Air College all day Sunday. Of course the gasoline event proved to be most exciting to spectators as well as to contestants. Roy Marquardt, of Burlington, Iowa, won this event with a time of 23:00. His plane crossed the Mississippi River and, in spite of an intense search, could not be located. Roy, however, received the huge chamber-of-commerce trophy for his flight. Chester "Chet" Peterson, a student at Parks Air College, was runner up in this event, with 21:19, while Ray Podolsky of St. Louis, Missouri, winner of the gas event for the past 3 years, had to be content with third prize this time. His plane stayed in the air for 16:17.8—a remarkable improvement above the record he set last year when his time was 10:16.

Two all-expense air trips on a Chicago and Southern Airliner to New Orleans and return were given to those boys gaining the highest points in Senior and Junior events. Richard O'Barski, 18, of Chicago, and Arthur Beckington, 14, of Rockford, Illinois, were the lucky winners. The silver trophy for the outstanding performance of the meet for the past 5 years has stayed in St. Louis. This time, however, this Stix, Baer & Fuller trophy has to travel all the way to Tulsa, Oklahoma, because there was no doubt that Roy Wriston was the hero of the meet. Besides setting his Indoor records, Roy won the Outdoor Stick Type (Open Class) with a time of 8:54.6. He also was second in the Open Outdoor Fuselage event with a score of 3:22.3. First in this competition was Jos. Matulis of Chicago with 4:2, and second and third in the Open Stick Type, behind Wriston, were Curtis Janke of Sheboygan, Wisconsin, with 6:59, and David Seltzer of St. Louis with 2:20.4.

The Mississippi Valley Meet is fast becoming one of the most important Model Airplane events of the year. It was cosponsored by Stix, Baer & Fuller Dept. Store in St. Louis, Missouri, the Missouri State Junior Chamber of Commerce, the Young Men's Division of the St. Louis Chamber of Commerce and Parks Air College. Among the donors of prizes were Stix, Baer & Fuller, the Junior Chamber of Commerce, Chicago and Southern Airlines, the St. Louis *Star-Times*, the St. Louis *Globe-Democrat*, San-Del Printing Co., and Maschmeyer-Richards Silver Co. Newspapers and radio stations cooperated beautifully with the sponsors of the meet. The 3 St. Louis papers devoted 2,041 lines to the event, while radio broadcasts were held for 4 days over various St. Louis and East St. Louis stations.

Sunday night all contestants were invited to a banquet in the mess hall of Parks Air College, at which Chas. C. Barnett, of the St. Louis Junior Chamber of Commerce, acted as toastmaster. Other speakers included Wm. Thomp-

son and Fred Parks of Parks Air College, Contest Director Bob Sommers, J. Walter Goldstein of Stix, Baer & Fuller and John Jacobsmeyer of the Aeronautical Department of the Chamber of Commerce.

## Results of the 1937 Mississippi Valley Model Airplane Tournament

Held at the St. Louis Arena  
August 28, 1937

Held at the Parks Airport  
August 29, 1937

## INDOOR

### Open Stick Type

1. Carl Goldberg, Chicago, Ill.	19:07
2. Joe Matulis, Chicago, Ill.	17:43
3. Curtis Janke Sheboygan, Wis.	13:42
4. Roy Wriston, Tulsa, Okla.	13:14
5. Marvin Schmidt, St. Louis, Mo.	10:17
6. Henry Goetz, St. Louis, Mo.	3:05

### Senior Stick Type

1. Milton Huguelet, Chicago, Ill.	20:17
2. Bob Christie, Chicago, Ill.	17:
3. Charles Stewart, Chicago, Ill.	16:51
4. Charles Belsky, Chicago, Ill.	16:11
5. Walter Erbach, Sheboygan, Wis.	15:33
6. Howard Negri, Chicago, Ill.	15:27
7. Edward Levy, St. Louis, Mo.	15:22
8. Richard O'Barski, Chicago, Ill.	13:51
9. Walter Stoop, Tulsa, Okla.	13:46
10. Walter Simmers, Chicago, Ill.	13:44.2

### Junior Stick Type

1. Wilmer Feltmier, St. Louis, Mo.	12:14
2. Arthur Beckington, Chicago, Ill.	10:19
3. Francis Kuntz, St. Louis, Mo.	6:46
4. Geo. Lambros, St. Louis, Mo.	6:12
5. Albert Maginot, St. Louis, Mo.	1:46
6. Herbert Buchman, St. Louis, Mo.	1:05
7. Jack Schilling, St. Louis, Mo.	1:03
8. Wallace Seaver, St. Louis, Mo.	.57
9. Robert McClelland, St. Louis, Mo.	.40
10. Robert Ries, St. Louis, Mo.	.14

### Open Indoor Fuselage

1. Roy Wriston, Tulsa, Okla.	40:44.9 (New World Record)
2. Joe Matulis, Chicago, Ill.	8:25

### Indoor Fuselage (Senior)

1. Richard O'Barski, Chicago, Ill.	13:57
2. Walter Erbach, Sheboygan, Wis.	11:34
3. Dennis Turner, Chicago, Ill.	10:43
4. Donald Dodd, St. Louis, Mo.	10:21
5. Roy Marquardt, Burlington, Ia.	9:17
6. Wallace Simmers, Chicago, Ill.	8:11
7. Milton Huguelet, Chicago, Ill.	7:06
8. Tony Schott, St. Louis, Mo.	4:42
9. Fred Zaiser, St. Louis, Mo.	1:39

### New World's Record Class "A"

### R. O. G. Stick Type Model (Open)

Roy Wriston, Tulsa, Okla.	10:05
(Former record 9:59, Joe Matulis, Chicago)	

## Results of the 1937 Mississippi Valley Regional Model Meet

August 28-29, 1937

## OUTDOOR

### Stick Type (Junior)

1. Arthur Beckington, Rockford, Ill.	1:59
2. Bill Reardon, St. Louis, Mo.	1:54
3. Wilmer Feltmier, St. Louis, Mo.	1:47
4. Harold Harris, St. Louis, Mo.	1:07
5. Samuel Harris, St. Louis, Mo.	1:02
6. Robert Gibbs	.36
7. Francis Kuntz	.33
8. Wallace Seaver	.18

### Stick Type (Open)

1. Roy Wriston, Tulsa, Okla.	8:54.6
2. Curtis Janke, Sheboygan, Wis.	6:59
3. David Seltzer, St. Louis, Mo.	2:22.4
4. Joseph Matulis, Chicago, Ill.	2:20
5. John Foerster, St. Louis, Mo.	1:47
6. Charles Bleitner, St. Louis, Mo.	1:22.5
7. Marvin Schmitt	1:14.9
8. Christy Magrath, St. Louis, Mo.	.51
9. Jacob Friedman	.39.1



# VACU-MATIC SCORES AGAIN!

**BOB MCKENZIE**

TRANSCONTINENTAL AUTOMOBILE CHAMPION  
COAST TO COAST

## WESTERN UNION TIMED

NEW YORK  
TO  
LOS ANGELES  
54 hrs. 40 min.

LOS ANGELES  
TO  
NEW YORK  
57 hrs. 30 min.

CANADA  
15,000 MILES  
18 DAYS

LOS ANGELES  
TO  
NEW YORK  
AND RETURN  
121 hrs. 52 min.

WASHINGTON, D.C.  
TO  
MEXICO CITY  
62 hrs. 27 min.

LOS ANGELES  
TO  
PHOENIX  
8 hrs. 18 min.

MURDOCK DRY LAKE  
1667 MI. IN 1 DAY

LOS ANGELES  
TO  
AVANNAH, GA.  
8 hrs. 27 min.

CALIFAX, VA.  
TO  
COVING, N.C.  
8 hrs. 21 min.

Vacu-matic Carburetor Co.  
7617 W. State St.  
Wauwatosa, Wisconsin

Dear Sirs:

Having just completed a new speed record between Los Angeles and Chicago, driving a 1938 Chevrolet equipped with a Vacu-matic carburetor control, I thought you might be interested in knowing some of the facts and the important part Vacu-matic played in the success of the run.

The distance covered was 2322 miles in thirty-nine hours and forty-two minutes, officially timed by Western Union, which gave me an average speed of 59.7 M.P.H. based on elapsed time and with the Vacu-matic averaged 18 1/2 miles per gallon on gas-line.

Before leaving Los Angeles, we made several test runs both with and without the Vacu-matic, and the tests proved that Vacu-matic increased my gas mileage 3 1/2 miles per gallon at the driving speed of 60 M.P.H. and also very noticeable increase in both acceleration and power.

After this experience with Vacu-matic, you can depend that on my future speed runs across country that I will be depending on Vacu-matic to give me the same added performance it has proven on this last record breaking drive.

Yours very truly,

*Bob McKenzie*



**Sets New  
Coast-to-Chicago  
Record**

**New Supercharge  
Principle  
SAVES GAS**

**MORE POWER - MORE SPEED  
FASTER PICK-UP - - NEW LIFE**

**E**STABLISHING new mileage records on cars in all sections of the country, the Vacu-matic again scores in a new speed record established by Bob McKenzie transcontinental automobile champion. Los Angeles to Chicago—2,322 miles in 39 hours and 42 minutes—driving 75 and 80 to maintain a speed average of 59.7 miles per hour!

Here is speed—a gruelling grind—where quick acceleration, greater top speed—and less stops for gasoline mean those precious moments saved that make new speed records possible.

The same Vacu-matic that helped Bob McKenzie establish this speed record and gave him such fine gas savings is now available for all car owners. It is positively automatic—simple to install—inexpensive—and pays for itself many times over in gas savings.

## **Automatic - - Nothing Like It!**

Vacu-matic is entirely different! It operates on the supercharge principle by automatically adding a charge of extra oxygen, drawn free from the outer air, into the heart of the gas mixture. It is entirely AUTOMATIC and allows the motor to "breathe" at the correct time, opening and closing automatically as required. No idling troubles—no carburetor adjustments necessary. It is so simple it will amaze you—so practical it will save you many dollars on gas costs.

## **Fits All Cars**

VACU-MATIC is constructed of six parts, assembled and fused into one unit, correctly adjusted and sealed at the factory. Nothing to regulate. Easily attached in ten minutes.

## **Agents and Salesmen**

VACU-MATIC offers a splendid opportunity for unusual sales and profits. Valuable territories now being assigned. Check and mail coupon.

**The VACU-MATIC Co.**

**Wauwatosa, Wis.**

## **Guaranteed Gas Savings**

VACU-MATIC must prove itself on every car. It is guaranteed to give worthwhile gas savings, quicker pick-up and more power, or it costs you nothing. "On my V-8 Ford it works miracles", says Ralph Fields. James Seeley—"On an International Truck on a round trip to Cleveland, 385 miles, it saved 19 gallons of gas." A. V. Grove—"On the Buick it showed 5 miles more per gallon." F. S. Peck—"I average 22 miles per gal. on my Plymouth, an increase of 7 miles, for a saving of \$15.00 a month, or \$180.00 a year." Wm. Lyons—"Averaged 25 miles on a gal. with a Model A Ford at 40 miles per hour."

## **Free Details**

You owe it to yourself to know all about this remarkable discovery. Mail the coupon below. Start saving gas with VACU-MATIC and enjoy a new driving thrill! There's no obligation—so get the facts now! Write today!

**— — — FREE OFFER COUPON — — —**

THE VACU-MATIC COMPANY  
7617-331 W. State St., Wauwatosa, Wis.

Gentlemen: Please send me full particulars concerning the Vacu-matic and details of your Free Offer. This of course does not obligate me in any way.

Name .....

Address .....

City ..... State .....

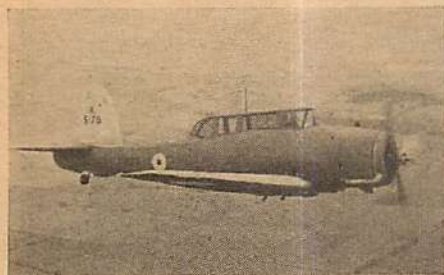
☐ Check here if interested in selling proposition.



## DIVE BOMBER

(Continued from page 50)

The #3 former will aid in assembling the cockpit inclosure parts. It is important to fit all joints carefully or they will show on the finished model.



The Blackburn Dive Bomber.

Fasten 2 blocks ( $1\frac{1}{8} \times 2\frac{1}{4} \times 1\frac{7}{8}$ ") lightly together with several spots of cement and carve the cowl shape. Sand and dope until smooth. Then split the blocks apart and hollow according to the broken lines on the cowl drawing. Then cement them together again. Cut a  $\frac{1}{8}$ " sheet disk with a  $\frac{3}{8}$ " diameter hole in the center. Cement this disk  $\frac{1}{4}$ " deep into the cowl. Carve a conventional nose plug to the shape shown and insert a  $\frac{1}{16}$ " aluminum tube bearing. Carve the exhaust stack and scoop.

### LANDING GEAR

The main strut of the landing gear is composed of a #14 music wire length bent as shown on the drawing and sandwiched between 2 grooved  $\frac{1}{16} \times \frac{1}{8}$ " strips, which are then sanded round. Make a matched pair of these struts and embed the upper exposed portions of wire to the center of the  $\frac{1}{8}$ " #1 ribs and cement heavily. Add the small struts as shown on the drawing. The rear strut should not be cemented at the top, so the main strut will be free for back travel.  $1\frac{1}{4}$ " rubber air wheels were very successful. The tail wheel is typical, being attached with a bent wire fork as shown.

### WING PANELS

The spars are  $\frac{1}{16}$ " sheet and are half the depth of the wing in their height,

tapering toward the tips. Use plenty of pins to hold the parts in place and start by assembling the ribs on the spars.  $2\frac{1}{16}$ " sq. strips placed under the rear of the ribs, close to the spars at ribs #1 and more distant at the tips, will help to line up the rib ends to the trailing edges. Additional blocking may be done where deemed necessary, but take care that the incidence is not washed in or out. Cement all rib joints and then add the bamboo tips and fillers. If ailerons are desired, cut  $\frac{3}{32}$ " out of the ribs directly over the spars drawings and cement in  $\frac{1}{32}$ " sheet spare, additional rib parts and soft wire hinges. Now remove the frames from the board.

### TAIL ASSEMBLY

The tail surfaces have been enlarged to insure improved performance to the model.

The easiest method by which the tail-surface frames can be assembled is to pin the spars to the drawing first, blocked up  $\frac{1}{32}$ ", then the leading edges and trailing edges. Insert  $\frac{1}{32} \times \frac{1}{4}$ " strips for the ribs. Block up the leading edges, trailing edges, and the tips to center the rib stock; then cement all joints and hinges. When the frames are dry, remove them from the drawings and trim and sand to the final streamline shapes. Make the stabilizer as a unit.

### PROPELLERS

This month we are confronted with another 3-bladed flying prop. Bevel the three blocks ( $\frac{3}{4} \times 1 \times 3\frac{3}{4}$ ") so they fit perfectly. Rub cement on the beveled edges and let dry, in order to prime the porous wood. Then cement them again, heavily, and pin them together on a smooth surface. Blank and carve in the manner of a 2-bladed prop, but take smaller cuts around the hub, so a more perfect job can be obtained. Sand and dope until smooth and balanced. The final step is to coat the hub heavily with cement for added strength. A scale-prop design is provided if needed.

### FINISHING

Cover the fuselage and vertical tail

with silver or gray tissue, the wings and horizontal tail with white tissue. The cowl may also be tissue-covered. Then mark the exhaust ring and ventilating flaps with ink, and add the air scoop and the exhaust stack. Cement the cowl assembly to the fuselage. Cement the wing and tail surfaces on and use plenty of pins to hold them in position until set.

Spray the tissue with water and let dry thoroughly, then coat the tissue with clear model dope. Cement the celluloid panes on the cockpit inclosure. Add as much detail as desired, such as: antenna, British insignia, lights, and panel marks.

If a balsa-covered fuselage is preferred, leave off the bamboo strips and cover the fuselage and center section with  $\frac{1}{64}$ " sheet.

### FLYING

Test the model over tall grass. Make the adjustments necessary for satisfactory flights and be sure to fly the ship in an area where it will not be possible for it to strike obstacles.

### MATERIAL LIST

#### Blocks

- 2  $1\frac{1}{8} \times 2\frac{1}{4} \times 1\frac{7}{8}$ "
- 3  $\frac{3}{4} \times 1 \times 3\frac{3}{4}$ "
- 1  $\frac{1}{2} \times \frac{3}{4} \times \frac{3}{4}$ "
- 1  $\frac{3}{4} \times \frac{3}{4} \times \frac{3}{4}$ "

#### Sheet

- 6  $\frac{1}{32} \times 2 \times 18$ "
- 1  $\frac{1}{16} \times 2 \times 18$ "
- 1  $\frac{1}{8} \times 2 \times 6$ "

#### Strips

- 6  $\frac{1}{16} \times \frac{1}{16} \times 18$ "
- 8  $\frac{1}{16} \times \frac{1}{8} \times 18$ "
- 2  $\frac{1}{16} \times \frac{3}{16} \times 18$ "
- 4  $\frac{1}{8} \times \frac{3}{16} \times 18$ "

#### Miscellaneous

- 1 oz. cement
- 1 oz. clear dope
- 1 sheet white tissue
- 1 sheet silver tissue
- 3 spoiled 116 photo film
- 1 pr.  $1\frac{1}{4}$ " air wheels
- 18 pcs.  $\frac{1}{32}$ " bamboo strips
- 2 ft. #14 music wire
- 1  $\frac{1}{16}$ " aluminum tube
- 90"  $\frac{1}{8}$ " flat rubber per motor

## AIR ADVENTURERS

(Continued from page 27)

For instance, Roy Hesson, of Amityville, N. Y., who is putting in a bid for his Lieutenantcy, has made a suggestion that may be something many others have had in mind for some time. If you have, let us know. Roy thinks we ought to institute a radio-operator's Craftsman award. He adds that Air Adventurers bidding for the rating should have a radio operator's license and be able to send at a speed of thirteen words a minute. He has several

other ideas along that line and we'd like to know what you think of them. Radio, while it may not be an integral part of aviation as far as flying is concerned, does play a big part in the safety of flying. Well, that's one idea anyway.

R. J. Laing of Overton, Texas, comes out flatfooted and says that the Bill Barnes stories are not as good as they used to be. Laing claims that luck plays too big a part in Bill's exploits, which is

a fair criticism, perhaps. But again we would like to get a broader consensus of opinion.

Claude P. St. Amant, of Senatobia, Miss., has started an Air Adventurers' club in a barn on a forty-five-acre farm. Claude is keen about the pictures we have been showing in *This Winged World*. He also likes our *Air Progress* feature and the *Pictorial History of Man in the Air*. But he's particularly keen about our *Model Department*. We wish Claude had told us just one thing he didn't like.

Every one seems to be for the Yearly Pictorial idea we broached a few months



ago. But we want a wider viewpoint. Erlon Johnson, of Buffalo, is a photography fan and he has sent us in a picture he has taken of a Douglas O-48a on the tarmac of the Buffalo Municipal Airport. He also sent in his approval of the Yearly Pictorial.

We're amazed, although we shouldn't be, at the number of young ladies who are flocking to our club. Miss Elizabeth Sauer, of San Francisco, has applied for her photography award with a swell picture of the Hammond-Stearman "Y" plane, which she took at Oakland Airport. Not only that, but Miss Sauer took the trouble to include full specifications of the ship.

Another young lady who will be welcomed to our rolls is Miss Mary Murth, of Verona, New Jersey, who sends in her photograph of her Taylor "Cub," a 5 foot 3 inch wing-spread model which looks like a pretty snappy job to us. Miss Murth is keen to become an active member in the club. Well, it seems that turning out large-scale Cub models is getting pretty well along that way, Mary.

William Larkins, of Oakland, Cali-



A production Hammond "Y," snapped by Miss Elizabeth Sauer of San Francisco, Cal.

fornia, has sent in his Yearly Pictorial coupon and a number of grand snapshots of military and commercial planes taken out at the Oakland Airport. Walter Fish has a new idea—in a way. He lives in East Providence, Rhode Island, and believes that good models could be made with celluloid. He knows that they would be heavier than balsa, but believes that better details could be put into the craft. We'll bet Walt has access to some good celluloid, or he'd never get that idea. But we'll also bet he can turn out a pretty smart-looking job with the material, if he can get it in colors. What's the inside on that celluloid idea, Walt?

It's amazing what interest has been aroused in gliding and soaring since we opened up that new department on motorless flight a couple of months ago. We knew the interest was there, if we could only get to the bottom of the thing. We are glad to know that it has brought such a response. Ora R. Rice, of Lima, Ohio, is keen about gliding and is writing in for all details on the price of materials for the construction of a glider. We've turned that over to our gliding editor.

David Roumien, of Burns Lake, British Columbia, was particularly delighted with our August number, in which we presented the article *Snow Birds*. David lives up in that country and has seen several of the planes mentioned. He can vouch for the hardships many of the pilots have to undergo. He's all for the Yearly Pictorial, too.

## INSTRUMENT FLYING

(Continued from page 22)

direction in which the airplane is turning. This act of precession is registered by a vertical pointer which is attached to the frame of the gyroscope and extends to the outside of the dial face on the instrument. In a right turn then, the pointer will move to the right side of the dial and in a left turn to the opposite side. Thus, by looking at the turn and bank indicator, it is possible for the pilot to tell definitely in which direction his plane is turning.

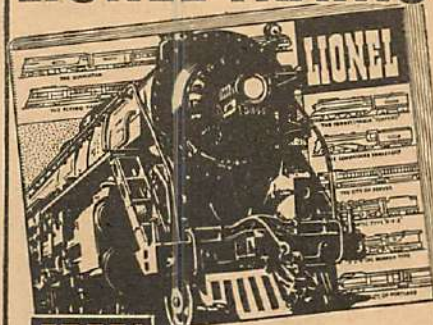
So much for the magnetic compass and the turn and bank indicator. The next on the list of key instruments to be considered is the air-speed meter. Its function is simply to compare the static pressure of the surrounding air against the impact pressure of the air caused by the forward motion of the airplane. On the leading edge of the airplane's wing are situated two small tubes, one, the "pitot tube," having its forward end open so that it faces the full impact of the air stream, the other, the "static tube," having its forward end closed, but having a number of small holes along its side, ninety de-

grees to the direction of the air stream. The "pitot tube" transmits the impact pressure of the air to a little sealed metallic diaphragm situated inside the air-speed meter. The "static tube" transmits the static, or actual pressure of the outside air, to a sealed chamber, inside the instrument, which surrounds the diaphragm. Thus the diaphragm, having its inside subjected to the impact pressure of the air, expands against the surrounding static pressure of the air inside the chamber and the magnitude of this expansion is used as an expression of the air speed. This is registered on the face of the instrument by a pointer, which is attached to and actuated by the diaphragm.

The fourth and last key instrument, the altimeter, might correctly be termed an aneroid barometer, its only difference from the more familiar instrument being that its scale is graduated into feet of altitude, rather than inches of mercury.

Being essentially a barometer, its reading changes with a change in barometric pressure; hence, as the plane in

## Now Ready - New Catalog of LIONEL TRAINS



**FREE!**  
AT YOUR DEALER'S  
or mail coupon

Forty-eight pages of exciting new train combinations - every great, new streamliner of the nation, pictured in full color. Send for your copy at once. Use the coupon.

THE LIONEL CORPORATION, Dept. 73,  
15 East 26th Street, New York, N.Y.

Enclosed in ten cents in stamps to cover postage and handling. Please send a copy of the new 1937 Lionel Catalog.

Name \_\_\_\_\_ Please Print  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_

## big 64-page MODEL BUILDERS' catalog & HOME CRAFTSMEN

**large supplement** saves money and time in buying Model (Airplane, R. C., Ship, Gas and Steam Engine, Racing Car) Kits, Supplies, Accessories, Hard-to-get parts, sheet metals, rods, wires, bolts, screws, etc., etc. (all very fine sizes). Thousands of tiny items. Send 15c (coin) today for both copies (none free). Supply limited. Act quick. Dealers: Write!

**CLEVELAND MODEL & SUPPLY CO., Inc.**  
4508-A28 Lorain Ave. : : Cleveland, Ohio, U.S.A.

## LOCOMOTIVE ENGINES & SUPPLIES

New catalog listing over 50 Model Gas & Steam Engines - Electric & Water Motors - Parts, gauges & Supplies. Send 25c for copy! Refund on 1st order.

**HOWARD ENGINES & MFG. CO.**  
Dept. AT 2417 N. Ashland Ave., Chicago

## CLASSIFIED DIRECTORY

An opportunity to contact a large field on a small lineage. Rate 10c per word (Minimum 20 words). Cash with order. Address:

## AIR TRAILS CLASSIFIED ADVERTISING

79 Seventh Avenue, New York City

AVIATION Employment Service for inexperienced workers. Salaried jobs available. Details for stamp. Desk "E", Airpoyment, Box 553, West Los Angeles, California.

**BUILD A GLIDER.** Complete drawings, pictures, constructional details for building man carrying glider, 25c. Federal, Box 344, Dept. 8, Indianapolis, Ind.

**MEN WITH CARS** to sell new electric are welder to mechanics, repairmen, factories. Wholesale \$2.50. Five minute demonstration makes sales. Up to 150% profit. Trindl Products, 2225 AA Calumet, Chicago.

## COLT 45 CAL. Frontier Model

Basswood construction kit with working plans and all necessary hardware. Barrel and cylinder are machined. **\$1.45**

COLT 45 Cal. "FRONTIER" model kit, 5 1/2" barrel, \$1.55  
COLT 45 Cal. "FRONTIER" model kit, 7" barrel, 1.70  
COLT 45 Automatic Pistol Kit, 1.00  
COLT 25 Cal. automatic pistol kit, .50  
THOMPSON SUB MACHINE GUN model kit, 3.00  
Savage Cal. 32 automatic pistol kit, .75  
LUGER 9 M/M auto. pistol kit w/8" barrel, 1.75  
LUGER 9 M/M auto. pistol kit w/3" barrel, 1.90  
All kits make beautiful full scale models. Postpaid in U.S.A.  
**GUN MODEL CO., Dept. W31, 2908 N. Nordica Ave., Chicago, Ill.**



which it is located gains altitude, the accompanying drop in air pressure is interpreted on an arbitrary scale on the face of the instrument to indicate the altitude the plane has reached above the point from which it left the ground.

So much for the mechanical operation of the four key instruments. Their function, as has been said, is to make control of the airplane possible when there is no visual reference point exterior to the plane by which the pilot can orient himself. In dense fog, for instance, the pilot could not possibly tell, without their aid, whether he was turning his craft to the right or to the left, or diving or climbing it; in fact, he could not even be certain (except for the change in pressure on his safety belt) whether the plane was upright or on its back.

This fact may be hard for the reader to grasp; if so, let him hark back to one of the experiments suggested at the beginning of this article—that of standing on one foot with the eyes closed. If he tries it, he will immediately be reminded what a difficult thing balance, without sight, becomes even with one foot on solid earth. In learning to fly blind, the pilot's greatest difficulty usually lies in making himself place greater trust in the instruments than he does in his own instincts, as the two are very often at variance.

Let us return to the cockpit of the plane which is undertaking a blind flight and glance at the instrument panel again. Figure 2 shows the plane to be flying a straight course of west at one hundred miles an hour and at four thousand feet altitude. Figure 3 indicates that the plane has gone into a right turn; the compass is moving—the turn-indicator hand is pointed toward the right side of the dial, the ball in the glass tube of the bank indicator is centered, showing that the turn is being made correctly; the altimeter and the air-speed meter are just as they were in Figure 2, indicating that the turn is being made on the level, i. e., with no change in altitude. Figure 4 shows virtually the same conditions, except that the ball in the bank indicator indicates that too much bank is being carried.

Figure 5 illustrates how the ball would act in the same kind of turn if too little bank, or too much rudder were being carried. Figure 6 indicates that a straight climb is being executed, in the proper manner, a condition to be deduced from the fact that the turn and bank indicators are both centered; the air speed is cut down to eighty (it is assumed that the throttle setting has not been changed) and the altimeter registers a slight gain in altitude.

If a pilot, then, were steering north and he wished to head east, his procedure would be, in effect, as follows: with his eye on the turn and bank indi-

cator he would push gently against the right rudder pedal, at the same time giving the plane sufficient bank with the control stick, to keep the ball of the bank indicator centered. He would glance at the altimeter to make sure that his plane was neither gaining nor losing altitude, and would then alternately consult the compass, the turn indicator, and the altimeter until the magnetic course of east was approached, at which time he would center his controls and resume straight flight. Actually, there is an error induced in the magnetic compass when near a northerly heading which must be safeguarded against in changing course; but that fact can be disregarded for the purpose of this article.

The pilot of the airliner which you hear in the fog overhead, or if you happen to be a passenger, which is carrying you safely through to the airline terminal, is doing just as described above. Of course, as has been previously stated, he usually has additional flight instruments to aid him, but the four key instruments are entirely sufficient for safe performance of his flight. The function of the three supplemental instruments, shown on the bottom row of Figure 1, should now be obvious to the reader. The Sperry horizon, the instrument on the left, serves to some extent the same purpose as the turn and bank indicator, and because it is not so sensitive (nor as accurate) it can be used when the pilot wishes to rest his eyes. The directional gyro, while it must be reset from the magnetic compass at intervals of not more than fifteen minutes, gives a much more positive reading than does the latter, and is therefore especially valuable in changing course. The rate-of-climb indicator, that instrument on the right of the bottom row, is valuable because it actually registers the climb while it is taking place, rather than after it has taken place, as does the altimeter.

So much for the control instruments themselves. Now let us consider the adjunct so popularly connected with everything to do with air-line operation, airplanes and blind flight, namely, the radio beam.

Figure 7 is a diagrammatic sketch of the manner in which the radio beam emanates from a radio-beacon station. The little circle in the center of the figure represents the broadcasting antennas shielded in such a manner as to send signals in four different directions. There are four sectors in the figure, covering arcs as indicated by the curved arrows. Each sector is labeled with a letter, either A or N, which indicates the signal broadcast into that sector by the beacon station. Glance now at the two upper sectors, N on the left and A on the right; between them will be noticed a small hatched portion which

widens as it departs from the center of the figure. Inspection of the swing of the two curved arrows will reveal the fact that this hatched portion is formed by the overlapping of the A and N sectors. In radio code the letter A is indicated by the signal, dot dash (.—) and the letter N by dash dot (—.). Hence the pilot of a plane in the upper right-hand quadrant in the figure would hear the signal A (dot dash) in his ear phones; if he were in the upper left hand quadrant he would hear the signal N (dash dot). However, in the hatched portion formed by the overlapping of the A and N sectors the two signals, each being broadcast, overlap each other to form a continuous buzz. A pilot in that portion, then, would hear neither an A (.—) nor an N (—.), but instead, a continuous signal (—).

In addition to the signals just discussed there exist along both edges of each continuous beam an area known as the twilight zone. This is illustrated by the shaded portions on either side of the hatched areas in Figure 7. In this zone the pilot hears both the identifying signal of the sector he is in and the continuous buzz. This is of material value to him as it warns him that he is approaching the continuous signal when he is seeking it. Usually pilots approaching a beacon station try to remain in the twilight zone on the right-hand side of the continuous signal, although they may follow directly along the continuous signal if they care to.

In Figure 7 then, the pilot in Position No. 1 hears the signal letter A being broadcast over and over again, the only variance being a pause now and then for station identification (also in radio code). In Position No. 2 (Figure 7) he is in the twilight zone and hears both the signal letter A and the continuous signal. In Position No. 3 the A signal has faded out and the pilot hears only the continuous buzz (also interrupted at intervals for station identifications). The radio beam is not, as many persons suppose, a narrow shaft resembling a searchlight beam or an inclined plane, to be heard only at certain altitudes. The pilots in Figure 7 would hear the same signals were their airplanes in relative positions on the ground or ten thousand feet in the air. In other words, the signals illustrated in Figure 7 apply at any altitude.

There does exist (more theoretically than practically) directly over the station a cone-shaped area in which no signal at all is heard. This extends indefinitely upward and may be several hundred feet in diameter at five thousand feet and several thousand feet in diameter at twenty-five thousand feet; it is called the cone of silence and is useful in letting the pilot know when his plane is directly over the broadcast-



ing station. Except when in this cone, however, the pilot is receiving one of the signals illustrated in Figure 7, regardless of his height above the ground.

The radio beam may be heard as much as two hundred or more miles away from broadcasting stations, depending, of course, upon the power of the sending station and the efficacy of the receiver. It is not usually entirely reliable at distances greater than a hundred miles. The hatched portion in Figure 7, or the sector of continuous signal, widens as it leaves the station and usually becomes seven or more miles in width at a point one hundred miles from the source. In all cases it can be more reliably used to approach a station than to depart from it.

Charts issued by the department of commerce picture, in a manner similar

to Figure 7, the locations of the various beacon stations, the magnetic directions in which their continuous signal sectors extend, and the frequency on which the stations operate. Usually the stations are located in close proximity to airports.

A plane then, equipped with instruments which perform the functions of the four key instruments, i. e., compass, turn and bank indicator, air-speed meter, and altimeter, may undertake a flight under any conditions of visibility, with reasonable assurance of getting to its destination, particularly if the radio beam can be employed *en route*. If it is not so equipped, however, a flight in which conditions of zero visibility are to be encountered cannot be accomplished, regardless of the prowess of the pilot.

## GLIDING AND SOARING

(Continued from page 15)

attain vertical velocities of 18 feet per second, and sailplanes have reached heights of thousands of feet by soaring under them. The pilot must be on the alert, however, against such masses breaking up, as this generates a strong downward current.

Soaring within the clouds themselves is possible and has been done many times, but since they contain zero visibility the plane should be equipped with blind-flying instruments. All high-performance sailplanes at this year's Elmira meet were so equipped.

In conclusion, we have what is called a storm-front soaring. An approaching rain or thunderstorm pushes the warm air ahead of it and up, thus causing some of the strongest up-currents known. Such currents hold enormous possibilities for record distance flights. More or less unexplored territory in the U. S., storm fronts were not used for great distance flying until the recent National contest. At that time Riedel, duPont, Lehecka and Barringer obtained excellent results, Lehecka soaring ahead of a black front for 48 miles.

The table below shows the vertical velocities of up-currents.

Light slope winds and thermals	1½ ft. per sec.
Strong slope winds and thermals	3-9 ft. per sec.
Very strong slope winds	12 ft. per sec.
Strong up-currents under and within clouds	12-18 ft. per sec.
Currents at head of storm front	up to 45 ft. per sec.

### CLUB NOTES

A new glider club has been organized in Philadelphia, called the Wings Gliding and Soaring Club, with Lewin Bar-

ringer as president and Percy Pierce as vice president. A Gull Wing Franklin has been purchased. Wistar Brown, a member of this club, recently bought the Goeppingen Wolf sailplane owned by Lewin Barringer.

The Airhoppers are conducting a membership drive and undertaking an expansion program. A Taylorcraft has been added to their air stock, and power-plane time is now available. Purchase of a two-place sailplane was also under consideration. Club members have been doing extensive flying at the Wurtsboro, N. Y., Airport.

At the farewell party given them by the Metropolitan Soaring Association of New York, the Lithuanian soaring pilots, Jonas Pyragius, and Bronius Oskinis, who attended the Elmira meet, were presented with special trophies for sportsmanship. When they sailed the next day for their homeland, Alexis Dawydoff and Emil Lehecka flew over their ship in their Taylorcraft as a bon-voyage gesture.

While attending an air carnival in Chicago, Lieutenant Oskinis soared his Minimoa over the city for four hours.

The International Soaring Contest was held in Wasserkuppe, Germany, from July 4th to July 18th. 27 ships participated, entrants being from Poland, Switzerland, Czechoslovakia, Austria and Germany. The last-named took first, second, third, fourth and sixth places.

Who says it doesn't pay to keep in trim? Inge Wetzel, the German lady who hung up a new world's glider flying record in Germany this summer, is a physical-culture student. Her sustained



## FREE MAIL COUPON for Big Train Book IN FULL COLORS

Page after page shows America's greatest train values, new and advanced features such as the amazingly low priced six wheel drive Hudson steam-type locomotives, the new remote control whistle unit, high speed model track, new transformers with circuit breakers included. All of America's famous streamline and steam-type trains have been reproduced. Select your fun-making automatic signals, stations, etc. Dads, too, make railroading a hobby.

American Flyer Mfg. Co.  
2245 S. Halsted St., Chicago, Ill.

SEND FREE  
TRAIN BOOK

Name .....

Address .....

**American Flyer Trains**

## BALSA STRIPPERS

Buy our new Improved Hand Balsa Stripper only 25c postpaid. It cuts all size balsa strips from 1/32 sq. to 1/2 by 1/2. Why buy balsa strips when you can cut your own and save money. Full instructions enclosed.

LITWIN BROS., 474 East 98th St., Brooklyn, N. Y.

## AVIATION APPRENTICES

Ambitious, air-minded young men, interested in entering the well paid field of Aviation, write immediately, enclosing stamp, to

**Mechanix Universal Aviation Service**

Incorporated  
Strathmore Station Dept. T Detroit, Mich.

## WHILE THEY LAST!

15" Flying Scale Model

● KITS ●

2 for 25c postpaid



15" Flying Verville Aircoach. 15" Flying Fairchild.

Selling out 2000 of these kits (made by a nationally known concern) to make room for new stock. 2 complete guaranteed kits at the price you usually pay for one. Order today! These popular models available:

Verville Aircoach, Fairchild 22, Heath Midwing, Barling NB4, Great Lakes Trainer, De Havilland Mailplane.

Every kit complete to Jap. tissue and large bottle cement. All 6 kits, postpaid in U.S. only 60c.

**DEALERS! CLUBS!**

Opportunity knocks! Limited number available. 3 doz. \$1.75 (less than 5c ea.) 1 gross \$6.00

Remit with order. Express charges collect.

**MODEL AIRPLANE UTILITY CO.**

5307 New Utrecht Ave., Dept. B11, Brooklyn, N.Y.



flight of 18 hours and 31 minutes may possibly not have been due to trapeze work, but—develop those biceps, boys.

The Boys Club of Pittsburgh, Pa., now has a glider club, organized as part of its Model Aircraft Division. They have recently come into possession of a Northrup Primary training craft, and have been working overtime at overhauling the ship and fitting themselves to obtain the necessary department-of-commerce sanction for operation.

The club consists of about twenty members, ranging in age from 16 to 20 years, and Mr. Harry G. Vogler, Jr., its organizer, reports keen interest in aerodynamic classes and rapid progress in ground-training courses.

Meets scheduled as we go to press: Associated Glider Clubs of New Jersey, annual meet, Labor Day week-end, at Schley Field, Liberty Corners, N. J.

. . . Metropolitan Soaring Association, soaring contest, October 12th, at Ellen-ville, N. Y.

Harland Ross, winner of the 1937 Air Trails Trophy, reports a tremendous amount of enthusiasm for the proposed Winter Soaring Meet in California. The meteorological conditions there have been found to be excellent in winter, though poor in summer. This makes it appear likely that America will have two national meets, six months (and 3,000 miles) apart, each year, in the near future.

Don't forget that you can organize a glider club with anywhere from 6 to 20 members. Less than 6 is impractical. If there are more than 20, the soaring time of each member will be cut down too much, unless you have more than one plane.

The initial cost will vary greatly. If

you have 20 members, it is possible to cut the initial cost as low as \$15 a person.

Dues need not run high, but must depend upon your decision as to who is to keep up repair costs and overhaul costs on your equipment. Space must be arranged for housing your glider and, if you operate from an airport, it is necessary to calculate rentals. Two new gliders are going into production in 1937, either one of which is within the reach of any group of enthusiasts. If you have been hesitating to proceed with your organization, you may safely do so at once.

AIR TRAILS, or Mr. Lewin Barringer of the Soaring Society of America, will, in one way or another, find an available instructor for you, as soon as you are ready to get into the air.

Be sure you have located a suitable take-off spot.

The movement grows!

## WAKEFIELD

(Continued from page 44)

As each model climbed aloft from the special wooden take-off, its flight was described on the public-address system. Shortly after noon the thermal currents became numerous and strong, as was evidenced by the four-minute flight of a badly adjusted model.

At twelve thirty lunch was served and at one flying again got under way. Models of all nationalities began to fly out of sight with alarming frequency. The English procedure of flight timing proved interesting. Due to the irregular terrain, the timers are not permitted to leave the take-off spot. The advantages of this arrangement were soon noticed. Unlike our contests, the Wakefield ran smoothly and quickly, the handy co-operation of timers and fliers facilitating the event. When, at four o'clock, the second round had just begun, the flying order was thrown open to any contestants that were ready. Soon models were taking off as fast as they could be wound and launched.

The courtesy of spectators proved a boon to the contestants. As each model threatened to disappear, the loud-speakers called for volunteers to use their cars for retrieving the ship. Amateur photographers obliged, on request, by moving away from the take-off platform. The entire crowd was orderly, obeying readily the wishes of the officials.

The contest did not terminate until about seven in the evening, at which time the visitors were returned to the Royal Aero Club. An informal supper for all was held at the Lyons Corner House. Every one dined as a guest of Lord Wakefield and the Society of Model Engineers.

The following day witnessed the

Bowden Trophy gas event, after which Lord Wakefield was the host at a formal banquet in the Park Lane Hotel, Piccadilly.

Among the speakers were Frank Zaic, of America, Paul Schroeder, of Germany, Monsieur Jean Desnoes, of France, Van Hattum, of Holland, J. C. Smith of the S. M. A. E. Dr. A. B. Thurston, president of the S. M. A. E., was the master of ceremonies. Mrs. Thurston presented the Wakefield Trophy to Monsieur Fillon, of France, the 1937 winner. Mrs. Bowden presented the Bowden Trophy to Herbert Fish, of America.

The following day the visitors were taken to the Science Museum, where they viewed the original Wright Brothers plane and other historical planes. In addition to the assemblage of world-renowned ships, the visitors were shown a fine collection of wartime ships, old and new propellers, and an assortment of models of all important planes ever built. Following the visit to the museum the guests were shown the sights of London.

On the morning of August 7th the American delegation left for France, the expected site of the '38 Wakefield competition.

It is difficult to express ample appreciation for the fine treatment accorded us by the English. I can say for the entire team that our stay was as pleasant as it was humanly possible.

The German models were powered with synthetic rubber. When Mr. Schmidtberg, a German contestant, tried an American rubber motor, his yellow ship climbed out of sight.

Most of the high-place winners were ships combining the advantages of the American fast climb and the European longer, but slower climb. The developers of rubber tensioners, the English this year introduced a new wrinkle.

## HIGH LIGHTS OF THE CONTEST

The motor is measured to twice the normal length, but only half the required number of strands are used. After approximately one hundred and fifty turns, both ends of the motor are attached to the prop shaft. The middle is then fastened to the rear hook, thus making a braided-appearing motor of the necessary number of strands. Since it cannot unwind entirely, the motor is self-tensioning.

Despite its short motor duration the winning model turned in an eleven-minute flight. Flown by Emanuel Fillon, of France, the ship stalled in the glide. This, however, proved to be a blessing in disguise. The model remained in sight of the judges."

The contestants received elaborate invitation cards to the reception held in their honor. The guests, contestants and members of the Society of Model Engineers, were announced on entrance. The incident of greatest interest to the American representatives was the appearance of the toastmaster. Clad in red coat and reading from the toast list from his position in the rear of the master of ceremonies, he announced the toasts in a loud voice.

The party of foreign visitors was so large that one small eating house refused admittance, in the fear that the place would surely be wrecked.

The English hosts were to see the Americans off at the railroad station. After the Americans had missed the train, the unruffled hosts appeared, three hours later, in the best of humor.

Mr. Lippman, forty-seven-year-old German entrant, has been building models for twenty-seven years.

After dining with the Americans it was noticed that Mr. Olson of Norway was the possessor of a few English words and phrases, while his fellow diners were still wrestling with his strange language.



## AIR PROGRESS

(Continued from page 7)

designers of the Lockheed Corp. "We have seen struts, braces and guy wires disappear. The next step will be to eliminate the fuselage itself. This, however, will only be practical in a craft weighing more than 200,000 and carrying about 100 passengers," they explained.

China will buy army and navy planes from Germany and Italy and will pay \$4,000,000 for them. China has ordered a 200-mile-an-hour ambulance from the Walter Beech Corp. It will carry 5 passengers and will be used by the National Government forces.

Speed races for military aircraft will be staged this year at Selfridge Field, Mich., on September 18th. It is believed that the Seversky S-35 will replace the Boeing P-26 as the featured pursuit. World War pilots of the First Pursuit Group will hold their twentieth reunion at the unit's headquarters there, headed by Captain Eddie Rickenbacker. The Mitchell trophy, put up by the late General Mitchell, was first raced for in 1922 and was offered in memory of the general's brother John, who died in France while a member of the group.

## AIR FORCES

The new Bell Aircraft Co.'s pusher fighter will be ready for army air corps tests within a short time. It is believed that it will have a top speed of 300 m.p.h., a range of 3,000 miles and a service ceiling of 8 miles. It will be powered with the new 1,000 h.p. Allison chemical-cooled motors.

The Sikorsky S-43 has "joined up" and gone military. The U. S. navy has put in an order for 14 of the noted amphibians and the army has purchased 5. A number of new Curtiss Y1A-18s, the new twin-engined attack ships, are now under construction for the army air corps. In addition, 210 new Curtiss Y1P-36 fighters have also been ordered.

The British navy is experimenting with a new high-speed antiaircraft gun, which is said to fire 480 shots a minute and which is believed to be the most efficient weapon of its kind in the world. At present 2 are being tested out on 2 special-type cruisers. They were shown to the public during Navy Week, but no one was allowed to get any closer than 300 yards of them.

The gun unit consists of a complicated piece of machinery, which "out-thinks" the human brain in following the course of a target airplane, and 2 banks of 4 barrels, which resemble the nozzles of a fire hose. The gun may be elevated from the horizontal to directly upward.

During the month of July, China pur-

chased arms and military aircraft from the United States valued at \$309,870. Japan purchased \$203,578 worth of the same sort of material. It is also reliably reported that 182 Americans have enlisted in the Chinese army, to fly against Japan. It is believed that Japan will make formal objections to Washington.

Roumania has ordered 24 Italian Savoia Marchetti S-79 bombers capable, it is believed, of well over 250 m.p.h. The Oerlikon Tool Co., of Switzerland, has put out 3 new types of air cannons that are now being widely used in European air services. They fire a 20mm. shell at the rate of 520 rounds a minute at a muzzle velocity of 600 meters per second. 2 of the new models are for wing mountings and the 3rd for mounting in connection with a V-type Hispano Suiza motor.

Norway is having a mystery-plane scare. For a number of nights during the summer a large multiengined plane has been flying over fortified and city areas. Some have identified it as a new Atlantic-type seaplane using Diesel engines. The Boeing Airplane Co. is putting up a factory in Vancouver, British Columbia, where they will build British Blackburn Sharks under license for the Canadian Royal Air Force.

Germany's new Zeppelin, the L.Z.130, will not be finished now until the Spring of 1938, owing to certain changes necessary to use helium gas. The ship will have to be lightened about 20 tons, to make up for the loss of lift. Italy is constructing 60 more military air fields and Denmark has ordered 12 Fokker Mercury-engined D.XXIs, which will be built under license in that country.

The war in Spain is giving the anti-aircraft experts the jitters. In more peaceful countries, anti-aircraft weapons may only be tested out in theory, but in Spain they are getting actual experience against actual targets, and so far the French weapons, which were supposed to be among the world's best, have proven absolutely worthless in the hands of the Loyalists. On the other hand, the guns made by German firms, being used by the Rebels, have been particularly effective up to 12,000 feet.

## MISCELLANEOUS

Several manufacturers are interested in the recent flights of Gerrard Post Herrick's "vertaplane," a combination autogiro and conventional biplane. The plane can be flown as a normal-type aircraft and can be landed by setting an adjustment on the top wing which revolves like the rotors of an autogiro. Navy officials are loud in their praise of the machine and believe there is a bright future for the type.

King George VI has returned to his old love of flying and recently flew from Windsor to a boys' camp in Southwold.

# FREE!

1. SPRAY FOR YOUR MODELS
2. 1 DZ. SHEETS JAP TISSUE
3. Choice of 3  
20 in. Model Plans—Curtis—Heath—Boeing—Driggs—Bellanca

Removable		FREE OFFER		one of	
above with purchases of \$1. or more.					
"SERVICE IS A HABIT WITH US"					
18" Balsa		WHEELS per pr.		PAUL-O-WINA	
1/16x1/16 100, 5c		Breh Balsa Celu		10c. Add 5c per	
1/16x3/16 35 for 5c		3/4 .01 .03		in. up to 10 in.	
1/16x3/16 18. 35c		5/16 .02 .04 .05		MACHINE	
1/16x3/4 15 for 5c		1 .03 .05 .07		PROPS.	
1/16x3/4 5 for 5c		1 1/4 .04 .08 .10		5 in. . . . .10	
3/32x3/32 30 for 5c		3 3/4 .07 .10 .16		Add . . . . .10	
3/32x3/16 10 for 5c		1 1/2 .07 .15 .30		up to 16 in.	
3/32x1/8 12 for 5c		18" Balsa Planks		THRUST	
3/32x1/4 10 for 5c		1x1' . . . . .1 for 4c		BEARINGS 1c	
3/16x3/16 8. 3c		1x2' . . . . .1 for 9c		BUSHINGS	
3/4x3/4 6 for 5c		1x3' . . . . .1 for 15c		Doz. . . . .3c	
3/4x3/4 3 for 5c		2x3' . . . . .1 for 25c		ALUMINUM	
1/4x2' 2 for 5c		2x3' . . . . .1 for 35c		WHEELS	
1/2x2' 2 for 10c		PROPPELLER		1" pr. . . . .6c	
1/3x2' 8 for 10c		BLOCKS		13.8" pr. . . . .11c	
1/16x2' 8 for 10c		1/2 x 3/4 x 5 8-5c		17.8" pr. . . . .14c	
3/32x2' 7 for 10c		3/2 x 3/4 x 6 6-5c		NOSE PLUGS	
3/16x2' 6 for 10c		5/8 x 1 x 7 4-5c		large . . . . .10 doz.	
3/8x2' 3 for 9c		5/8 x 1 x 8 3-5c		small . . . . .5c doz.	
3/4x2' 3 for 10c		3/4 x 1 1/2 x 8 3-5c		Clear Dope	
3 sheets or 36"		3/4 x 1 1/2 x 9 3-5c		1 oz. . . . .5c	
lengths, double		3/4 x 1 1/2 x 9 3-5c		34 . . . . .25c	
above prices; add		1 x 1 1/2 x 12 6c ea.		Model Pins	
10c packing		1 x 1 1/2 x 15 6c ea.		pks. 5c	
charge for 36"		DOPE CLEAR		Brushes No. 6 5c	
lengths.		1 oz. 5c 1/2 pt. 25c		INSIGNIAS	
NOSE BLOCKS		2 oz. . . . .10c		French, American,	
1x2x1 . . . . .1c		Colored		English, German	
2x2x1 . . . . .2c		1 oz. 5c 3/4 pt. 20c		1 1/4" . . . . .4 for 3c	
2x2x1 1/2 . . . . .3c		2 oz. . . . .10c		1 sheet of 24. 5c	
2x2x1 3/4 . . . . .5c		BAMBOO 11 in.		Dummy Radial	
2x3x2 . . . . .5c		1/16x3/4 . 6 for 5c		Engines	
2x3x2 1/2 . . . . .5c		Shredded 40-5c		1 1/2" Diam. . .14c	
2x3x3 . . . . .10c		ALUM. LEAF		2" Diam. . .18c	
1/16" Tubing		2 Sheets . . . . .1c		3" Diam. . .23c	
3/16" . . . . .10c		WIRE		Sheet Celluloid	
1/8" . . . . .10c		6 ft. . . . .3c		2x6 . . . . .2c	
Rubber 3c		THINNER		6x8 . . . . .4c	
1/16 3c 20 ft. 5c		Best. 1 oz. . . . .5c		12x16 . . . . .15c	
1/4 that 20 ft. 5c		1/32, 1/16		Wood Veneer	
Sheet Aluminum		1/32, 1/16		20x20 . . . . .1 for 9c	
.003 . . . . .sq. ft. 10c		3 ft. 2c		20x20 . . . . .17c	
TISSUE, AA		36 in. . . . .3c		PROP. SHAFTS	
Ac. cool., doz. 19c		2 . . . . .1c		1 for 1c	
Silv. cool., doz. 5c					
Superf. wh. 5c					
SKYWAY MODEL AIRCRAFT SUPPLY CO.					
353 Seventh Ave., Dept. B, Brooklyn, N. Y.					

**3 PLANS FOR 10¢**  
BOYS! HERE'S REAL VALUE.

Imagine! Plans for **THREE** different 15" flying scale models with complete instructions for only a **DIME**—plus 3c stamp. Here they are:

**CURTISS ROBIN-FOKKER D-7 -  
BRITISH S. E. 5**

This is the best plan offer ever made, so send for them today and start building yourself these three swell flying models. Single plan 5c plus 3c stamp.

**R-T PLAN CO.**

**1 JOHN ST., NEW ROCHELLE, N. Y.**

# AIR TRAILS

features an

EXCLUSIVE SERIES  
of CONTEST and  
TROPHY WINNING  
MODELS

Each issue will contain  
ONE or MORE  
COMPLETE PLANS  
for a  
CHAMPIONSHIP  
MODEL



Sussex. Captain E. H. Fielden, who has retained his position of Captain of the King's Flight, a post created by the former King Edward VIII, piloted the monarch in a special plane selected by the Air Ministry.

The Ryan Co. has at last released some data on its new 3-place cantilever

low-wing monoplane. It is an all-metal job and will use either the 150 Menasco or the 145 Warner Super-Scarab as standard equipment. It is said to be extremely clean in lines and particularly comfortable in cabin arrangements.

A monument to commemorate the landing of Rear Admiral Richard A.

Byrd's flight across the Atlantic in 1927 has been started by the villagers of the tiny hamlet of Ver-sur-Mer in Normandy. It will be known as the Byrd foundation, and the sponsors have hopes of its becoming a haven for needy aviators and possibly an orphanage for the sons of dead aviators.

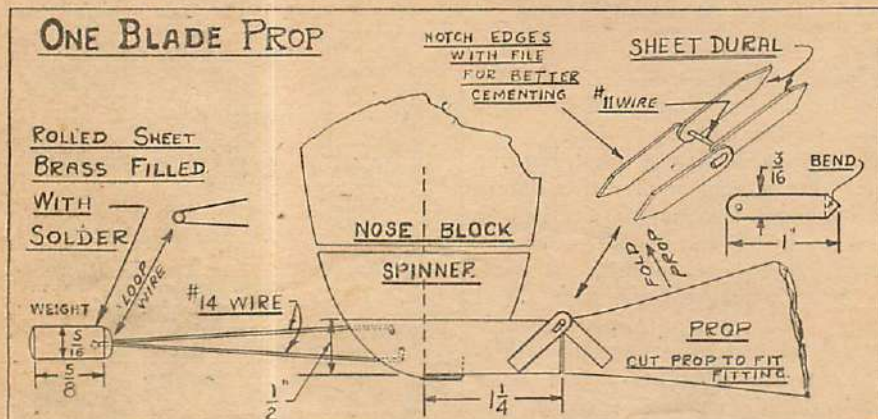
## 1937 MOFFETT TROPHY WINNER

(Continued from page 43)

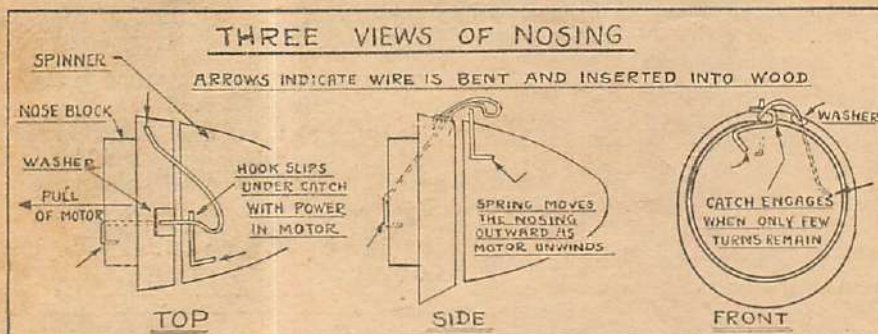
### TAIL

Construction follows closely that of the wing. The front spar is built up

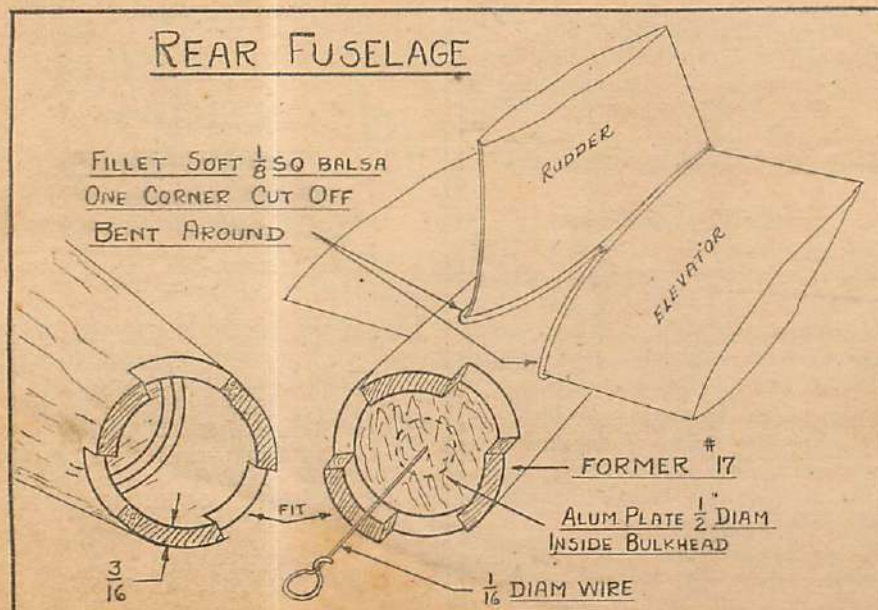
from  $\frac{1}{32}$ " sheet balsa. The rear spar is solid  $\frac{1}{16} \times \frac{1}{32}$ ". The tips of the elevator are built the same as the wing tips.



The 1937 winner sported a feathering, one-blade prop.



Below: Because of the tensioner, the rear fuselage section stays attached without hooks, etc.



A typical section of the rudder—marked AA—is shown in the drawing. The rear portion of the rudder is  $\frac{1}{16}$ " sheet balsa secured to the main rudder with two short pieces of soft copper wire. The main spar of the rudder is  $\frac{1}{16}$ " outside diameter aluminum tubing. This spar runs through the fuselage from the top portion of the rudder to the bottom part.

Both rudder and elevator are covered with ordinary outdoor variety tissue. Follow with water dopping and one coat of dope. Use glider polish on the flexible portion of the rudder. The elevator and rudder are both mounted rigidly to the rear end of the fuselage. Balsa fillets are cemented between the rudder and elevator at the point where they join the fuselage. The elevator is set at zero degrees incidence. That is, the bottom surface is directly in line with the center line of the fuselage. Check the alignment carefully while assembling.

### LANDING GEAR

This landing gear has the least resistance of any type we've yet seen on any model. There is a minimum of exposed parts because of the fuselage shape. This landing gear is partly responsible for the slow sinking speed of the Clodhopper II. Impartial observers credit this model with the slowest sinking speed of any model entered in the 1937 national meet.

Landing-gear supports consist of one piece of  $\frac{1}{16}$ " diameter wire bent to shape and secured to former #6. The wheels are  $\frac{1}{16}$ " thick cut from three-ply balsa veneer. Aluminum tubes are inserted through the wheels to provide smooth running. Conical pieces of pine wood are cemented to both sides of the wheel to support this aluminum tubing. Pronged aluminum discs may be substituted.

### MOTOR

16 strands of  $\frac{1}{4} \times \frac{1}{30}$ " brown rubber were used. It is lubricated with prepared rubber lubricant. The motor was 49 inches long. Rubber tubing was used on all wire fittings which contacted the rubber. This is important. The rubber strands will be cut by an unprotected wire fitting.

### COLORING

U. S. army #4 yellow was used on the fuselage and elevator. Fokker Red was used on the wing, rudder, propeller and wheels. Complete and ready to fly, the model weighed 8.4 ounces.



OUR SENSATIONAL NEW 1938 CATALOG NOW READY! NEARLY 600 PAGES OF UNUSUAL NOVELTIES, SEND 10c FOR IT!

### BROADCAST thru your radio TALK - SING - PLAY

**BROADCAST** your voice on programs coming through your own radio set—make announcements from any part of the house—laugh with cracks, jokes and mystery friends. Imitate radio stars, practice singing, singing, radio acting, etc. Do a "Radio Show" or a "Radio Variety Show".

**World Mike**  
Made especially for home use, attached in a jiffy without tools. Not a toy, but on your own program at home, parties, club, etc. Price Postpaid **25c**

**DELUXE MIKE**  
Large microphone, attached to the radio set. Practically any radio set will operate it. Includes microphone, amplifier, and speaker. Price Postpaid **\$1.00**

### ALL WAVE WORLD WIDE RADIOS

For home or office use, complete with 15 to 400 meters. Both wave and long wave. Includes microphone, amplifier, and speaker. Price Postpaid **\$1.55**

**ONE TUBE BATTERY KIT**  
Complete with 15 to 400 meters. Includes microphone, amplifier, and speaker. Price Postpaid **\$2.00**

**ELECTRIC TWO TUBE KIT**  
Complete with 15 to 400 meters. Includes microphone, amplifier, and speaker. Price Postpaid **\$2.50**

### CRYSTAL RADIO

This is a radio in itself! It is the only one of its kind. It is a complete radio set, including microphone, amplifier, and speaker. Price Postpaid **\$1.50**

### Wireless Transmitter Broadcasting Set

First again! First with the famous crystal radio, then the World Radio, then the Dollar Radio, and now a complete Wireless Transmitter Broadcasting Set. Price Postpaid **\$1.00**

**Not a Mike, but a complete Broadcasting Set**  
**Complete with Key, in Kit Form**  
**Uses 2 oscillating tubes**  
**Complete Transmitter, plus 10c post.**

### Radio & Television Books

Learn to use your radio and television. Includes books on building, repairing, and using. Price Postpaid **\$1.00**

### LEARN TO TYPE

Learn to type quickly and easily. Includes book and typewriter. Price Postpaid **\$1.00**

### MINNER SPORTSTER

Popular flying model. Includes book and model. Price Postpaid **12c**

### STINSON RELIANT FLYING MODEL

Popular flying model. Includes book and model. Price Postpaid **25c**

### FUN LICENSES 10c

Fun licenses for various activities. Price Postpaid **10c**

### WHOOPEE CUSHION

Whoopee cushion. Price Postpaid **10c**

### JOY BUZZER 28c

Joy buzzer. Price Postpaid **28c**

### ELECTRIC MOTOR 15c

Electric motor. Price Postpaid **15c**

### JAPANESE ROSE BUSHES

Japanese rose bushes. Price Postpaid **10c**

### BLANK CARTRIDGE PISTOL

Blank cartridge pistol. Price Postpaid **50c**

### MIDGET POCKET RADIO

Midget pocket radio. Price Postpaid **\$1.00**

### Pocket Telescope

Pocket telescope. Price Postpaid **25c**

### Wonderful X-RAY 10c

Wonderful X-ray. Price Postpaid **10c**

### CHAMELEON 25c

Chameleon. Price Postpaid **25c**

### WATCH IT CHANGE COLOR!

Watch it change color. Price Postpaid **25c**

### THIEF VAULT

Thief vault. Price Postpaid **50c**

### INSERT A COIN AND OUT COMES A DELICIOUS CHOCOLATE BAR

Insert a coin and out comes a delicious chocolate bar. Price Postpaid **12c**

### COMPLETE CAMERA OUTFIT

Complete camera outfit. Price Postpaid **45c**

### BOYS! BOYS! BOYS! THROW YOUR VOICES!

Boys! Boys! Boys! Throw your voices! Price Postpaid **10c**

### Open Any Lock

Open any lock. Price Postpaid **25c**

### LUMINOUS PAINT

Luminous paint. Price Postpaid **10c**

### Photo Ring Skull & Crossbones

Photo ring skull and crossbones. Price Postpaid **25c**

### Photo Ring Skull & Crossbones

Photo ring skull and crossbones. Price Postpaid **25c**

### Photo Ring Skull & Crossbones

Photo ring skull and crossbones. Price Postpaid **25c**

### Photo Ring Skull & Crossbones

Photo ring skull and crossbones. Price Postpaid **25c**

### Photo Ring Skull & Crossbones

Photo ring skull and crossbones. Price Postpaid **25c**

### Photo Ring Skull & Crossbones

Photo ring skull and crossbones. Price Postpaid **25c**

### Photo Ring Skull & Crossbones

Photo ring skull and crossbones. Price Postpaid **25c**

### Photo Ring Skull & Crossbones

Photo ring skull and crossbones. Price Postpaid **25c**

### Photo Ring Skull & Crossbones

Photo ring skull and crossbones. Price Postpaid **25c**

### Photo Ring Skull & Crossbones

Photo ring skull and crossbones. Price Postpaid **25c**

### Photo Ring Skull & Crossbones

Photo ring skull and crossbones. Price Postpaid **25c**

### Photo Ring Skull & Crossbones

Photo ring skull and crossbones. Price Postpaid **25c**

### Photo Ring Skull & Crossbones

Photo ring skull and crossbones. Price Postpaid **25c**

### Cigaret Pistol

Cigaret pistol. Price Postpaid **25c**

### Cap Pistol

Cap pistol. Price Postpaid **25c**

### Field Glasses

Field glasses. Price Postpaid **25c**

### Knockout Bank

Knockout bank. Price Postpaid **25c**

### Silent Defender

Silent defender. Price Postpaid **25c**

### Yacht Cars

Yacht cars. Price Postpaid **25c**

### Cigarette Stinkers

Cigarette stinkers. Price Postpaid **25c**

### Ocarino

Ocarino. Price Postpaid **25c**

### Jew's Harp

Jew's harp. Price Postpaid **25c**

### Nose Flute

Nose flute. Price Postpaid **25c**

### Hill Billy Band

Hill Billy band. Price Postpaid **25c**

### How to Tap Dance

How to tap dance. Price Postpaid **25c**

### Electric Pants Presser

Electric pants presser. Price Postpaid **25c**

### French Photo Ring

French photo ring. Price Postpaid **25c**

### Cowboy Song Book

Cowboy song book. Price Postpaid **25c**

### Lover's Secrets

Lover's secrets. Price Postpaid **25c**

### How to Build a Midget

How to build a midget. Price Postpaid **25c**

ADDRESS ALL ORDERS FOR GOODS ON THIS PAGE TO **JOHNSON SMITH & CO. DEP. 157, DETROIT, MICH.**

**1938 CATALOG 600 PAGES OF UNUSUAL NOVELTIES**

Send 10c for 600 page paper covered edition, or 25c for complete DELUXE cloth bound library edition

The most unusual catalog you have ever seen. Thousands of useful gadgets, toys, novelties, joke articles, puzzles, magic tricks, seeds, books, radios, make up goods, cameras, jewelry, musical instruments, airplane & boat kits, tobacco, 15c telegraph set, water wings, live chameleons & alligators, good luck rabbits, 15c adding machine, 25c radio, 15c radio transmitter, 25c microphone, 25c electric train, 10c airplane kits, sweater emblems, freckle seeds, telescopes, 39c field glasses, experimental kits, 10c books, movie machines, 10c fountain pen, slide rule, pipes, 25c novelties, wings, master keys, brass knuckles, all wave radio, college diplomas and marriage licenses, dance & jitsu books, gold writing pencil, etc., etc.

**3,500 ILLUSTRATIONS, 5000 NOVELTIES**

**NEW, DIFFERENT AND SPECTACULAR NOVELTIES**

Bigger and better than ever—things you never thought existed—articles you have always wanted!



# Picture Yourself at the Doors of Aero I. T. I.

## At Aero I. T. I.---

**YOU** study courses and follow a training system prepared under the direction of the aircraft leaders on the Executive Board.

**YOU** get your training in actual airplane factory technique, with the most complete, most modern equipment ever assembled for student instruction, under experienced aircraft production men.

**FOUR** brand new buildings on a five-acre campus constitute the last word in a composite aircraft plant. They are devoted solely to training men to meet the industry's pressing need for skilled technicians.

**WITH** buildings, equipment, courses, and training system designed by leading aircraft builders, "the manufacturer literally becomes your teacher" . . . at the Aero Industries Technical Institute.

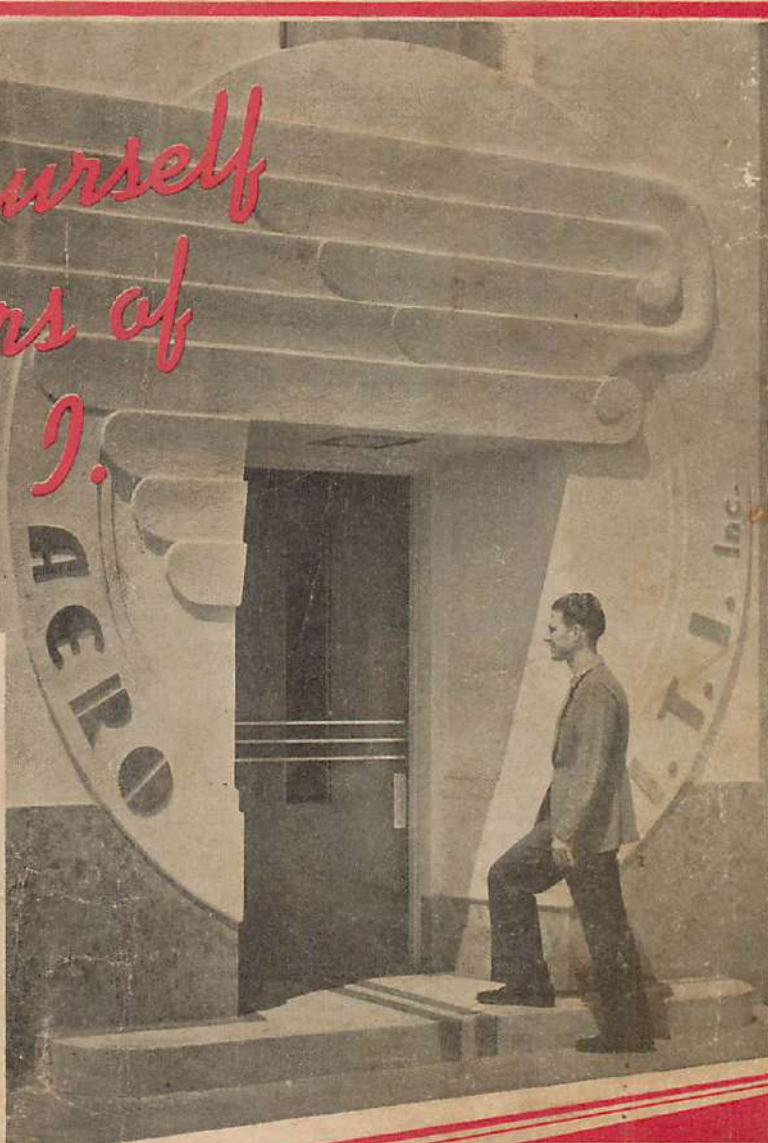
## Executive Board . . .

**ROBERT E. GROSS**  
President, Lockheed Aircraft Corporation

**JOHN K. NORTHROP**  
President, The Northrop Corporation

**C. A. VAN DUSEN**  
Vice President, The Consolidated Aircraft Corporation

*The training system, operation, and management of the Aero Industries Technical Institute is supervised by this group of aircraft plant executives.*



## PICTURE YOURSELF

stepping over the threshold of Aero I.T.I. to start your career in the aircraft industry.

Ahead of you is a fascinating course of training in the only aircraft institution of its kind in the world—operated under the direct supervision of leading airplane builders.

Beyond your Aero I.T.I. days is a career that—for the really ambitious man—will richly reflect the training advantages exclusively offered by this new institution.

Send coupon for the free booklet, "More Planes" . . . get complete details on Aero I.T.I. courses.

**NO MATTER WHERE YOU LIVE** there is a plan whereby you may start this unmatched training **NOW.**



5257 West  
San Fernando Road  
Los Angeles, California

**AERO INDUSTRIES TECHNICAL INSTITUTE, Inc.**  
5257 W. San Fernando Road, Los Angeles, Calif.

Please send free booklet, "More Planes," and complete information on Aero I.T.I. training. I am 18 years of age or over and can furnish character references.

Name..... Age.....

Street.....

City..... State..... a-3-t

*"Where the Manufacturer Becomes Your Teacher"*