AIR TRAILS

A STREET & SMITH PUBLICATION

AIR TRAVELERS AREN'T HEROES

Guest Editor:
C. BEDELL MONRO

15c
NOVEMBER, 1938

MEGOW'S

Gas-Powered Models of the Champions!

Roland Fischer of Denver, Colorado, and his World's Champion "Quaker Flash".

QUAKER FLASH! $4.95 plus 20c postage

The big champion among all gas-powered models. Easy to build—2 full-size plans, 28" x 34" and 5 clear photos. Cutout propeller, ex. hard Balsa wood, special steel wire, sheet aluminum for cowl and all necessary supplies. Uses any model airplane motor. Wings removable and gear folds back for carrying. 3½" puncture-proof wheels. Wingspan 67"; length 47".

FLYING QUAKER $5.95 plus 20c postage

Span 7'. Wt. with motor, 5 lbs. Kit contains 3 full-size plans, 28" x 34", cutout propeller blank, ex. hard Balsa cut to proper sizes, special steel wire, sheet aluminum, celluloid, bamboo paper, cement, streamlined wheels and many other features.

These famous models are putting model builders IN THE LIMELIGHT . . . taking prizes, winning contests, attracting attention in field meets all over the country. The builder who starts with a Megow model is already a long way on the road to victory.

The FLYING QUAKER, shown below, is America's best-known gas-model. The QUAKER FLASH, shown at the left, became the first STOCK model ever to win the championship. Bassett's NEW SENSATION, designed for those who want smaller, lighter, quicker and easier-to-build models that will withstand rough-going, is the latest Megow offering.

David Kohler, Lewisburg, Pa., and his FLYING QUAKER which easily won first prize at the Sunbury Airport Contest in July.

Maxwell Bassett, pioneer gas-model builder and his new sensation designed for Megow's.

New Sensation! $3.95 plus 20c postage

New, small type, light weight, practically crackup-proof model designed by Maxwell Bassett, pioneer gas-model builder. The most complete in its field. Ready-to-use propeller, all metal parts die-cut, special rubber wheels. Tested in actual flying for nearly a year. Uses any small motor with approximately ⅝" stroke and bore. Wingspan 48"

GIANT FLYING 50" MODELS
with Motor-Hum Device!

Rubber-powered scale models designed for long, stable flights and flat glides. Big, colorful, equipped with motor-hum device. For size, light weight, strong construction and design they reach a "new high". In addition to those shown here, there is also a WACO at $2.00; a 60" STINSON RELIANT at $1.50; AERONCA K at $1.00; and FAIRCHILD RANGER at $1.00. See your dealer or any kit will be mailed for 15c additional for postage.

REARWIN SPEEDSTER $1.00 plus 15c post.

MONOCOUPE $1.25 plus 15c post.

TAYLOR "CUB" $1.00 plus 15c post.

Howard Hughes' coast-to-coast record winner.

HOWARD DGA8 $1.25 plus 15c post.

MODEL AIRPLANES, SHIPS, RAILROADS
Send for Catalog today!

Send 5c for the largest, most complete catalog we have ever issued. 94 pages, illustrating scores of model airplanes, ships . . . and the NEW MEGOW HO GAUGE RAILROADS. Also ready-made parts and supplies for all model-builders.

NEW 30" FLYING MODELS 50¢ plus 10c postage

CESSNA C-34

Here are models of today's most popular planes, with plenty of detail to interest the most critical scale model builder. These models all fly exceptionally well, and are ideal for flight and endurance contests. See catalog for full line.

RYAN SC

MEGOW'S

Dept. AT, Howard and Oxford Streets, Philadelphia, Pa.
or 217 N. Desplaines Street, Chicago, Ill.
or Great Western Merc. Co., 718 Mission St., San Francisco

Guiterman Co., Ltd., London, Eng. Aer-O-Kits, Sheffield, Eng. A. Warnaar, Voorburg, Hol. American Products, Tienen-Tirlemont, Belg. Eskador, Stockholm, Sweden. K-Dee Pty., Ltd., Sydney, Aus.

Please send me

- ☐ QUAKER FLASH
- ☐ NEW SENSATION
- ☐ FLYING QUAKER
- ☐ REARWIN
- ☐ MONOCOUPE
- ☐ TAYLOR CUB
- ☐ WACO
- ☐ AERONCA K
- ☐ FAIRCHILD RANGER
- ☐ STINSON RELIANT
- ☐ HOWARD DGA8
- ☐ CESSNA C-34
- ☐ RYAN SC
- ☐ CATALOG

Money Order for $_____ is enclosed

Name _____

Address _____

City _____ *State* _____

WILL HELP YOU TO PASS THE PRACTICAL FLIGHT TESTS FOR ANY RATING

Just Published—on Primary and Advanced Training

"Air Piloting Manual of Flight Instruction"

By VIRGIL SIMMONS

Formerly Flying Instructor, Boeing School of Aeronautics; and in U. S. Army and Navy Air Services

300 Pages, 75 Illustrations, Price $3.00

WRITTEN to help its users meet the latest government requirements—*the Civil Air Regulations issued May 31, 1938*—this new book supplies in detail the flight training instructions needed by student pilots and also by pilots, already proficient, who aspire to attain higher grades. In addition it will be helpful to flying instructors and to pilots who wish to obtain the instructor rating. It brings you the cream of what the author has learned in training hundreds of pilots in his twenty years of continuous experience in both the Army and Navy Air Services, and as an instructor and director of flight training in leading commercial flying schools. It is designed for use as a text in primary and advanced flight courses given at schools. It is also designed as a practical guide for pilots who wish to correct faults and attain greater proficiency in precision flying.

AIR PILOTING supplies a detailed system of instruction from the beginner's first dual flight with an instructor, his first solo, right on to flying by instrument. All flight test maneuvers now required for the various pilot certificates and special ratings are completely analyzed and explained. Diagrams illustrate every detail of the maneuvers and make every detail of their correct execution clear and easily understood. Radio range layout, methods of orientation, private flyer's use of radio, are all thoroughly covered.

In addition to full instructions on primary essentials, the manual contains much information on advanced flying techniques, including exhibition aerobatics. Its descriptions of average faults and explanations of their causes and methods for their correction will help you to increase your own skill.

PARTICULARLY important are lists of specimen questions—totaling 377—taken from official examinations for all grades of pilot certificates, including that of flying instructor. Answers that have been accepted as correct accompany each question.

OUTLINE OF CONTENTS

General Considerations. Advice to beginners. Pilot ratings and official requirements. Safety precautions. Ten Commandments of safe flying.

Airplane and Controls. Parts of airplane described; functions described. Wings. Fuselage. Engine and propeller. Control surfaces. Control parts. Landing gear. Pilot's equipment.

Primary Flight Training. Outline of procedure followed by typical schools. Detailed description of first eleven lessons with explanation of maneuvers taught.

Piloting an Airplane. Primary flight training maneuvers: Straight and level flying. Climb and glide. Gentle turns. Turns in glide. Climbing turns. The take-off. Taxying. Landing. Medium banks. Steep banks. Stalls. Spins. Base-line glide approach.

Civil Air Regulations. Selected air traffic rules which must be thoroughly mastered by student pilots preparing for government examinations.

Solo Pilot Flight Course. Procedure before and after solo. Factors to observe in primary S's 1 and 2. Advantages of the base-line glide approach. Summary of flight test requirements.

Private Pilot Flight Course. Shallow, circular, steep eights. Triangulation spirals. The 180°, 360°, 1080° spirals; vital factors to keep in mind. Practicing stalls, with and without power. Primary and advanced spins. Procedure for the 720° vertical bank. Cross-wind take-offs and landings. Forward and sideslips; slipping turn.

Limited-Commercial Pilot Course. Requirement for higher degree of proficiency in same maneuvers as those in private pilot's flight test. Restrictions and privileges of the limited-commercial pilot rating.

Commercial Pilot Flight Course. Summary of maneuvers in flight test. Possible additions made by inspectors to usual flight test routine. Precision maneuvers recommended for developing highest skill in handling plane near ground, from predetermined exact altitudes. Night flying. How to execute the split-S turn; the chandelle; skyline S; half roll; barrel roll; loops; falling leaf.

Cross-Country Flying. Map reading. How to lay out a cross-country course. Facilities provided by Federal airways system. Preparation for cross-country flying. A typical cross-country flight with detailed explanation of pilot's procedure.

Airways Radio. Radio-range orientation described and illustrated—90° method, parallel bisector method. Radio compass navigation; fundamental principles explained. How to obtain bearings. Establishing fixes. Magnetic compass deviation. How to prepare a calibration chart of radio compass deviations. "Homing." Combined radio-range and radio-compass navigation. Charts.

Instrument Flying and Rating. Maneuvers that must be performed solely by instrument, in practical blind flight test. How radio skill must be demonstrated. Airplane, Link Trainer instruction methods. Flight Plan. Typical practice flight procedure.

Flying Instructor Rating. Requirements for special competency rating. Latitude given examining inspector to assure himself of candidate's qualifications. Summary of flying school rules and sequence of training maneuvers for primary and advanced students with which prospective instructor is expected to be thoroughly familiar.

Meteorology. Condensed selection of definitions and explanations pertaining to meteorology within scope of examinations given for all ratings above solo pilot.

Miscellaneous. Handling plane having 3-wheel landing gear. Exhibition aerobatics at low altitude: Inverted figure 8. Cuban 8's nos. 1, 2, 3.

THE RONALD PRESS COMPANY, Publishers
15 East 26th Street — ESTABLISHED 1900 — New York, N. Y.

PREPARES FOR WRITTEN TESTS:

Aeronautics— A Ground School Text

by Hilton F. Lusk, *formerly Dean, Boeing School of Aeronautics.* 420 *pages,* 175 *illustrations,* **$3.25.**

This book offers you a complete ground school course covering all the subjects you need to know to pass the written examinations for a government certificate as a pilot in any of the ratings, or as an airplane or engine mechanic. 226 test questions like those asked in official examinations help you test your grasp of each subject covered.

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. Inclinometers. Pitch, roll, turn indicators. Operating principles of gyroscopic instruments. **Engine Instruments:** Construction and operation of tachometers, pressure gages, thermometers, fuel quantity gages. **Safety Appliances:** 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 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 each operates. **Principles and Applications of Meteorology:** Effects of winds, storms, visibility in relation to flight.

A COMPLETE ENGINE COURSE:

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.

Fill in, tear out, and mail

Sent on 5 Days' Approval

The Ronald Press Company
Dept. M247, 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.)

- ☐ Simmons, Air Piloting.....$3.00
- ☐ Lusk, Aeronautics 3.25
- ☐ Moors, Engine Mechanics Manual..... 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.

NOVEMBER, 1938 **VOLUME XI, NO. 2**

Reg. U. S. Pat. Off.

EDITOR: C. B. Colby

ASSOCIATE EDITORS: Wm. Winter and Clyde Pangborn

LIGHT PLANE EDITOR: Arch Whitehouse

GLIDING & SOARING EDITOR: Alexis Dawydoff

MODEL EDITOR: Gordon S. Light

ART EDITOR: J. Walter Flynn

SINGLE COPY, 15 CENTS

YEARLY SUBSCRIPTION, $1.50

STREET & SMITH PUBLICATIONS, INC.

79 SEVENTH AVENUE, NEW YORK, N. Y.

AIR TRAILS

5 ARTICLES

HOW MODEL BUILDERS HELP THE INDUSTRY 9
By John Sprague

WE WIN THE THOMPSON 18
By Roscoe Turner

ATTACK IS SUDDEN 24
By Frank Lambert

AIR TRAVELERS AREN'T HEROES . . . 26
By Bill Burleigh

CATAPULTING FOR AIRCRAFT . . . 28
By Paul H. Wilkinson

4 DEPARTMENTS

LIGHT PLANE FLYING CLUBS 30
Conducted by Arch Whitehouse

N.A.A. NEWS 32
Conducted by William R. Enyart

GLIDING AND SOARING 34
Conducted by Alexis Dawydoff

AIR ADVENTURERS 36
Conducted by Albert J. Carlson

7 FEATURES

FLYING TOWARD SAFETY 6
(Guest Editorial)
By C. Bedell Monro

ABOUT THE GUEST EDITOR 8
By Tracy Richardson

AIR PROGRESS 10

THIS WINGED WORLD 11

SHIPS IN BLACK AND WHITE 23
By Norman Barker

WHAT'S YOUR QUESTION? 29
Conducted by Clyde Pangborn

ABOUT THE COVER 38

2 STORIES

WINGS OVER BAJA 20
By Dick Moreland

A MAN'S GAME 39
By George L. Eaton

9 MODEL ITEMS

Model Contents on Page 51

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. Allen L. Grammer, President; Henry W. Ralston, Vice President and Treasurer. Copyright, 1938, by Street & Smith Publications, Inc., New York. Copyright, 1938, 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 Canada, 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 or art work. To facilitate handling, the author should inclose a self-addressed envelope with the requisite postage attached, and artists should inclose or forward return postage.

THE MOST STRATEGICALLY LOCATED SCHOOL IN AMERICA

CALIFORNIA FLYERS' STUDENTS TRAIN WHERE 55% OF AMERICA'S PLANES ARE PLANNED AND BUILT

Logical, isn't it, that the best possible place to learn aviation is here, where there is the most aviation activity? Southern California has the title of America's Aviation Capital and by a wide margin. Here more than half of the nation's planes are planned, built and tested. Here in California there is more flying and more licensed planes than in any state in the union. This is a terminus of five of the nation's leading airlines. People in every part of the world ride in Los Angeles-built planes; in America every plane in active service on every airline was built in the West.

Here in the Nation's Aviation Capital California Flyers is the only nationally recognized flying school, is the only U. S. Government approved school offering courses in all branches of aviation—flying, mechanics, drafting, and instrument flying. Located in large, modern, fireproof buildings on the nation's busiest Bureau of Air Commerce testing field, California Flyers offers the type of training that builds aviation careers. Plus all of this is the most important point of all—California Flyers offers the greatest opportunity to step directly into a good-paying position after graduation because of their close association with Southern California aircraft engineers, builders and operators. This is a point proved in California Flyers' impressive record of graduates actively engaged in important posts in the aviation field. Today, look into the unusual opportunity California Flyers offers young men for aviation careers.

Typical of the modern training equipment at California Flyers, is the latest type C Link radio beam and instrument trainer, one of few used in Aviation Schools in the United States.

William Fly, former California Flyer Student and now American Airlines First Officer, says:

"It's one of America's ace aviation schools and I know—I've looked them all over."

Here's an opportunity to see for yourself. Write, right now, for California Flyers' intensely interesting free catalog. Learn first hand the unlimited opportunities here in the Nation's Aircraft Capital. Investigate California Flyers' free transportation arrangement. Don't delay. Start your aviation career today by filling in this coupon.

CALIFORNIA FLYERS, INC.

SCHOOL OF AVIATION

LOS ANGELES MUNICIPAL AIRPORT, INGLEWOOD, CALIFORNIA

SEND FOR CALIFORNIA FLYERS CATALOG TODAY

CALIFORNIA FLYERS, INC.
School of Aviation, Dept. AT-11
Los Angeles' Municipal Airport, Inglewood, Calif.

Please send me your new FREE catalog *"Aviation Is Calling You."* I am interested in subjects checked:

Flying ☐ *Mechanics* ☐ *Combined Courses* ☐
Instrument Flying ☐ *Drafting* ☐
Aircraft Building (Aircraft sheet metal) ☐

Name_____ Age_____

Address_____

City_____ State_____

THE ONLY FLYING-MECHANICAL SCHOOL IN THE NATION'S AIRCRAFT CAPITAL

FLYING TOWARDS SAFETY

Editorial By C. BEDELL MONRO, President, Pennsylvania-Central Airlines

The airlines are now handicapped by the early forms of "glamour" publicity and advertising in which the element of adventure and romance had to be stressed. It is true that anyone flying in the barnstorming days was adventurous and was usually the secret envy of his or her more timorous friends.

Unfortunately for the air lines, an airplane accident is announced in headlines on the front page of the newspapers; the causes and the precautions taken to avoid future accidents hide shyly, if they appear at all, in some obscure corner of an edition printed weeks later. Nobody can blame the newspapers—it does make exciting copy.

The public has become more than air-minded; it has become air-conscious—conscious of the advantages and the necessity of air travel to modern business and recreation—and superconscious of the supposed dangers and uncertainties of flying in even moderately poor weather. In other words, the public everywhere and at all times wants to know whether air travel is safe.

What is safety? In anything that moves, from a baby buggy to an airplane, accidents inevitably will occur. The annual carnage caused by automobile travel has kept few of us in our homes, unless we have been the victims. Ocean liners have been burned, piled up on the rocks, sunk in storms. Trains have collided, rails have been spread and wheels have come off; buses have skidded into ravines, dropped into rivers, been ground to bits by trains.

None of that is pleasant, but it is inevitable. All of us know that despite every precaution, accidents still will beset us. The air transport industry recognizes that, and the air transport, like all others, is constantly adding to its safety measures.

When a plane comes in for overhaul, it is literally taken apart and the pieces distributed to half a dozen different shops where highly skilled men test instruments for infinitesimal variations, examine metal parts with a magnetic process for finding flaws which would remain hidden even from a microscope, probe the entrails of radios, adjust the mechanism and the balance of propellers and do a hundred other things of greater or lesser importance.

In a few days the pieces come streaming back through the process of assembly, are fitted together, and the airplane is ready for service. You may be sure that there are no parts left over, except those removed for the substitution of new material.

Contrary to public belief, the pilot is never forced to go out on a run when he feels that the trip should be canceled. Even if he is willing to fly in severe weather, the flight control manager may refuse to sign the necessary flight clearance. And should the flight be cleared and the pilot consider the trip inadvisable, he may refuse to fly it; so there is the double-check system in force in connection with the human element.

Pennsylvania-Central Airlines is lucky in having among its veteran pilots Mr. Horace Stark, a man who has developed two successful instruments which ultimately will result in uninterrupted service during "bad weather." He has perfected the airport orientator device, which simplifies the pilot's problem of locating and approaching an airport in heavy weather. His newer invention, the "position finder," is a simple gadget with which a pilot will be able to fix his location within a few seconds.

We are placing this device in all our planes, and I feel that it is the greatest safety instrument developed since the artificial horizon was brought out in 1932. I feel no hesitancy in predicting that all air lines will be adopting it within the next six months.

Our air track system of blind landing has received so much attention from newspapers and magazines (Air Trails, July, 1938), that I will merely mention that it has been used experimentally for the last six months with satisfactory results.

It has always been our firm conviction that we could maintain our splendid safety record only by the highest standard of morale. This we believe we have accomplished through a management-employee relationship—the personnel has been selected so that it may be truly said that each job fits the man, and each man fits the job. In this way we are able to devote our best efforts to the mechanical maintenance of the planes—their motors, instruments and radios—as well as to the efficient execution of advance weather forecasting, flight control, pilot supervision and check, dispatching of passengers, mail and express, and all the thousands of other details.

The answer to the query about whether air travel is safe can best be answered by stating the fact, only amplified in this magazine last month, that the insurance companies have decided to bet 20,000 to 1 against your being killed in an airplane accident on regularly scheduled service, making available to the public air trip insurance—$5,000 for twenty-five cents. And insurance companies are not charitable institutions. We accordingly feel that 1939 can be faced without misgiving regarding immeasurably improved prospects for the future.

Learn at Home To Make $40, $60, $75 a Week in AVIATION

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 examinations." JOHN HALENDA, 329 S. Balliet St., Frackville, Pa.

Make Me PROVE I Can Train You at Home in Your Spare Time

Send Coupon for FREE Lesson

Don't take my word for it. Make me PROVE that I can give you at home in your spare time, the vital ground training you need for success in the growing Aviation Industry. How can I prove it? Just mail the coupon, and I'll send you a sample lesson absolutely free, with no strings attached. Go over it for yourself. Note the clear, easily understood way in which everything is explained. See how easy it is to learn—right from the start. Then read my free book, "Wings of Opportunity." It will give you the facts on Aviation—tell you how you can train at home in spare time for a good job—show you what a big future there is in Aviation—give you *all* the latest information on the fascinating business of Aviation. You will see what my graduates are doing, what they make, how they got jobs, etc. Mail the coupon now for my FREE BOOK and FREE LESSON. It may start you toward a good pay job in Aviation.

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 when they started training, are holding down fine jobs right now—in the air and on the ground. *Over forty different types of jobs to choose from,* once you have the necessary training. Get the facts about my practical training and Money-Back Agreement NOW!

I Train 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—made as simple and easy as possible. You get all the information you need to pass the Government's written examinations 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 on your Flight Instruction at a good airport near your home.

Get My FREE Book Now—Mail Coupon

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 handy coupon on the right today—right now—while you're thinking about it. I'll send you my SAMPLE LESSON and my big FREE Book—packed with interesting facts about your opportunities in Aviation. Mail coupon NOW.

WALTER HINTON, President, Dept. B3C
Aviation Institute of America, Inc.
1115 Connecticut Avenue, Washington, D. C.

Walter Hinton

First to fly the Atlantic; first to fly from North to South America; first to explore the upper regions of the Amazon by plane. Flying Instructor in Navy for five years. Now giving ambitious men practical ground work training in Aviation at home. Mail the coupon below for your copy of his big new FREE Book today.

AIRPLANE FLIGHT INCLUDED

Just as soon as you complete my training, I arrange a flight for you at an accredited Flying Field. There is no extra charge for this. My book tells all about it. Mail coupon.

Mail for my big FREE BOOK on AVIATION Now!

Walter Hinton, President, Dept. B3C
Aviation Institute of America, Inc.
1115 Connecticut Avenue, Washington, D. C.

I am anxious to have you prove to me that you can train me at home in my spare time for Aviation. Send me, without obligation, your free sample lesson, and your free book, "Wings of Opportunity."

Name.....
(Print Clearly)

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

City..... State .....S

ABOUT C. BEDELL MONRO

By TRACY RICHARDSON

Rare it is indeed to find a man of pedagogic training who has a canny business sense and who also has the ability to relax and gain enjoyment from whatever leisure he may be able to snatch from a busy life. Such, nevertheless, is the combination of qualities found in C. Bedell Monro, youthful president of the Pennsylvania-Central Airlines Corporation.

Mr. Monro was born in Pittsburgh thirty-seven years ago. He prepared at Shadyside Academy in his native city and then went on to Harvard, where he was graduated in 1923 with an A. B. He then spent about a year at the Sorbonne, after which he entered the University of Pittsburgh to study for his master's degree, which he received in 1926. Following this he married and became an instructor in English at the University of Pittsburgh, remaining at that post for five years.

A Boeing 247D, type of ship flown by PCA.

Mr. Monro's interest in aviation was awakened soon after the War when he had a flight with a barnstorming pilot in the vicinity of Pittsburgh. The pilot gave him an exciting flight down the Susquehanna. They hopped over one bridge and under the next.

This bridge-hopping attracted so much attention to him and his flying partner that he began to wonder about the possibilities of commercial aviation—if it could be made safe rather than spectacular.

The vision which came to him at that moment has been realized; a safety award was given to his company just last April for having flown eleven years without a passenger or crew fatality in more than 50,000,000 passenger miles.

In 1928 Mr. Monro was the prime mover in organizing a small company to do aerial advertising and handle passenger hopping. On one of the preliminary flights the lone plane of the company was cracked up, but that did not stop Mr. Monro. He interested several older Pittsburgh men in the possibilities of aviation and became secretary (later vice-president) of the Pittsburgh Aviation Industries Corporation, and of Pennsylvania Airlines.

The first route of the latter was from Pittsburgh to Cleveland via Youngstown. In 1929 the transport company carried passengers and express from Pittsburgh to Washington. In 1934 Mr. Monro became president of the Pennsylvania Airlines and Transport Company.

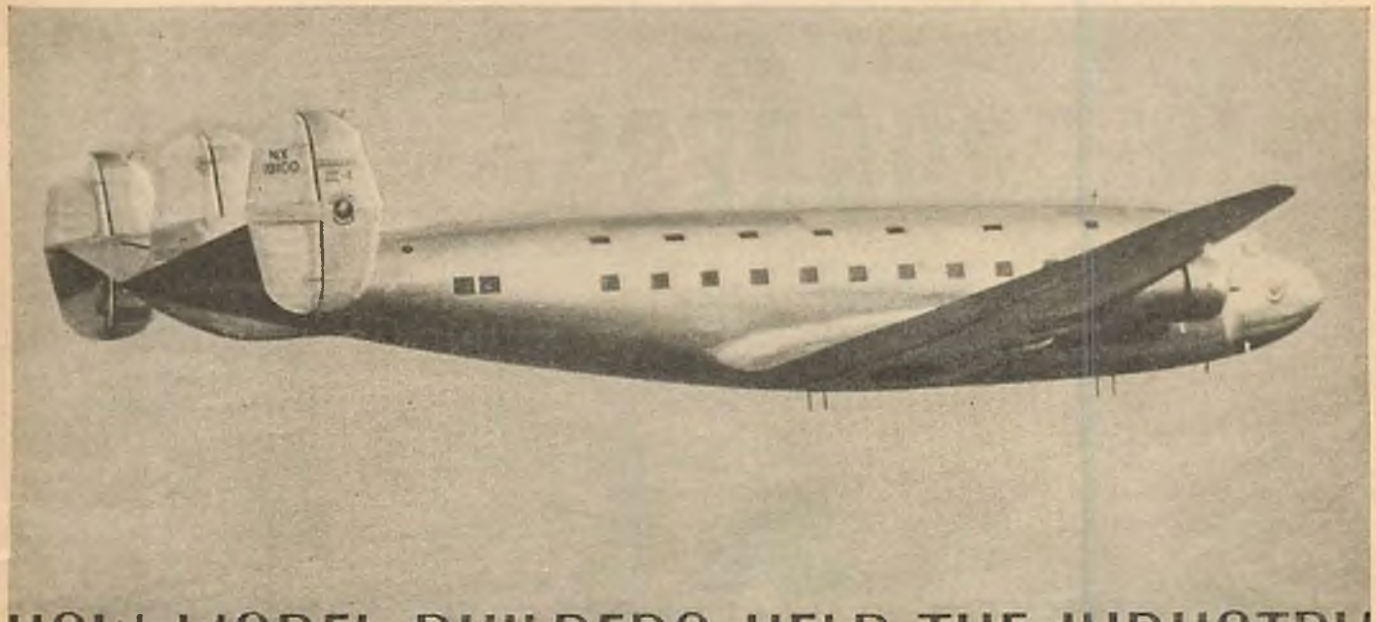
Following the cancellation of airmail contracts by the government in February, 1934, a new company known as Central Airlines, Inc., bid successfully and extended the route to Detroit. Pennsylvania Airlines continued its passenger and express operations and extended them to Detroit. In July of the same year the Detroit-Milwaukee route was added—via Pontiac, Lansing, Grand Rapids and Muskegon. Flint was substituted for Pontiac in 1937. A merger was effected the same year and Mr. Monro became president of the Pennsylvania-Central Airlines Corporation.

A run was started in April from Pittsburgh to Charleston, West Virginia, via Parkersburg, but soon was discontinued because of a lack of adequate airway facilities—a typical example of the president's adherence to safety principles.

In October of 1937 the link between Washington and Buffalo via Baltimore, Harrisburg and Williamsport, was made, and the company began opening many new routes in rapid succession—Pittsburgh to Buffalo, Pittsburgh to Baltimore, Washington to Norfolk, Chicago to Grand Rapids and, in July, Detroit to Sault Ste. Marie in the vacation land of Michigan's Northern Peninsula.

In his eleven years of association with the aviation industry, C. Bedell Monro has watched his idea of a feeder line grow from a route covering 126 miles to a network of more than 2,100 miles, and from 200 passengers in 1928 to 67,102 in 1937.

Mr. Monro's policy is best told in his own words: "A conservative operating policy more rigid than the requirements set forth by the United States Department of Commerce in its safety regulations. . . . Our efforts are continually concentrated on increasing safeguards in accordance with our traditional policy. A centralized flight control and the duties and the responsibilities of pilot, personnel and flight control officers were coördinated to insure that each flight would be dispatched and operated only after a most careful system of 'double checks' on weather, courses and flight altitudes. In addition, increased training facilities have been made available to our pilots so that they may be able to keep at the highest point of efficiency at all times. Aside from the training and the procedure involving the human element, a large part of our efforts are spent on the improvement of flight equipment, its navigational instruments and radio facilities and on the improvement of ground navigational facilities."



HOW MODEL BUILDERS HELP THE INDUSTRY

Did you know that model building is more than a hobby, that there are 2,000,000 enthusiasts in the country, and the business is valued at $2,500,000?

By JOHN SPRAGUE

Life magazine is responsible for the statement that there are in this country approximately 2,000,000 model builders, and that the industry created by model building is valued at $2,500,000.

Although this announcement coming from an impeccable source is not a surprise to model enthusiasts, it does mark a momentous event in the status of model airplane building. The one insurmountable handicap that has prevented model building from attaining its rightful respect in the eyes of the general public has been the erroneous impression held by the layman. Model airplanes were branded as "kid stuff."

Actually, model building is now an indispensable factor in the American aviation industry. It must be understood that the average age of the hobbyists qualifies many of them to serve in various capacities in the real plane field. And it is known that many do find their way to aeronautical employment.

To build airplane models successfully, the boy who is the beginner must enter upon a period of apprenticeship that eventually necessitates a certain degree of mathematical knowledge, the understanding of stress and proper constructional design and, of course, a familiarity with aerodynamics.

More specifically, his knowledge of aerodynamics includes such things as the characteristics of airfoils, plotting them, and their uses for different types of performances; the proper disposition of aerodynamic forces and the relation between the areas of the different flying surfaces. He must have at his fingertips longitudinal, lateral and spiral stability. In fact, the average gas model builder is both interested in and capable of wading through governmental technical reports.

The giant Douglas DC-4, above, is the product of a model builder's dream. Many prominent men in aviation were model builders.

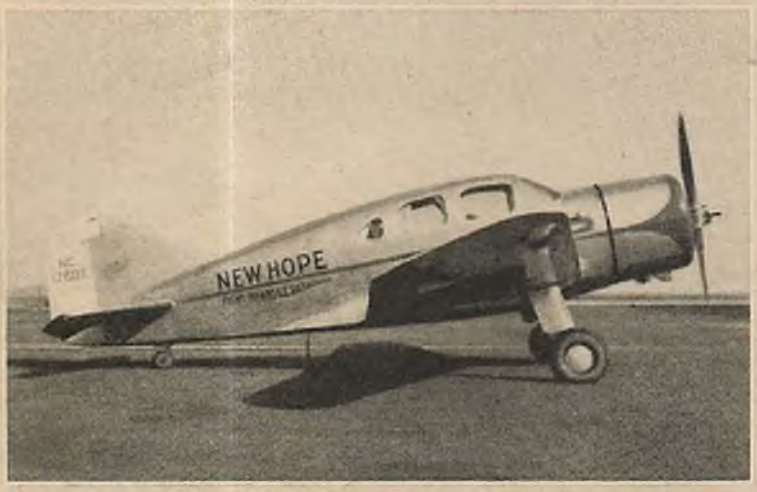
The value to aviation of such a militant youth support cannot be overestimated. From the publicity standpoint alone there is no promotional force that can achieve equal results. In thousands of homes model builders wage continual verbal war with parents and elders that aviation is safe. They point out in rebuttal the fine records of the air lines, bring attention to photos of new sky liners, and, in many cases, by their own desperation to justify the time they spend in model building, gain the enthusiastic support of their fathers. No aeronautical advertising could possibly gain such attention in the home.

Most phenomenal about the model builder is his grim determination to break into the real plane field. In the face of handicaps which only their enthusiasm prevents them from considering hopeless, they assimilate a vast store of aeronautical knowledge. From this earnest group comes a large portion of the air-school students and candidates for the military air services.

From it came Donald Douglas, designer of the well-known DC-4. . . .

AIR PROGRESS

A Summary of Aviation News



This Wasp Jr.-powered Spartan Executive 7W has been selected for use in President Roosevelt's campaign against infantile paralysis.

TRANSPORT

Beginning July 1st, TWA carried children accompanied by adult guardians at half fare. This move was made to capture complete family trade during the vacation period, and the plan worked with unexpected success. Children under two years of age, when accompanied by an adult, are still carried free of charge.

* * *

The Grand Canyon-Boulder Dam Tours, Inc., have inaugurated scenic flights by seaplane over Boulder Dam and Lake Mead. The service is a combination of TWA land planes and a Boeing flying boat owned by the Grand Canyon-Boulder Dam Tours, Inc. A combination ticket also includes a twenty-mile cruise into the Grand Canyon gorge aboard a fast motor cruiser.

* * *

Twenty new pupils signed up for the Ryan Aviation School's special summer course, and the expansion of the engineering department necessitated moving this division of the school to larger quarters. Stanley H. Evans—noted British aeronautical engineer who was trained at Handley Page's, served later with Gloster, and in recent years connected with Douglas and Northrop—is now in charge of that branch of instruction.

The Piper Aircraft Co. is instituting a new feature in its educational policy. Two ground-school courses will be offered by members of the factory staff—the first involving the training of about 200 CCC members at Camp Loganton, in Pennsylvania. The course will include theory of engines, aircraft construction, simple aerodynamics, navigation, meteorology and a rapid overview of radio as adapted to aircraft. From this group six students will be selected and chosen for a course in practical aircraft welding in the Piper factory at Lock Haven, Pa.

The second course was originally sponsored by the Cub Fliers of America and consists of a ground-school course covering one year of tuition from papers prepared by the Cub Fliers connected with the Piper factory. It is presumed that this course will be open to all Cub owners or members of clubs owning Cub planes.

* * *

TWA is conducting a research for impressions of business men who do not fly. It has been discovered that most men are under the impression that air travel is far less dependable than statistics prove. TWA officials point out that more than 1,000,000 passengers were carried safely by the air lines last year and more than 180,000 safe landings were made so far this year by scheduled airliners. The average person has the idea that about 800 passengers a year are killed in air-line crashes—a figure which is exactly 1,700% too high.

* * *

After many years of preparation and several test flights in the form of chartered trips with passengers and special air mail, the new Intercontinental Airways, which is a combination of KLM—Royal Dutch Airlines—and the KNILM, Royal Netherlands Indies Airways, finally opened their service from London to Sydney, Australia. They made the trip in two days' faster time than their rivals. The company is using American-built Douglas and Lockheed airliners. The service brings Egypt and Bagdad within two days of travel. Karachi is reached in three days. Calcutta and Rangoon within four, and a passenger can have dinner in the Raffles Hotel in Singapore five days after leaving London.

* * *

A new Polish airliner, designed to replace American machines now in use over the P. Z. L. company's lines, has a top speed of 235 m.p.h. It looks much like a Douglas Mainliner with twin rudders *a la* Lockheed. It uses Cyclone G.2 engines and carries fourteen passengers and a crew of three.

* * *

The Manchuria Aviation Co. has taken delivery on two Heinkel He.116's, small four-engined airliners. The planes were flown from Germany to Tokyo in 51 hours, 17 minutes, a distance of 9,300 miles.

* * *

Pilots in transport work in Canada will come under new regulations this year. The minimum age has been raised from 19 to 23 and the maximum age fixed at 45. Commercial pilots will be compelled to show 500 hours, and new regulations will apply to the endurance test, night-flying test and blind spins.

* * *

Imperial Airways has taken delivery of the first Armstrong-Whitworth Ensign, one of the larg-

(Turn to page 90)

THIS WINGED WORLD

International

This modern generation! Jean Rudd, age 4, and sister Barbara, 17 months, fly alone from England to Switzerland.

Wide World

Below—This apparently harmless window will house one of the gunners of the new British Handley-Page medium bomber.

Above—Sky giant and no fooling! Robert Wadlow, of Alton, Ill., goes for a plane ride in a Lambert Field tri-motor ship.

Below—The barefoot boy who broke the record! Clarence McArthur, flying barefoot, sets light plane record of 207 m.p.h.

the news of the aeronautical

Wide World

International

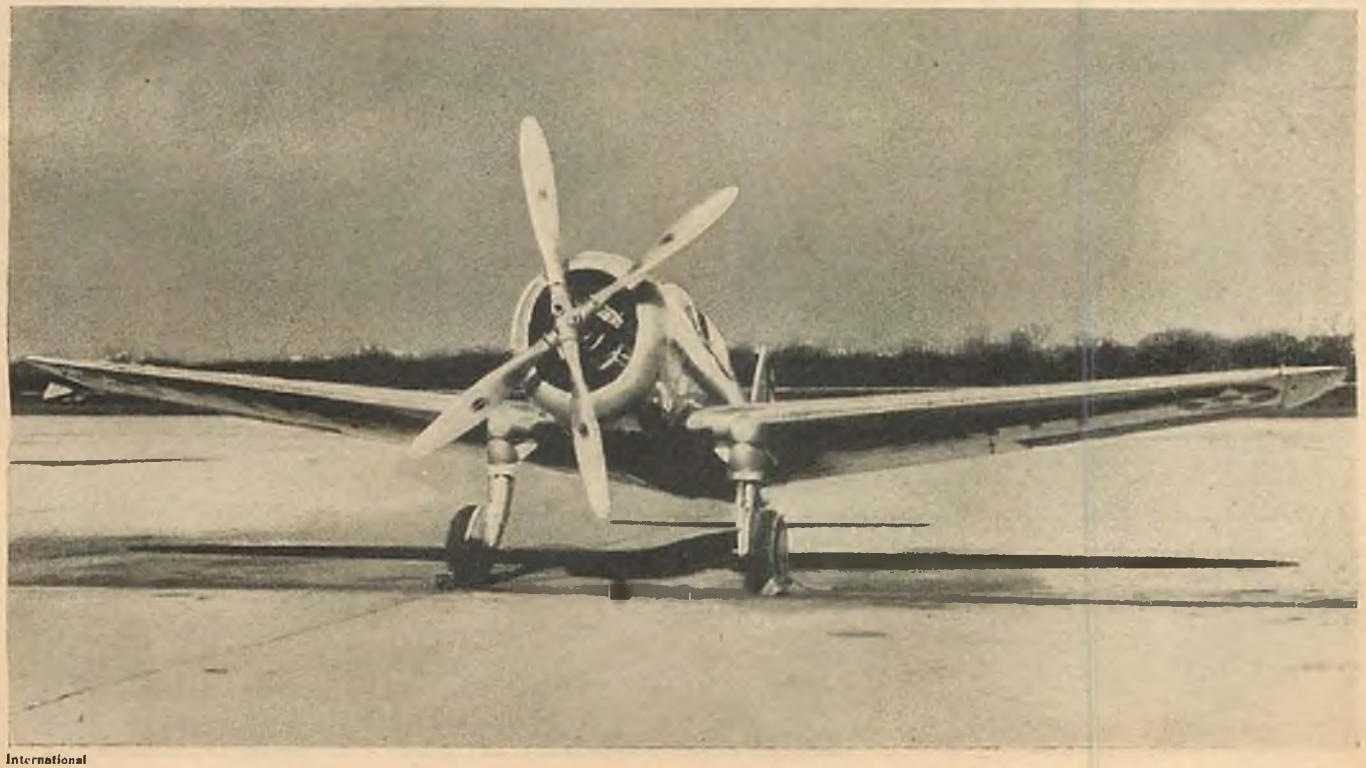
Acme

Above—Clipped wings! Former Assistant Sec'y of the Navy Ingalls' plane now used to blow warm air over fruit trees.

Wide World

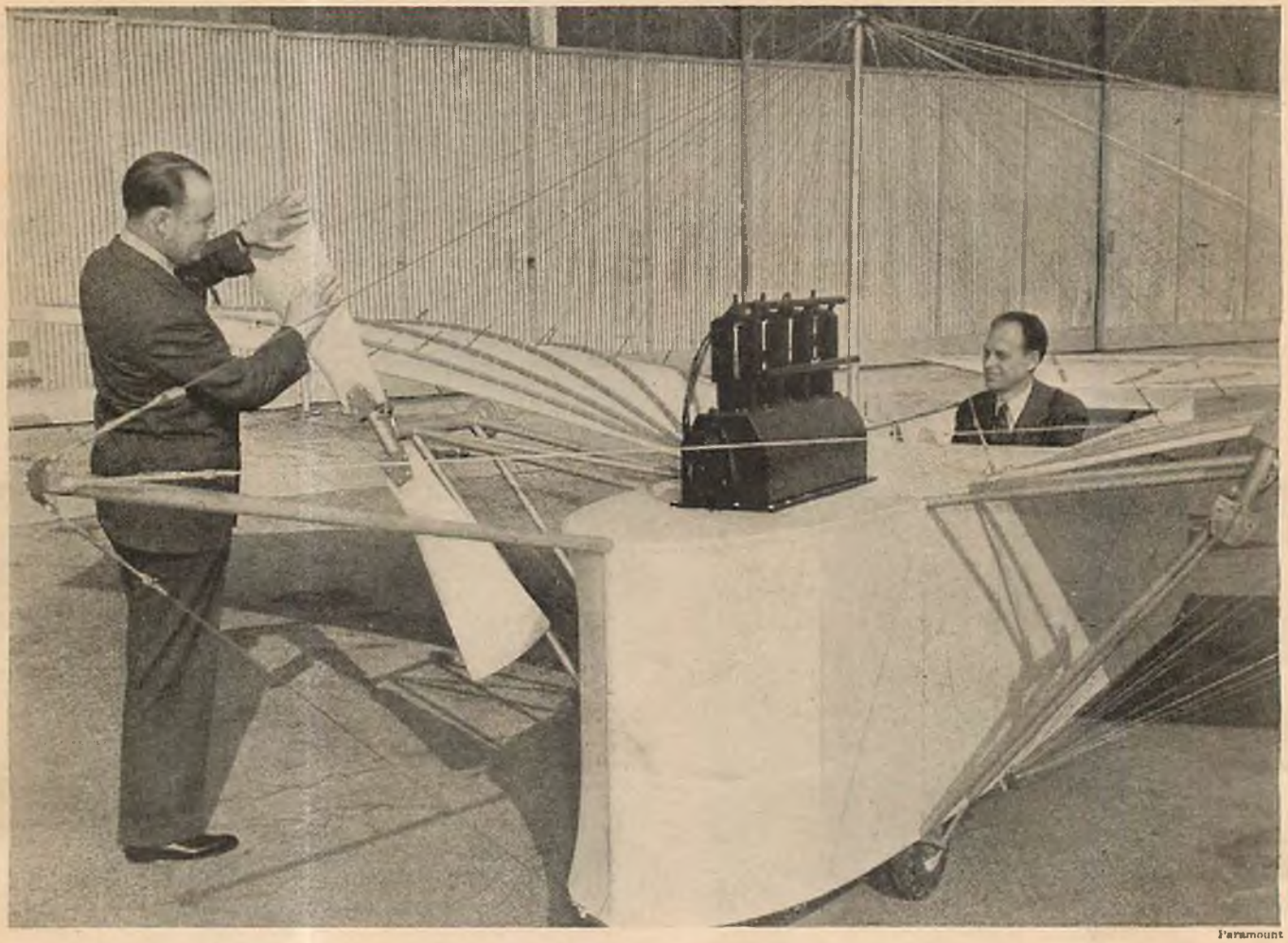
Above—The first lady of France—to win a sailplane license! Mme. Jarlaud, who was recently awarded her soaring license.

world presented in pictures



International

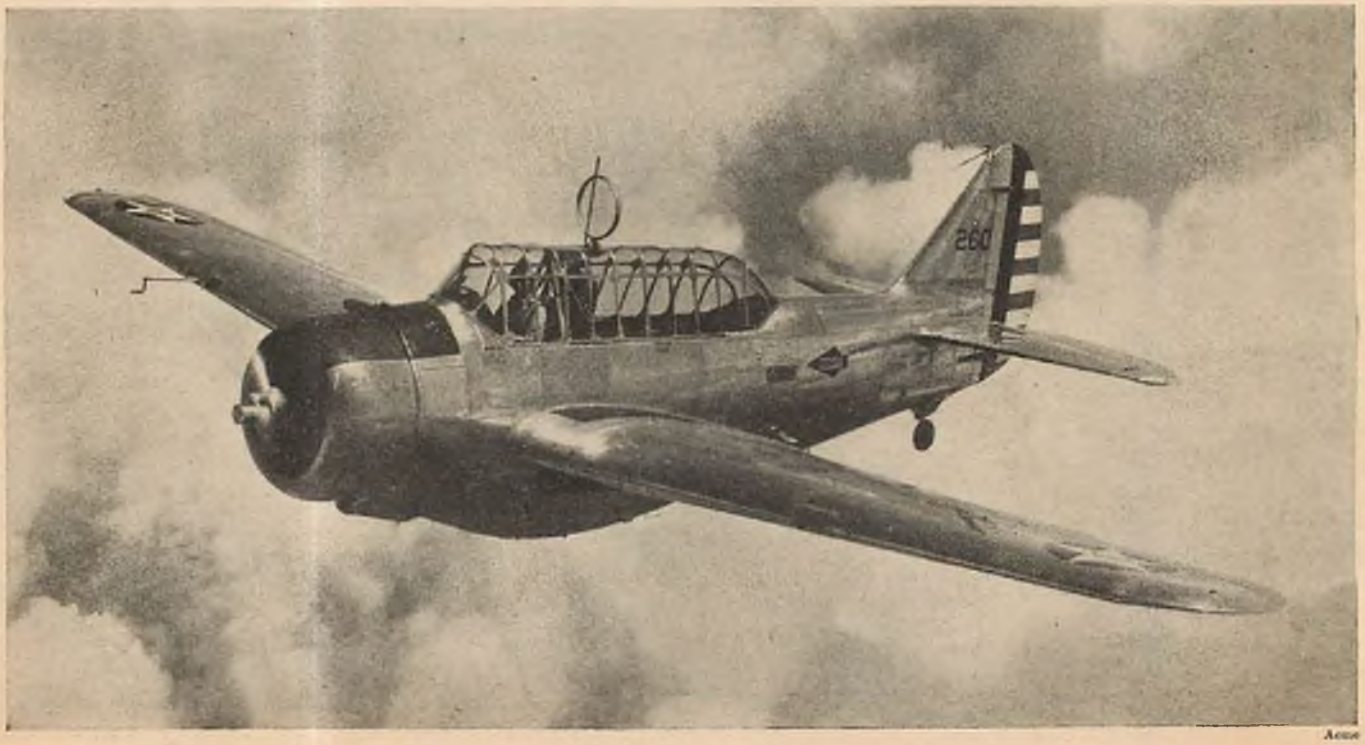
Below—No, this is not a mistake. Two props turning in opposite directions are being tested in anti-torque experiments.



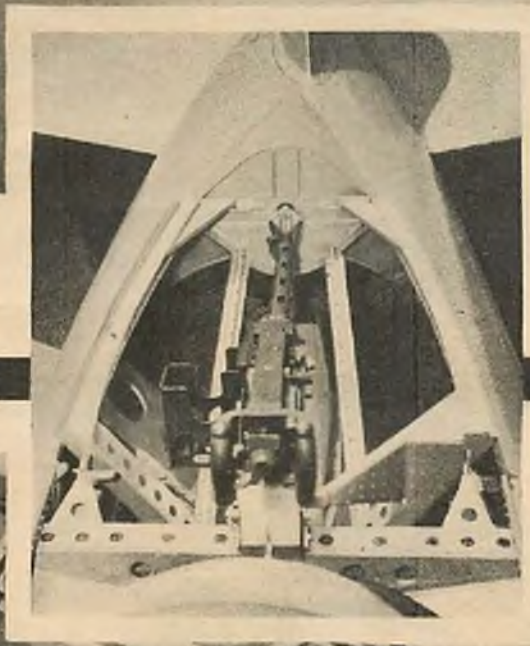
Paramount

Above—Built to crash! One of two power gliders built from blueprints of 1904 to be flown and eventually crashed in the historical motion picture "Men With Wings." Note wing ribs and guy wires.

Below—It's a long flight from the above design to the latest in U. S. Army Air Corps observation planes shown below. This North American O-47A three-place ship flies 1000 mi. at over 200 m.p.h.



Acme



Top to bottom photos show how the revolving turtleback opens to permit gunner to protect the tail of the Seversky Convoy Fighter. Sliding seat enables gunner to also cover all angles of fire above.

guns to the rear!

1

sign of the times

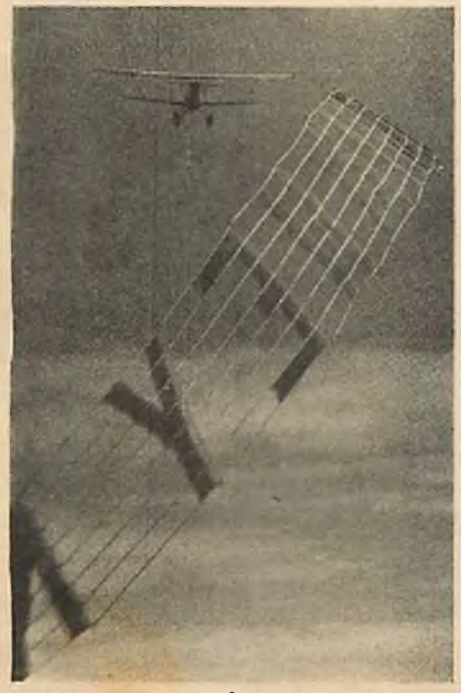
2

So that's how they do it! Perhaps you have wondered how those giant towed signs are made and how they are taken into the air and brought down again. Here's the answer. Figure 1 on the opposite page shows the two trailing cones that keep the sign out in line and steady. These are attached to the last letter of the sentence. In figure 2 the size of the letters is evident. These are of strong cloth attached to cords and light bamboo poles to keep them extended. The letters are approximately five and a half feet high and some of the signs are over a hundred feet in length. Figure 3 shows how the signs are laid out in a line upon the field. The pilot flies toward the sign, hops into the air, and flies over the sign peeling it off the ground behind him as shown in number 4. Expert piloting is essential in getting the 150-foot tow rope which is attached to the front of the sign into the air without fouling. The bamboo stick on the front end of the sign is weighted at lower end so the sign will fly vertically, as shown in figure 5. Getting the sign down again is the easiest part of the flight. The pilot simply flies across the home field and releases the tow rope, Figure 6. The sign drops to earth where the crew reassembles the letters into another advertisement while the pilot takes up another, already prepared and laid out.

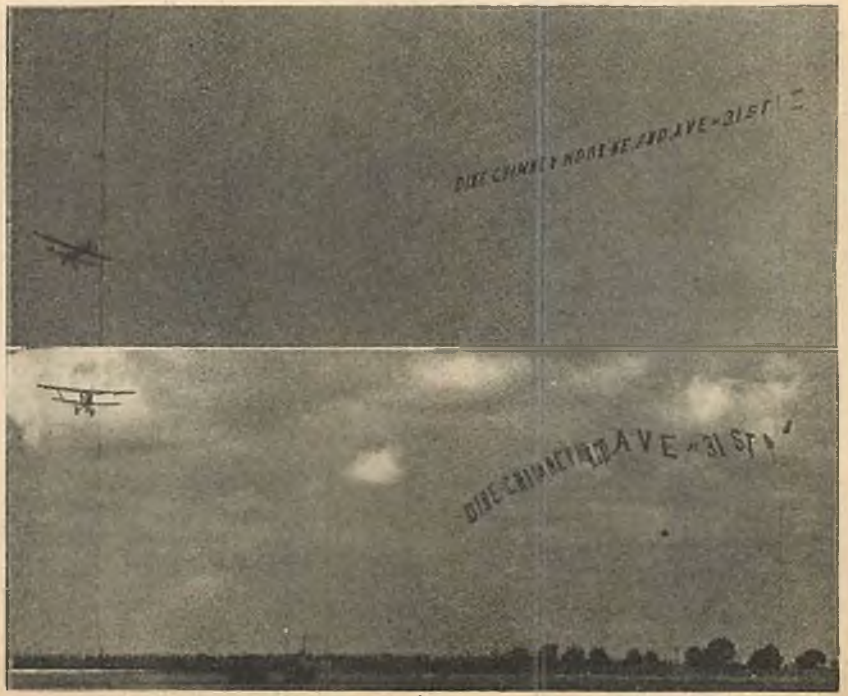
3

5

Globe feature



4



6

WE WIN THE

By ROSCOE TURNER

Early last May I was sitting in my New York apartment when the telephone rang. It was my old friend, "C. B.," editor of this magazine, on the wire. Seems he had just heard I was planning to compete in my sixth Thompson Trophy Race in Cleveland on Labor Day. He asked me if I would cover the National Air Races for Air Trails.

"How can I," I said, "and be a participant at the same time? Besides, the press will cover it. Besides again, I'd be talking mostly about the winner. Did I tell you Turner was going to win?"

However, he convinced me that it was not so much an actual detailed account of the races he wanted, but rather an intimate picture of little details that went on behind the scenes. Realizing the amount of work that was ahead of me in preparing for this race, I hesitated to commit myself. And, of course, I also thought of the excitement and drain on my time that would follow my winning of the big classic. Do I hear loud cheers? Well, brethren, I'll admit this much: Even at that time I was positive that this year I had the airplane which was going to be in the winner's inclosure at the Cleveland Airport a little after five p. m. on September 5th. And a good plane helps a lot.

I have followed the progress of Air Trails since its first issue, and know the constructive work it has done in keeping the aviation enthusiasts abreast with developments in the industry. So, C. B., you asked for it, and here it is.

The following months were certainly busy ones for me. My Pesco special, the plane I was counting on, had been in winter storage in the hangar of the Queen City Flying Service at the Lunken Airport, Cincinnati. Bunny Hinsch, president of the Sportsman Pilot Association of America, and his partner, Larry Schmidlap, were of great assistance to me in getting the kinks out of her in preparation for flying across country to the Pacific coast. On the coast my mechanic, Don Young, was already working on my other racing ship, the Wedell-Williams special, the ship in which I finished second in the Thompson Trophy Race two years ago and set a transcontinental east-to-west record in 1933.

There was to be a series of races in Los Angeles on Decoration Day, and I had planned to enter either of the two ships that was ready, in order to do a little preliminary testing before the big event in September. After my arrival, we decided I was to use my Pesco. This is a specially built Laird racing plane constructed along lines of my own and powered by a Twin Wasp, having a one-thousand-horsepower motor with a three-bladed Hamilton controllable-pitch propeller.

In the Los Angeles race, both Earl Ortman and myself broke the world speed record for this type of course,

oe Turner holding the Thompson Trophy.

The event was of national importance, the big moment of the year for the city of Cleveland.

CLEVELAND PLAIN DEALER 8 A.M.

TURNER'S RECORD 283 M.P.H. WINS

Trophy Winner Streaking to Record-Shattering Victory

270,000 WATCH PILOT SPEED TO NEW MARK FOR THOMPSON TROPHY

PLEDGES ANOTHER AIR-RACING KLING

Turner Wings Way to Fans' Hearts, Too

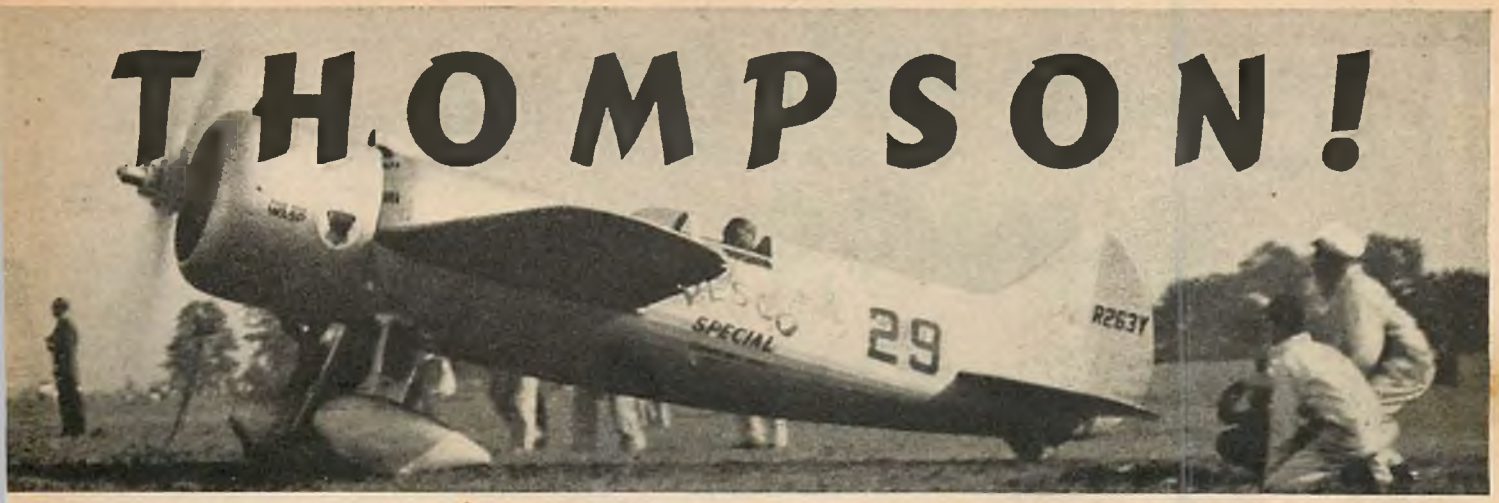
CHILE QUELLS NAZI REVOLT ATTEMPT

31 KILLED IN OHIO

Chute Jams; Sky Jumper

RACE CROWD SETS AVIATION RECORD

THOMPSON!



Waiting the starting flag for the biggest speed event of the year. In foreground is Turner's Laird Pesco racer, in the middle background Ortman's Marcoux-Bromberg, and, background, Turner's other ship, Joe Mackey up.

Earl beating me by one-tenth of a mile. We both averaged two hundred and sixty-eight miles per hour. Neither of us opened his ship up entirely, and it was mostly a matter of jockeying for position. However, the Pesco's performance gave Don Young and me every confidence it had the additional speed needed for the big race at Cleveland. We were ready.

I had secured the services of Lieut. Joe Mackey, former army pilot, to fly my other ship. (Don't think I wasn't proud of that ship, too. It helps give me the funny title of being the only man in the world who has ever owned two racing planes at the same time which can do better than three hundred miles per hour.) We flew across the continent at leisurely stages and arrived in Cleveland on August 5th. The following days were entirely devoted to getting those two planes in the most perfect condition possible.

Then came the day of the qualifying trials. We had to make two laps of the ten-mile rectangular course. I had the old ship well opened up during these two laps, and qualified at the average speed of 281.25 miles per hour, the fastest time, giving me the pole position. Lieut. Mackey qualified at 261.439 miles per hour, giving him third position, and Earl Ortman qualified at 270.473.

Two days after the qualifying round, Cleveland turned into a city that was very reminiscent of a college town the day before the big game. The hotels were jammed and practically every person connected with aviation was in Cleveland.

Right here some people may take time out and question the benefits of speed racing in aviation. It is actually a great testing laboratory to the industry, just as the Indianapolis races are to the motor industry. Charles E. Thompson, late president of Thompson Products, Inc., was one of the first to realize the benefits of such competition and established the Trophy in 1930, and since his death in 1933 the sponsorship has been continued by the present head of the company, Fred Crawford. There is little question that many of the large aircraft factories conduct their own elaborate research into aeronautics, and you may wonder what further purpose can be served by the daredeviltry of the racing birdmen. Much of value comes from the ingenious solutions to the problems that arise in this special flying. Space is at a premium in the racers; fuel pumps, landing gear, cooling apparatus, must be highly efficient and still occupy a minimum of room. Many of the developments born of racing are adopted by military and civil aviation, for in the fires of such strenuous competition they get their proof.

Friday night, before retiring, I sent Jacky Cochrane a telegram of best wishes in her effort to win the Bendix transcontinental. I had great confidence in the Seversky pursuit plane she was handling, as *(Turn to page 95)*

Young, mechanic, completes the picture.

Turner lands the Pesco racer after setting a record of 283.261 for the Thompson Trophy Race.

WINGS OVER BAJA

by

DICK MORELAND

ADMIRAL MORGAN was pacing restlessly up and down the big office when Lieutenant Jeb Walker was ushered into his presence. The admiral was a tall man, worn thin and hard by long years at sea. His hair was white, his face brick-red and there were tiny wrinkles about his eyes. He was a salty, hard-boiled admiral and he wore on his left breast, over a double row of ribbons, the gold wings of a pilot.

"Find anything?" he barked.

"No, sir," Jeb replied. "Didn't see so much as a chunk of driftwood."

The admiral grunted. "Our Intelligence men have unearthed a queer story. Two operators came back from Tiajuana yesterday with a report that a gang of criminals is located somewhere in Baja California. They're stealing planes and selling them to the rebel army in Mexico. Paint 'em over, of course, and change the numbers. Thefts have been reported from three airports in Los Angeles and as far north as Seattle."

"You don't mean—" Jeb burst out. "They wouldn't steal planes from the navy!"

The whole thing was incredible, impossible. Navy planes didn't disappear into thin air. Nevertheless, three XL flying boats and a Stephens fighter had disappeared. One morning, they had flown out for the usual spotting practice. They had not returned nor had there been any word from the pilots. That had been four days ago. Now, every plane in the station was in the air, scouring the coast for the missing ships. From Los Angeles to the southernmost tip of Baja California the searching planes had flown. And not a sign of the three boats and the trim little fighter had been discovered.

Jeb Walker was concerned. Danny Taylor, who had gone through the Academy with him and won his wings at Pensacola at the same time, had been flying the Stephens. Jeb knew that Danny was a careful flyer, that he had brains. If Danny had got into trouble, cracked up, or been forced down, he would have found some way to send word. As no word had come, Jeb could only suppose that he was either killed or else, improbable as it seemed, was being held prisoner.

"That's what you're going to find out," said the admiral. "You're going down into Lower California and see for yourself."

"Yes, sir," said Jeb with feeling. "I'll mount a couple of guns and—"

The admiral shook his head. "Don't forget that Lower California is Mexican territory."

"But, sir," Jeb protested, "Danny Taylor's one of my best friends. I'd go through hell for him."

"Maybe you will before this is over," said the admiral grimly. "I want you to crash a plane on the lawn in front of the Administration Building. You will face a court-martial which will discharge you from the navy. You will pretend to become a drunkard and to go down into the gutter like a worthless bum. The navy can't do anything officially. You're going into Lower California and locate those flyers. Now do you see what I mean?"

"Yes, sir," said Jeb slowly.

"Very well. You can take one man with you."

Jeb managed a grin and answered: "If it's going to be a fight, I want O'Halloran. He's a crack boxer and loves a good scrap."

"Thought so," grunted the admiral. "O'Halloran's enlistment expires in a few weeks. We'll hand him his discharge and have him go down to Tiajuana and wait for you there."

C Squadron considered Jeb Walker a skillful, careful pilot. They were surprised when he came roaring down out of the clouds and cracked up an old KT flying boat on the neat little green square in front of the Administration Building.

The pilots of C Squadron were sorry when Jeb went before the inevitable court-martial board. And they were sorrier when they heard that Lieutenant Walker's resignation had been asked for and received. Several of them went to his quarters to offer condolence and sympathy, but got a strange reception.

"I'm through," Jeb said bitterly. "I don't want any sympathy. I'm headed for hell and I'm taking the shortest and quickest route. I'm going to hit the first saloon in Tiajuana and stay there until I drink it dry."

They pleaded with Jeb, but it didn't do any good. To Tiajuana he went and into the first saloon, and there sat himself down at a table and in a loud voice demanded a bottle of whiskey.

Hug O'Halloran, by an odd coincidence, happened to choose the same saloon in which to stage a riotous celebration. He had been there for three days, had refused to leave, and had amused himself by trying to drink out of every bottle behind the bar. A crowd had gathered and Hug was declaring himself in a loud, pugnacious voice. "Sure, I was in the navy," he announced. "But I ain't no more. I served my time and I'm through. I'm my own boss and I'm looking for trouble."

Then he spotted Jeb sitting at a table across the room, and suddenly began to slap his thighs and laugh. "Do you see that guy over there?" he cried. "He used to be in the navy, too. One of the best flyers they had, but he cracked up a ship, got court-martialed, throwed out and disgraced. Him and me is just the same. We're both on the bum and don't give a damn who knows it."

Jeb acknowledged Hug's greeting with a scowl and proceeded to down a stiff drink of whiskey.

Hug went on with his broadcasting. "That guy can make a airplane sit up and talk," he bragged. "I've flew with him myself. But it's all over now. He's just a bum and out of a job. We're a fine pair, we are, him that used to be the best pilot on the Pacific coast, and me that used to be the best mechanic."

A big, red-faced man, with dull, hooded eyes, edged through the crowd, watched Jeb toss off another drink, then moved casually forward and sat down at a table just behind the flyer.

"Is it true?" He spoke in a soft,

apologetic voice. "Have you been a flyer in the navy?"

Jeb turned slowly, peered through bleared eyes at his questioner. "Sure," he said sullenly. "What of it?"

"Plenty of jobs for good pilots," the stranger suggested. He flipped a card from his pocket. "Let me introduce myself," he said. "I am Jack Marko, president of the International Aviation Company."

"Never heard of it," growled Jeb, examining the card.

Mr. Marko's lips twisted themselves into a grin. "It's a new company," he explained, "doing business of a very confidential nature. Frankly, Lieutenant Walker, we are the purchasing agents for the rebel army in Mexico."

Jeb flopped back in his chair and scowled at the affable Mr. Marko. "So you know who I am?" he said. "You've heard all about me, I suppose."

"Sure, why not?" said Marko easily. "Your story, your picture, was in the papers. I knew who you were the minute you came into the bar."

Jeb grunted and reached for the whiskey bottle. Marko put out his hand and pushed the glass away. "Just a minute," he said easily. "I want to talk to you. Maybe we can do business. That is, if you've got over some of your navy ideas."

Hug O'Halloran had observed the meeting between Jeb and Marko. He now came shouldering his way forward, an ugly smile on his face. "Is this guy botherin' you, lieutenant?" he demanded of Jeb. "Gimme the word and I'll sock him."

Marko pushed back his chair and stood up. His right hand dropped casually into his coat pocket.

"What shall I do, lieutenant?" asked Hug truculently. "Sock him or not?"

"No, sit down," Jeb answered. "Don't start a row. And besides, Mr. Marko is the president of an aviation company. If you behave yourself he might give you a job."

"To hell with a job," said Hug. "I don't want a job, I want a drink."

"Sit down," ordered Marko.

Hug sat down reluctantly, elbows on the table, his head resting in his hands. Marko smiled and went on: "I think you two are the kind of men I'm looking for. In my business it's very difficult to get good pilots and mechanics. I pay well, but there is an element of danger in the work which seems to frighten most of the flyers away. My company has a landing field in Lower California. From there the planes are flown across the Gulf into Mexico. As our ships are intended for the rebel army, they naturally are preyed upon by the Federals. The lines shift, so that it is very hard for us to keep track of rebel headquarters. You can see what a difficult business it is."

"Fighting," said Jeb. "Plenty of excitement."

"Yes," said Marko. "If it's fighting you want, I'll see that you get plenty."

"Sounds good," said Hug thickly. "Where's he at? Who wants to fight? Lead me to him."

"Guess that answers for O'Halloran," said Jeb. "Known him a long time. He's an expert mechanic when he's sober."

"He'll do," said Marko. "So will you. The job's yours if you want it."

"We're hired," said Jeb. "What'll we do next?"

Marko had an automobile waiting.

The Mexican with the knife whimpered and went down. Hug stepped across his body and planted a right on the jaw of the other.

Jeb and Hug climbed in and were driven rapidly across the brown-baked hills. They came to an old ranch house surrounded by low flat fields which looked as though they had once been under cultivation. The place was deserted now and there was a faded sign on one of the buildings which announced that it was for sale.

Marko chuckled as he led his two new employees around the end of the barn and showed them wide double doors which had been cut into the side of the building.

Inside stood a neat cabin monoplane, painted dark gray.

Hug checked the plane and found it in perfect condition. He noticed also that the registration numbers on the bottom and top of the wings had been painted out. Hug said nothing, reported to Marko that the ship was ready to fly.

The three of them wheeled the plane out, Hug and Jeb started the motor and kept it turning over until it fired smoothly. Then Marko climbed into the cabin, slammed the door behind him. "All right," he ordered, "let's go."

Jeb gave the ship a swift run down the field and pulled her into the air. Marko leaned over and tapped him on the shoulder, pointed south. "Straight ahead," he said.

It was an hour's flight by the chronometer on the dash. Both Hug and Jeb tried to watch the country below, but there was such a sameness about it—an endless brown plain dotted with low hills—that they could recognize no landmark. Once they had to climb six thousand feet to cross a mountain range; for a while the sea showed under the right wing and then the course swept inland and the blue water and white surf were lost.

"Circle," ordered Marko, pointing down. "The field's just below." Jeb looked down but could see nothing. They were over what appeared to be an old crater. On one side a fringe of green marked the presence of water. He did as he was told, circling lower and lower until the whole bed of the crater spread out below him, a dry salt-rimed waste.

Marko smiled when he saw the confusion on Jeb's face, indicated a narrow belt of greenery. Jeb swept over it and saw the field.

At one time the crater must have been a lake. The water had gradually dried up until now there was only a strip perhaps a half mile long and a quarter mile wide. Even from the air it was easy to see that this narrow lake was salt. Both sides of it were flanked with smooth, flat beaches where the salt had dried. But it made an ideal landing place. A flying boat had plenty of room to land on the water; the salty beach was a perfect field upon which to set a land plane down.

Jeb circled again and came back to the lower end of the lake. Then he cut the gun and the monoplane glided down to hit smoothly on the salt beach.

Marko climbed stiffly out. "Welcome to *El Nido del Gavilan*," he said with a grin.

"The Hawk's Nest," translated Jeb. "A hawk that hid here would be hard to find."

Marko eyed him shrewdly for a moment, then nodded. "Just what I figured," he said. "Come with me. The boys will take care of the plane."

A squad of Mexicans appeared and rolled the plane back under the trees. Jeb now saw that there were buildings all along that avenue of greenery. A little town had grown up there. There were houses of adobe, a long low building which could easily have been a hangar, a number of saloons and, at the lower end, a more pretentious two-story affair which Jeb guessed was Marko's headquarters. Jeb noticed that the single street of the town appeared to be deserted. Blinds were drawn on all the windows; doors were tight shut; nothing stirred, not so much as a stray dog.

Marko ushered them into a long low-ceilinged room with a bar across one end. The furnishings were crude but comfortable. He motioned them to chairs and put a bottle on the table before them. "Well," he said cheerfully, "here we are."

"Good layout," grunted Hug. "Only for them greasers that put the plane away, we ain't seen a soul."

"Easy to explain," said Marko. "We are night owls. We take no chance on being seen during the daytime. Everyone stays indoors until it gets dark. This is not only for our protection, but for our comfort. It's hot here, as you can imagine.

"This building is headquarters for the pilots," Marko went on. "Most of our flying is done at night, so they sleep during the day. Another rule of this place is that no one is allowed to leave without my permission. This is for our mutual protection. We cannot have the members of our organization getting drunk in the bars of Tiajuana. Our work is extremely confidential. We are on Mexican soil. If the Federal government of Mexico discovered our whereabouts it would send planes after us."

"One thing I don't understand," said Jeb. "Where do you get the planes you sell to the rebels?"

Marko's face hardened. "It's not wise to ask too many questions," he answered. "I have agents all up and down the coast who visit the airports and factories and —er—make arrangements for a certain number of planes to be delivered to us each month. Your job will be to fly planes across the Gulf to certain places in Mexico where they will be delivered to the rebel army. You'll be given an opportunity to enjoy life here. This bar is always open to pilots and mechanics. This is a free town. Go where you like. If you get into trouble you'll have to fight your way out."

With the coming of night El Nido del Gavilan took on new life. Rows of dull blue lights appeared along the single street; the cantinas opened; one by one the inhabitants of the strange little town began to appear.

Jeb and Hug had been left to themselves all day, had received no word from Marko. They supposed that their services were not to be needed immediately and Hug suggested a tour of the town.

"We ought to know our way around this joint," he added. "If we have to get out quick we want to know which direction to go."

"There must be some system of beacons," said Jeb. "Otherwise, I don't see how the pilots can find the field in the dark."

It was early in the evening; few people were out when Jeb and Hug made their way quietly along the street and came to the long low building which Jeb had picked for the hangar. The white salt beach stood out plainly in the night. The water of the narrow lake seemed to have a peculiar phosphorescent glow about it. On the rim of the crater a light began to flash. It was a revolving beacon of some kind, for it sent out two white beams and then a blue one. Jeb's trained eyes searched the rim of the crater all the way around. On the far wall he picked up another faint gleam. "That's it," he said to Hug. "All a pilot has to do is line up those two lights and come down. Once he gets inside it's easy to see the salt beach or the lake."

Hug had been making some investigations of his own. He had discovered that one of the hangar doors was loose. He now pushed it to one side and looked in. Jeb heard him cursing softly and went over to see what he had discovered.

"Look at that," whispered Hug. "One of our XL's. I'd know that baby any place. I ought to—I put in enough time workin' on her."

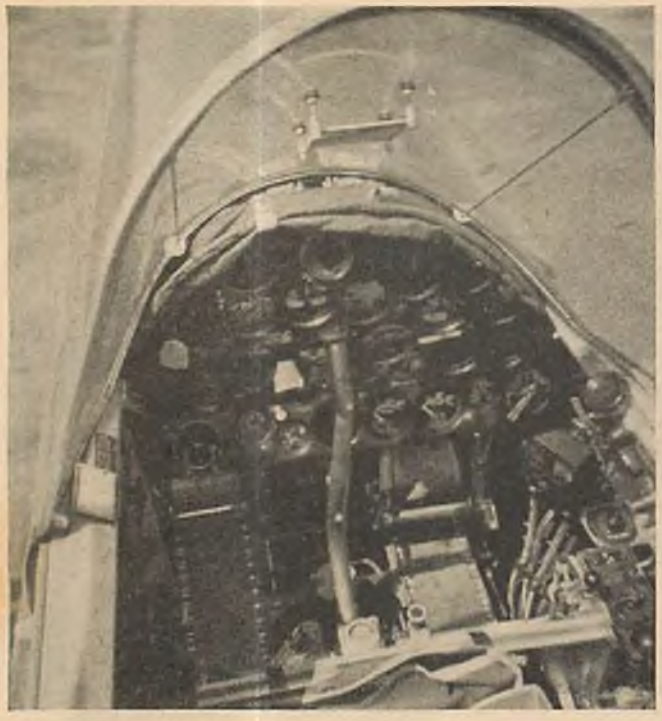
Jeb saw one of the missing navy ships resting on a truck inside. Its appearance had been considerably altered. All numbers or identifying marks had been removed. The whole plane had been painted a dull olive-drab. But there was no mistaking the construction of the ship, the peculiarly built pontoons, the method by which the great Wasp motor was bolted on the nose.

"Right," said Jeb in a whisper. "Find the rest of 'em." *(Turn to page 84)*

ships in black and white

Fastest of all shipboard fighters is the Navy's Brewster F2A-1, 54 of which have been contracted for. This interesting Cyclone-powered single-seater is an outstanding design for many reasons, the most evident being the exceptional visibility. The transparent cockpit canopy permits vision upward and to the rear. A window beneath the fuselage enables the pilot to see downward. The F2A-1 should prove a boon to mechanics, for the engine cowl is removable and the retractable landing gear well out of the way of the motor installation.

It is hard to say what this all-metal hornet will do. Top speed must be over 350 m.p.h. Observers say that take-off is six seconds with full military load! Ceiling is well over 30,000 feet and the range more than 650 miles. The F2A-1 is not to be confused with the two-place dive-bomber released for export.



The pilot of this Curtiss twin-engined attack is a mighty busy man with those instruments and ground-level flying to take care of.

ATTACK IS

An Army pilot's word picture of the tactics of attack aviation.

YOU hear a droning noise somewhere, a noise like angry bumblebees or like a fleet of trucks speeding along some distant highway. In a few seconds the rumbling gets louder and you figure out the direction it's coming from just in time to see a long, low line of airplanes topping the nearest clump of trees and heading toward you. A few more seconds and they are almost on you, nine of them, getting louder and larger by the second until they cover half the horizon and are flying so low that you need not raise your head to look at them until the last second of the approach. As they come toward you nothing is visible but the round engine cowlings and the leading edges of the low wings, and you can't help noticing what a thin target they would make if you were trying to defend yourself.

You know they are peaceful. You know it's just a flight of Uncle Sam's attack planes getting a little practice—a sight more or less familiar to many thousands of Americans in rural areas within two or three hundred miles of March Field or Barksdale Field. But even though you have witnessed these simulated attacks many times they still make you tremble just a little. It's the suddenness of the thing that gets you; the sudden noise that scarcely warns you at all, and then the terrible swiftness of the approach. Nine A-17As flying wing-to-wing, a line of shining metal more than two hundred yards long sweeping toward you at a speed of more than two hundred and fifty feet a second. A beautiful sight, but the low nearness of the planes and the overwhelming crescendo of sound are almost terrifying.

At their speed of more than three miles a minute the planes seem to outdistance their own throbbing vibrations, and they are actually gone before the roar dies away. The departure is just as sudden as the approach, and in a few seconds the formation is no more than a glistening streak disappearing toward the skyline. Then the spectators can relax, remind themselves that nothing serious has happened, and start breathing and talking and looking around again.

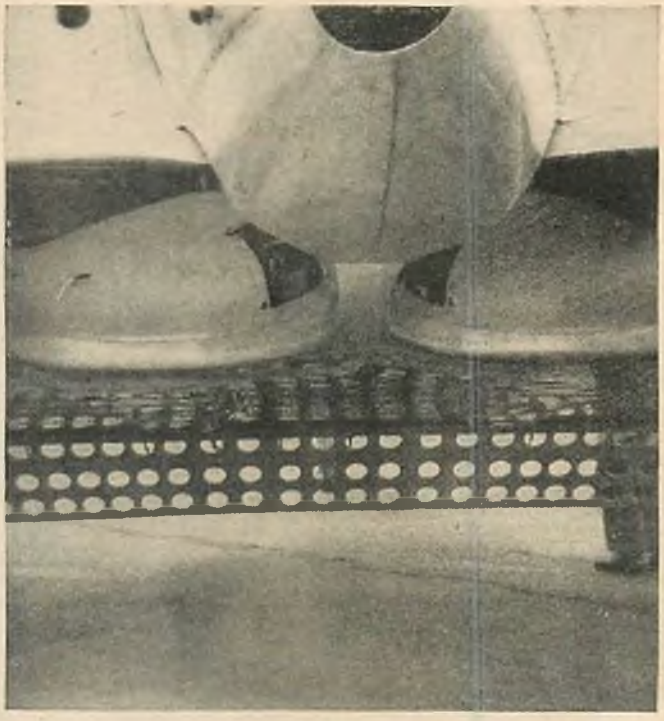
Of course, a nine-plane formation is merely one "flight," the smallest attack formation ever used under normal conditions. A squadron has three flights, twenty-seven planes plus the squadron commander's plane. And there are four squadrons in an attack group, which is the largest operating unit. But an entire group formation is so immense and covers so much territory that you can scarcely watch more than one flight at a time. The power and impact of a group can best be felt when ten or twelve flights sweep over you one after another, like successive waves of doom.

The A-17A is the standard attack airplane in this country, although it is not the newest or the fastest.

How pursuit and attack elements turn. Below, A-17As turn on same level to remain unseen. Above, P-26As bank one above the other.

SUDDEN—

By Frank Lambert



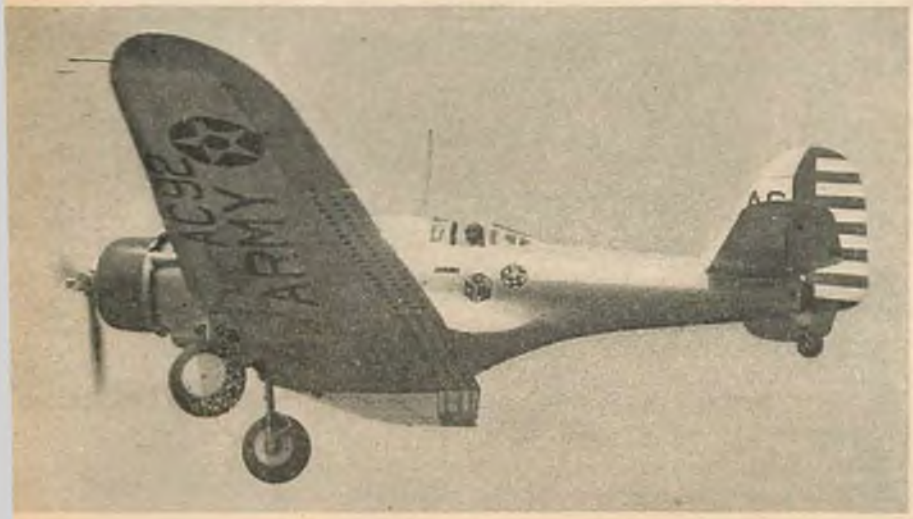
Close-up of a Northrop A-17A attack, showing the wheel wells and full trailing edge and flap, perforated to reduce tail buffetting.

The Curtiss A-18 has a considerable edge in these respects, but only about a dozen of them have been built as yet, and it remains to be seen whether or not the bi-motored type will replace the single engine for attack work. The former stacks up better on paper, since it seems to be speedier and more efficient in its weight-carrying abilities. But it is naturally a great deal less maneuverable and more difficult to operate in close formation, and this is a mighty important consideration for the boys who do their work down where speed is something that is seen and felt and not just a figure on an indicator. When you get down there, flying becomes a fine art with no room for calculations, and those characteristics of an airplane's performance that can be felt are a great deal more important than the ones that can be measured. In these respects the A-17A is almost the answer to an attack pilot's prayer, and most of these men have already developed a real affection for the more than one hundred of these smooth, sweet-handling jobs now in constant use.

We have three kinds of attack planes now in general use. Most of the old Curtiss A-12s are still doing service at Kelly Field and in Hawaii. The original A-17s (with the non-retractable landing gears and non-supercharged engines) are in Panama and scattered throughout the States on various assignments; and several score of the more modern A-17As are the equipment for two attack groups here in the States, at Barksdale Field and March Field.

Attack is the newest special branch of army combat aviation, and its youthfulness is obvious when we consider that with four types now flying only one type of attack plane has passed into history. The old A-3 cruised at about a hundred and ten, and its top speed seldom reached a hundred and forty, but it was sturdy and steady and dependable in every respect. There are old-time mechanics who still argue that the Curtiss D-12 engine, which powered the A-3, was the most dependable airplane engine ever built. Sometimes you read a long list of various types of attack planes, usually compiled by somebody who merely dug the names up somewhere and did not know of their comparative unimportance in the development of attack aviation. They were mostly experimental models which proved unsatisfactory. A few of them were like the A-3, which was originally designed as an observation plane (the "O-1"), in that they were borrowed from other branches of military aviation and modified to fit the purposes of attack. But unlike the A-3, the forgotten types failed to function efficiently in attack work.

Just what is attack work, anyway? The question is being asked quite frequently since attack has come into prominence as a result of its new equipment and its spread to the West *(Turn to page 77)*



An A-17A. Attack pilots prefer retractable landing gears. High-speed emergency landings are generally made on belly of ship.

Above—Panic-stricken passengers fighting for their lives as the ship careens along. Below—The berths where the passengers do not go to sleep—well, perhaps not for five minutes.

AIR TRAVELERS *aren't heroes*

Pampering of air passengers has got to stop, or we won't be heroes any longer!

By BILL BURLEIGH The earth was coming up fast! We were diving down at an almost vertical angle, the wind shrieking around us and women screaming. Just as we were whipping below the tops of the buildings the craft was snapped around and up in a vertical bank that glued us to our seats and made the tears come to our eyes from the pressure. Then a stomach-wrenching jolt and we were stopped.

There, doesn't that sound just like the landing of a giant airliner? Well, you're wrong; dead wrong. That was a brief, thank Heaven, description of my one and only ride on a roller coaster fifteen years ago. But somehow or other that also seems to be the popular though completely erroneous conception of what a landing feels like in a modern transport. Roller coasters, you can have 'em! I'll stick to flying, where I can be "scared" to death in comfort.

Since the first of the year I have flown over ten thousand miles both in private planes and in airliners all over the country, and I'm looked upon locally either as some sort of hero, with a charmed life, or some sort of devil-may-care person whose wife must sit at home when I fly, nervously pulling her inexpensive hanky apart while the little ones play about her knee.

Both the above ideas are slightly off. In the first place, I'm not a hero. I'm scared of roller coasters and cows and in the second place, I'm anything but devil-may-care. And, my wife likes to fly as well as I do.

I do the same things, in the same way, that you do, with possibly the exception of traveling a great deal by air. That's why I'm hoping this will take some of the heroism out of air travel for the uninitiated. It's almost a shame, because I still am human enough to like that slight feeling of superiority that can be attained by climbing out of an airliner, at an airport, and walking with a very "bored-with-it-all" air up to where you and you are looking over the fence at us air travelers. I'll let you in on a secret about all that "superior" air—very often it comes from our being waked up from a snooze and we are still half asleep, or it might be that we *are* bored.

Air travel is nowhere near as exciting as you might think. It is beautiful, yes, more than you could imagine until you do fly, but as to excitement it is rather disappointing.

Many have asked me about the terrific sensation of taking off and landing and of "tilting up like that" when you turn those awful corners. Let's get that straightened out right now, so we can get up in the air and explain what you won't be frightened by and will be pleased with.

In the first place, you will not be able to tell when you leave the ground, unless of course you watch the wheels, and even then it's difficult because the wheels continue to revolve for several seconds afterward. I have time and again tried to time a flight with my split-second chronograph watch, but not yet, even with watching the wheels, have I been able to start the sweep hand at the right second. All airliners climb so gradually that until you have reached an altitude of several feet which is made obvious by passing beyond the boundaries of the airport, you will have to guess at the take-off time. Forget about it.

...rving passenger stoically accepting bountiful lunch tray instead ...the cheese sandwich wrapped in waxed paper he had expected.

As to landings—yes, you can tell when the actual contact is made, although I recently slept through five landings in an upper berth on the way back from the coast in a T.W.A. skysleeper. The reason you can tell when you land is that no matter how smoothly the ship touches the runway, the settling of several tons of airplane upon tires, shock struts and cement must make some sort of impression that even you will feel. On the other hand, I have been drinking soup when we sat down for a passenger pickup and not spilled a drop. Well, all right, one drop. But I'd have done that anyway, so that doesn't count. Don't worry about landings, they're a fake!

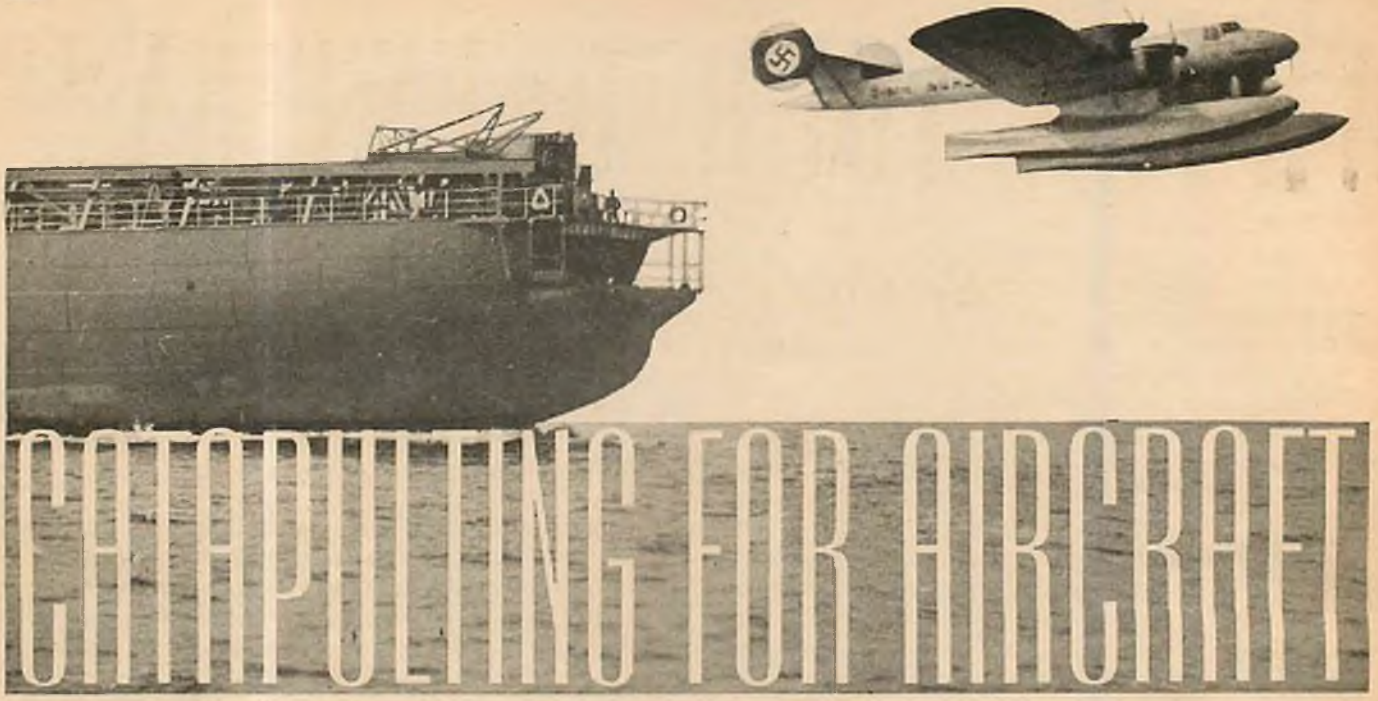
Most of the jouncing you see the wheels do when a big liner comes in for a landing is never felt inside the cabin, and if it is, it amounts to no more than riding over a railroad crossing in a limousine.

As to the "tilting" when you make a corner. Sure, the plane tilts. So does Junior when he makes a corner on his bicycle, and so do you when you are rounding the corner of Vine Street just as the bus is leaving at the corner of Pearl. When a plane makes a turn it tilts up slightly so that the wings rest upon solid air and will not skid toward the outside of the turn. All race tracks, railroad beds and highways are banked for the same reason, to prevent skidding.

This banking, too, looks much worse from the ground for the simple reason that you see the wings tilt apparently at a terrific angle. Really this angle is usually from twenty to thirty degrees. Measure this and you will see that this is nothing to get excited over. Centrifugal force also keeps you securely in your seat. Another reason that the air traveler doesn't notice this as much as the watcher is that he, seated in the fuselage of the ship in the center of the banking wings, tilts but a fraction of the distance the wing tips go up or down. There you are, all worried for nothing.

One other item I have been asked about, warned about, and made mad about is those terrible "air-pockets" that just lie in wait for the foolish air traveler. In the first place, there isn't any such thing, and in the second place there isn't any such thing. What gave rise to the name is a descend- *(Turn to page 82)*

Frightened children clinging to their terrified mother as the huge transport roars through the clouds—or perhaps we're mistaken.



CATAPULTING FOR AIRCRAFT

Is the catapult the solution to transoceanic flying?

By PAUL H. WILKINSON

Author of "Diesel Aircraft Engines"

Catapulting aircraft, so that they may attain their flying speed more rapidly than during a normal ground or water take-off, is coming into use more and more for commercial ships now that long distances have to be flown with heavily loaded planes. This procedure was developed from the take-off of scouting planes from platforms on the gun turrets of naval vessels during the War. For many years, catapulting was confined to the launching of single-engined planes from battleships and cruisers. A notable exception, however, was its use on the crack North German Lloyd ocean liners, the *Bremen* and the *Europa*. Each carried a mail plane that was catapulted while the vessel was still hundreds of miles from its destination, saving as much as fifty hours in the delivery of the mail. For eight years, single-engined seaplanes and "turntable" catapults were used on these vessels during the summer months to speed up delivery of mail.

The success of these North Atlantic operations had a good deal to do with Deutsche Lufthansa's decision to employ catapulting for the South Atlantic crossing of their Germany to South America air route. At that time, heavily loaded flying boats without payload could hardly make the crossing, and a take-off from the water with a full payload was out of the question. So two freighters—the *Westfalen* and the *Schwabenland*—were pressed into service, and catapults which could launch planes up to fifteen tons in weight were installed on their decks. The catapults were built by Heinkel, who had supplied the equipment for the North German Lloyd boats, and they were of the "fixed-track" type as compared with the turntable variety hitherto used. This involved heading the surface vessel according to the direction of the wind for take-off, but it was the only way in which a catapult track of adequate length could be obtained for multi-engined planes aboard a privately owned, ocean-going vessel.

These two catapult ships were stationed at the African end and at the South American end of the South Atlantic crossing. From the floating bases, sturdy twin-engined Dornier flying boats weighing ten tons in their fully loaded condition were launched for their trips over the 1,900 miles of ocean separating the two continents. This service has been in regular weekly operation since February, 1934, first with Dornier Wals with B. M. W. gasoline engines, and more recently with four Dornier Do. 18's powered with Junkers Diesels. These flights have been maintained regardless of weather conditions, as the plane does not have to depend upon the calmness of the ocean for its take-off, nor is it necessary to worry about head winds as it carries ample fuel for any emergency. Upon landing near its mother ship, the

(Turn to page 74)

Top—They're off! The huge 17-ton Diesel-engined Nordwind takes to the air at the commencement of its 2,400-mile North Atlantic hop.

Right—The Nordwind, mounted on its cradle aboard the Friesenland. Cables run from cradle around large pulleys to mechanism below.

WHAT'S YOUR QUESTION?

By Clyde Pangborn

Question: Will you kindly inform me of the size, speed and general specifications of the Boeing YB-15? R. P., Tarentum, Pa.

Answer: Inasmuch as the YB-15 is on the Army secret list, we do not have full particulars regarding it. The span is 152 feet, length 90 feet, top speed in the neighborhood of 240 m.p.h.

Question: I read your article in the July issue of Air Trails and it stated that the Army Air Corps is looking for flying cadets. Please send me full information, as I am interested. J. T., Mount Pocono, Pa.

Answer: For detailed information on cadet training in the Army Air Corps, write to the Adjutant General of the Army, Washington, D. C.

Question: Can a Britisher enlist in the American Air Corps if he becomes a naturalized American citizen? L. B., Cathays, Cardiff, G. B.

Answer: Yes. A Britisher who becomes an American citizen can enlist in the U. S. Air Corps if he passes all necessary requirements as to physical condition and education.

Question: I am interested in falling bodies. Here is my problem. I would like to know if a man falling from a plane at 10,000 feet would attain a greater speed when he hit the ground than a man falling from 5,000 feet. What is the top speed of a falling human body? L. G., Richmond, Cal.

Answer: The maximum speed reached by a falling human body is approximately 125 m.p.h. and it does not matter from what altitude the body is falling; the speed remains constant, as it represents the terminal velocity.

Question: I am 14 years of age and expect to enter high school in the beginning of February. I am planning a career in the field of aviation, especially aircraft and engine mechanics. Please advise me of some aviation school nearest to my home. J. M., New York, N. Y.

Answer: I suggest that you investigate either the Roosevelt flying school, which has courses for master mechanics, or the Manhattan High School for Aviation Trades, 22 East 64th St., N. Y. C. In our September issue you will find a list of schools together with courses they teach and tuition costs.

Question: Why are there so few high-wing transport planes? Is there a reason other than the necessity of a large retracting landing gear system? Have you any information about a variable camber wing designed recently by a man in Toronto? If so, why not pass it along? H. H., Toronto, Can.

Answer: The simpler retracting landing gear mechanism is part of the reason for having more low-wing than high-wing transport planes. Other reasons are better aerodynamic efficiency due to cleaner lines, greater speeds and more cabin space. We don't have any information regarding the variable camber wing you mention above. However, if you know anything about it we would like to have the dope on it.

Question: Can a boy with a high-school education become a mechanic in the Army or Navy Air Corps if he wears glasses? Do model airplane firms accept good U. S. stamps for model supplies? What armament does the Bell Airacuda carry? What was the fastest Allied plane used in the World War? Do you believe the G-8 stories are true? O. H., Brenham, Tex.

Answer: Yes, a boy with a high-school education wearing glasses can become a mechanic in either the Navy or Army Air Corps. Some model airplane supplies do accept U. S. stamps up to certain sums, probably not more than fifty cents. However, I'd suggest sending money orders for supplies. The Bell Airacuda's armament consists of two 37mm. rapid-firing guns located in the nose of the motor nacelles, and four machine guns. I think that the fastest Allied plane during the War was the Bristol Night Hawk fighter, with a top speed close to 170 m.p.h. It was built toward the end of the War. The G-8 stories are purely fictional and are not meant to be true.

Question: Why is a third of the wheel cut away on an airplane? How do they correct prop torque of airplanes? Where can I reach the company which manufactures the Knight Twister? How much does the Twister cost? I have a collection of 674 pictures, the two pictures I am sending are the only ones I don't have the names of. Please give me the names of the two ships. A. H., Tulsa, Okla.

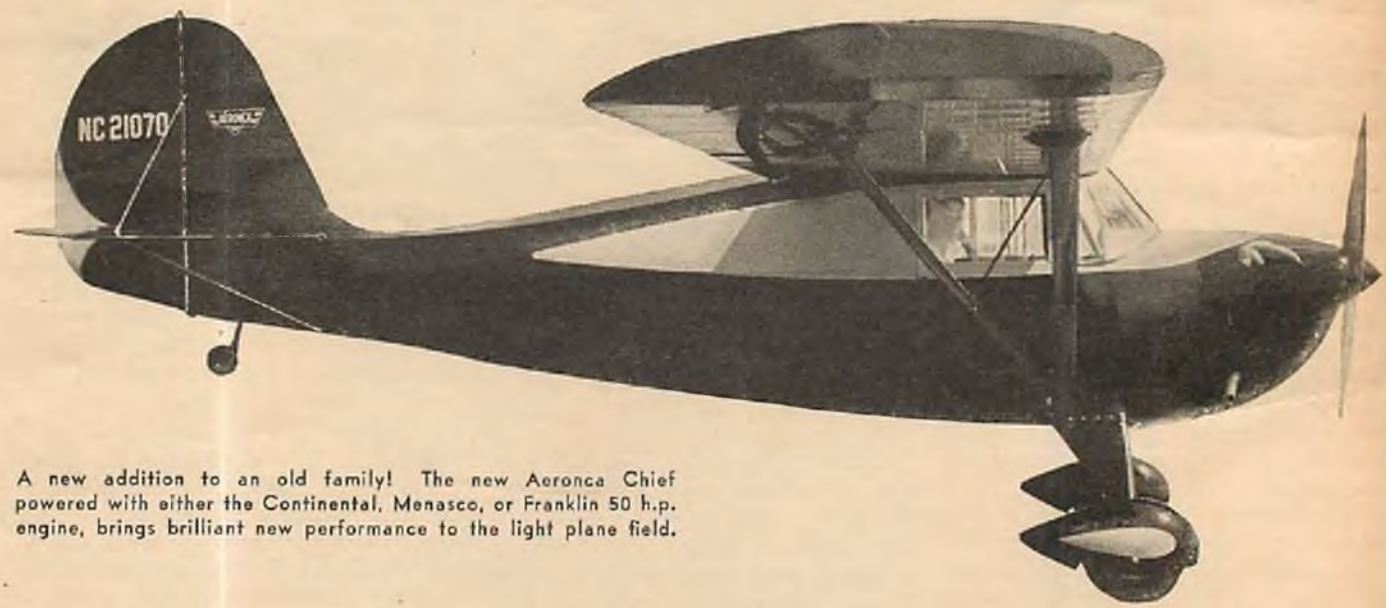
Answer: The wheel on the steering column of an airplane is cut away for convenience's sake. Inasmuch as the wheels do not turn the whole 360 degrees, there is no necessity for a complete circle. The Knight Twister is manufactured by the Payne Aircraft Co., Joliet, Ill. Write them regarding the price. Two methods are used for correcting propeller torque on an airplane. One is by offsetting the rudder stabilizer and the other by the use of trimming tabs located on the rudder fin. The pictures of the two planes you sent me are the Pander PIII sport monoplane, built by H. Pander & Zonen, Holland, powered by a Gypsy engine, and the tri-motor Koolhoven, built by Koolhoven Vliegtuigen, Rotterdam, Holland, and powered by three Cirrus engines. *(Turn to page 92)*

AS SOON AS POSSIBLE AFTER BEING RECEIVED, ALL QUESTIONS WILL BE ANSWERED. THOSE OF GENERAL INTEREST WILL APPEAR ON THIS PAGE; OTHERS WILL BE ANSWERED BY MAIL. ENCLOSE A STAMPED, SELF-ADDRESSED ENVELOPE TO INSURE ANSWERING.

light plane flying clubs

The light plane sport is one of the most mysterious branches of the aviation industry. No matter how many articles are written about light planes and light plane clubs, those who are actually interested never seem to find the real answer to their questions. There seems to be no straight answer to costs, the number of light planes available, and the true performances of the various types. No one seems to get the light-plane-club idea straight, no matter how often efforts are made to clarify the situation.

The reason in most cases, of course, is clear to us who are reasonably close to the authorities, the manufacturers and the officials of light plane clubs. At the present time there are too many light plane types, which in reality are practically alike. There are too many overlapping laws, all worthy in themselves, but frightening and puzzling to the average person who simply wants to fly.



A new addition to an old family! The new Aeronca Chief powered with either the Continental, Menasco, or Franklin 50 h.p. engine, brings brilliant new performance to the light plane field.

It is so easy for writers, in attempting to cover the light plane sport, to take a set of figures, facts and comparisons and make up an article on light plane flying. Most of these, unfortunately, contain very little real information of value to the man who really wants to fly.

In the past few months I have gradually reached this realization and have attempted to run the true facts of light plane flying to earth by consulting men who actually fly, men who know the light plane sport and have no particular interest in any periodical or light plane factory.

They have come clean with me and given me their actual experiences and shown me their books. They are real light plane men who love flying for the sport of it, but they believe at the same time in telling the truth about light plane flying. They know the game and its limitations, they know how far they can go on a 40 h.p. engine, and they know how far the average light plane pilot gets in his effort to reach the heights of a transport or limited-commercial ticket.

We of Air Trails have long been trying to sell the light plane game to the public. We believe in it, and we believe (and have proven) that the light plane game can become the backbone of commercial aviation.

But, while we have spent hours and tons of wordage in telling America about the light plane and the operation of clubs, we have never before attempted to strip down the business and show it exactly as it ticks. This month I am going to show you that light plane flying is not simply buying a $1,500 plane, taking a $300 flying course, purchasing a parachute and signing up for some insurance.

It is all very well to say that so many thousand people are taking flying lessons, that so many thousand are holders of amateur or private tickets, that so many light planes have been manufactured, will be manufactured, or have been purchased in the last fiscal year. The summaries from flying schools, manufacturers and organizations are always interesting, and we are always glad to draw on them for our information, but unfortunately these sources do not tell the complete story. It is this other side that Air Trails readers should know, and in telling it we believe we are doing the light plane sport a real favor, for it is truth that counts in any business, and especially in this strange but fascinating sport of amateur flying.

Don't get the impression that we are out to debunk the light plane flying game. We hope to show the true facts and conditions, so that you who plan, perhaps, to enter the ranks of light plane flyers next spring, will know exactly what you are taking on. And before going any further, I should say that nothing *(Turn to page 75)*

In which the true use and purpose of the light plane is discussed from both pilot and manufacturer angles for our readers.

conducted by
arch whitehouse

Pick-up lunch! Food and gas being supplied to Kenneth Kross and Glenn Englert during their nonstop flight from New York to Miami in a Cub.

Acme

Capt. Carl J. Crane, Capt. George V. Holloman, and R. K. Stout, perfecters of the automatic blind-landing pilot.

OFFICIAL SENIOR

N.A.A. NEWS

Developments in the nation's aviation activity

MACKAY TROPHY AWARDED

Over Wright Field, Ohio, one torrid day in August a year ago, a big Army C-14 monoplane approached in a long, easy glide. Gracefully it banked around in a hairpin turn over the end of the airdrome and pointed its blunt nose into the wind, the sun glinting on the sleek chrome-yellow wings. Nearer and nearer it came toward the runway, hardly swaying, although the air close to the earth was bumpy. Just at the right instant it leveled off, landing gear and tail wheel touched the surface, brakes were applied, and the plane rolled to a stop —a perfect landing.

Then the throttle moved forward slightly and the idling propeller once more sped into a shimmering disk to keep the engine from cutting out.

Many onlookers thought that this smooth landing was just the work of a veteran pilot. But to those "in the know" it marked a new epoch in air transportation, for that plane, during the whole landing operation, *had been untouched by human hands!*

As the perfecters of the system clambered out of the ship there was no fanfare of public applause to greet them, although they had probably contributed more to aviation progress than many who have made spectacular flights. The courageous flyers, who are also scientists and engineers of no mean ability, were Captains Carl J. Crane and George V. Holloman. With them was Raymond K. Stout, a civilian project engineer employed by the Air Corps Materiel Division.

For this outstanding development—truly one of the most significant milestones in the forward march of aviation—the officers will be awarded the Mackay Trophy for 1937, thus rightfully taking their places along with aviation's immortals. The award is made annually to the officer or officers of the United States Army who make the most meritorious flight of the year. It was tendered in 1912 by Clarence H. Mackay, the air-minded president of the Postal Telegraph-Cable Company, to the Aero Club of America, now the National Aeronautic Association.

And how did the flyers who staked their lives on developing a system that promises to lick the jinx of "zero-zero" turn the trick? After exhaustive experiments against odds that would have discouraged those with less zeal and energy, they succeeded in interlocking the radio compass and the gyro pilot—two of the most valuable devices in use today, but which previously were used separately for the most part, certainly never before linked together for a completely automatic landing. With the Crane-Holloman device a pilot can throw a master switch anywhere within a twenty-mile radius of the landing field, then sit back with nothing more to do, confident that the plane will be brought to a safe landing at his destination.

One doesn't have to be a prophet to envisage the revolutionary effect the automatic blind-landing system will undoubtedly have in the whole field of flying if it comes into general use.

The Mackay Trophy is closely linked with most of the highlights in the history of Army aviation. Witness, for example, the first nonstop flight across the American continent by Lieutenants Kelly and Macready; the first flight around the world under the leadership of Captain Lowell H. Smith; the Army "good-will" flight around South America; and many more. Brigadier General Henry H. Arnold, now Assistant Chief of the Air Corps, and one of the Army's first flyers, was the first recipient of the award. Away back in 1912—the days of "wooden

ships and iron men"—the general made a forty-one-minute flight in one of the queer box-kite contraptions with their furiously sputtering engines which were then considered even more marvelous than our latest ocean-crossing flying boats of today.

As one glances back through the pages of aviation history, it hardly seems possible that such a new science could progress so rapidly. Crane and Holloman have blazed the trail for an era that holds endless possibilities.

NEW MILITARY AIR MEET POLICY

The Acting Secretary of War, the Honorable Louis Johnson, has announced that the War Department in the future will be governed by a new and rigid policy with respect to the participation of the Army Air Corps in civilian air meets. Both the Army and the Navy have been faced with a close distinction between their desire to demonstrate to the public their progress in flying and in equipment, and the loss in training time and appropriated funds demanded by indiscriminate participation in air meets and exhibitions. As a consequence, certain definite decisions are announced with which the Navy is in general accord, and which are designed primarily to further the aviation industry in the United States.

In the future the Air Corps will take part in two, or not more than three, national air meets or industrial exhibitions per year. The requests for participation will be sponsored by the National Aeronautic Association, and will take place at centers of large population which will be changed from year to year. Special consideration will be given to the coverage of all geographical sections and to the fact that the meets or exhibitions shall have international as well as national significance. Further provisions will include requirements for large popular attendance, ample financial responsibility, and a non-profit arrangement by the promoters of the meets or exhibitions.

It is the aim of the War Department, in participating in these large national meets and exhibits, to contribute to the general advancement of aviation, its industry and its flyers by demonstrating military progress in conjunction with civilian development.

N.A.A. TIMED HUGHES' FLIGHT

As with his other record-breaking flights, Hughes' around-the-world circuit was run under the observation of N. A. A. timers in the United States and, through N. A. A. arrangement, the timers of F. A. I. clubs around the globe.

When the flight began, and many months before as well, N. A. A. and F. A. I. timers and representatives were on the alert along the entire route, prepared not only to clock officially his time of arrival and departure from each stopping, but to give Hughes such other aid and assistance as could be offered.

Typical of Hughes' thoroughness were arrangements for a number of alternate stopping points in the event that weather or other considerations made a last-minute change of itinerary advisable.

At New York, J. P. V. Heinmuller, veteran F. A. I. timer, went forty-eight hours without sleep in the tedious period of waiting before the official take-off to insure a certified and exact time record. The speed record for circumnavigation of the world carries great glory, and many times in the past the truth of whether a new performance does or does not break a record has been decided by the minute and second hands of the official timer's watch.

And so, by cable and by sworn affidavit from Paris, Moscow, Omsk, Irkutsk, Fairbanks, Minneapolis and New York, the sworn records of Hughes' flight were collected at N. A. A. headquarters in Washington to establish the official hurdle that anyone must better who is intrepid enough to try to wrest from Hughes the title of "fastest round the world."

AVIATION'S NEW AUTHORITY

The Civil Aeronautics Act, creating the Civil Aeronautics Authority, which was passed by the last Congress, has for its purpose the coördination in a single independent agency all the functions *(Turn to page 91)*

as seen by the National Aeronautic Association

Albert I. Lodwick, Executive Vice-President of the Aviation Manufacturing Corp.

Albert H. Near, President Aero Club of Kentucky and Superintendent of Bowman Field.

Colonel John H. Jouett, also a member of the Executive Committee of the N. A. A.

GLIDING AND SOARING

World Feature

The new Ross sailplane climbs on a winch tow. It had been hoped to use this ship for Lew Barringer's Texas expedition, but, unfortunately, it was not completed much before the Elmira meet.

LIST OF MANUFACTURERS

Many of our readers have written in seeking information as to where gliders, plans and construction kits can be purchased. Below we give you a list of manufacturers and agents along with a description of their products.

MacFarland Aircraft Co., Greenville, Ohio. Makers of the MacFarland primary glider, which can be purchased finished or in the form of a construction kit, the price of the latter depending on how many of the parts come in a finished form. Plans alone can also be bought.

Leslie J. Rowe, 2070 Vinewood Ave., Detroit, Mich. Maker of the Detroit Gull primary glider. This is one of the finest of the primaries. Built from the plans of the German Zoegling, it is one of the few that has an A.T.C. rating and can be licensed.

Briegleb Gliders, 3234½ West 27th St., Los Angeles, Cal. Makers of the Evans primary with an all-metal fuselage, which has an A.T.C. rating, and the Briegleb utility, a type quite popular on the West coast.

Hawley Bowlus, San Fernando, Cal. Maker of the Baby Albatross sailplane, the ship on the cover of the July issue of Air Trails, which also contained a descriptive article on it by Frank Tinsley. The Baby Albatross can be purchased also in kit form.

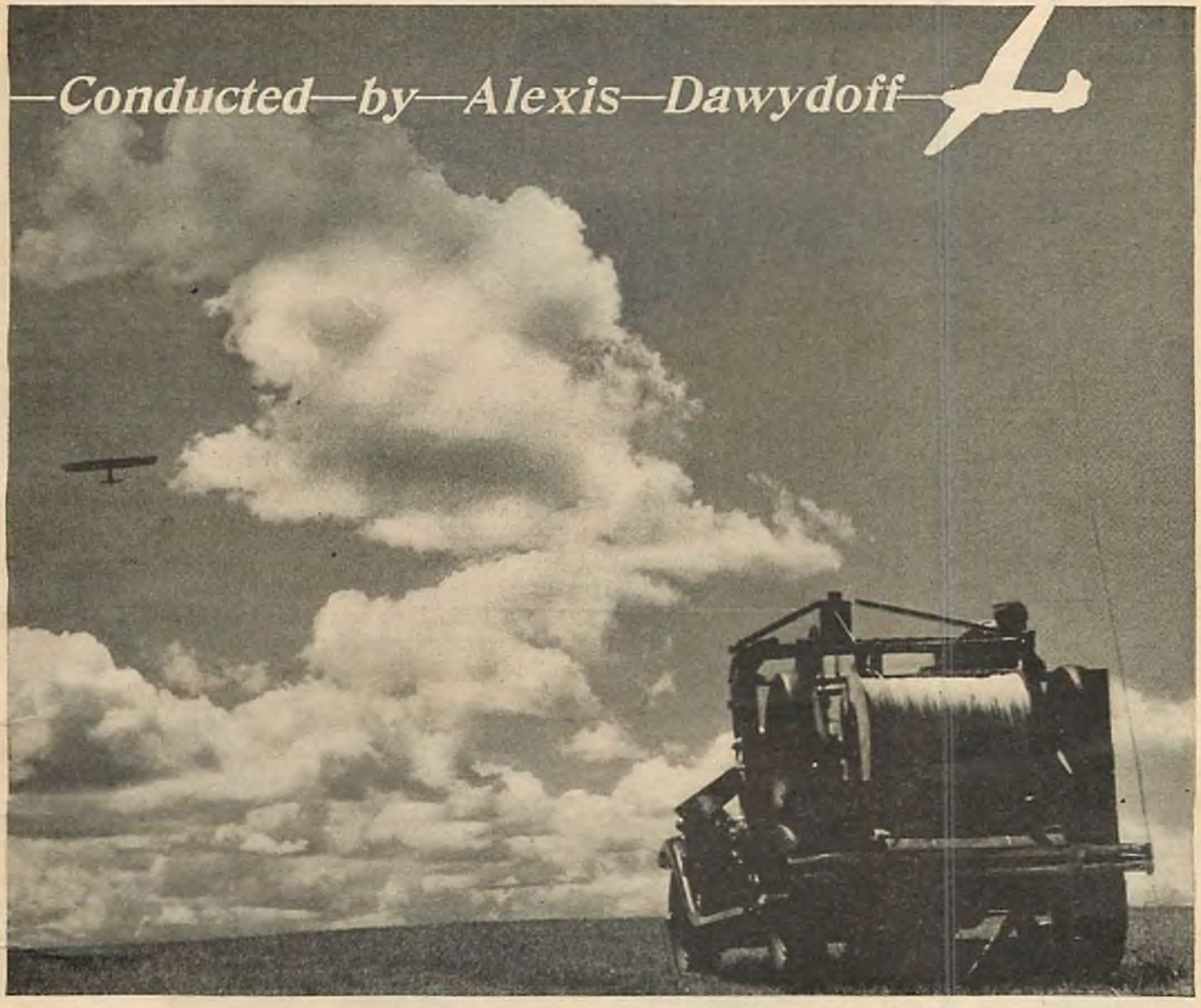
Ross Manufacturing Co., 911 8th St., Wichita Falls, Texas. Makers of the Ross high-performance sailplane, the only representative of its kind in this country. In this ship Robert Stanley flew from Elmira, N. Y., to Washington, D. C., during the Elmira Contest. No plans or construction kits for this ship are available, as it is sold only as a finished product.

Schweizer Metal Aircraft Co., Peekskill, N. Y. Makers of utilities, single and multi-place sailplanes, and the only manufacturers who build all-metal ships in this country. Their two-place high-performance sailplane equals any imported ships in performance. Plans or kits not available.

Arthur B. Schultz, 15100 Woodward Ave., Detroit, Mich. Designer of the A.B.C. sailplane, an intermediary sailplane of excellent design and performance which won the first prize in Mrs. Warren Eaton's design contest for gliders last year. Only plans for this ship are available.

All other gliders such as Waco primaries, Meads, Franklins, Cadets and Hallers are no longer manufac-

—Conducted—by—Alexis—Dawydoff—



A beautiful shot taken at Elmira, showing a sailplane rising smoothly during the first few seconds of the winch tow. The winch is operated by the friction of the jacked-up rear wheels.

tured, though a number of them are still in existence and occasionally are for sale. The Soaring Society of America, 1500 Locust St., Philadelphia, Pa., acts as a clearing house for the purchase and sale of these ships through the medium of their magazine, *Soaring*.

Here we must also add that we have frequent inquiries about plans for some of the high-performance German sailplanes such as the Rhonsperber, the Minimoa, and the Wolf. Plans for these ships are not available, as the construction problems are very complex, and it takes not only a good builder, but also a good engineer to cope with them. Plans can be had for a number of English gliders, a few of which have been built and flown successfully over here. The Dunstable Sailplane Co., Phoenix Works, Gerrard Cross, Bucks., England, sells plans for the Kestrel sailplane. One of these ships has been built and flown by the members of the Y Glider Club of New Jersey.

CLUB NEWS

Soaring Champion Emil Lehecka put on a stunting exhibition with his Cadet II glider during the annual Maine Aero Rendezvous air show held at the Augusta State Airport. Along with other members of the Airhoppers Gliding and Soaring Club, Emil also did considerable flying in the Grantland Rice movie short called "Champion Airhoppers," scheduled to be released the middle of September.

The equipment of the Purdue University Glider Club of Lafayette, Ind., consists of one two-place and one four-place glider, and a power winch. They have a 240-acre airport where at present they are running tests to determine tension on tow wire and the actual landing and sinking speeds of their ships, using apparatus loaned to them by the Aeronautical Department of the university.

Elery Clark, head of the Clark Glider School, Hartford, Conn., has moved his school to Canaan, Conn. He now boasts of a girl student, Eleanor Carver, who recently started flight training.

A. Valiere, also of Hartford, is completing the building of a Bowlus Albatross.

Movie Actor Clark Gable had a ride *(Turn to page 94)*

$900 OR $17,000,000?

Greetings, Air Adventurers!

What a summer for air history! What a grand feeling to be a part of it all and to live through such stirring days. Not since the great era of 1927 has aviation made such great strides, not only in technical advancement, but in the quickening of people's imagination. Somehow we of Air Trails, and particularly of Air Adventurers, feel that in some small way we are part and parcel of it all, and perhaps can be forgiven if we crawl off to our corner now and then, thumb through the pages of our magazine, gaze on the pictures, features and stories, and enjoy in our own quiet way a dash of the spirit that has made all this history.

We have had improved commercial flying, great air races, a fine show of military planes, and a great boost in light plane flying. We have had the Lockheed-14, the *Mercury*, the Hamburg *Nordmeer*, and Corrigan's crate. Great figures, great pilots, great planes —and great courage.

America and Americans have played a worthy part in this summer program. Two Americans in particular, Howard Hughes and Douglas Corrigan.

I have already had many letters from readers and members asking me for my opinion on the two great flights put up by these aviators. The questions were many and varied, but it will take very little imagination to guess the general tone, so we won't waste space on them.

Howard Hughes, a wealthy young sportsman who inherited $7,000,000 and ran it into $17,000,000 before he was thirty, spent something like $165,000 on a Lockheed flying laboratory, selected the best crew money could obtain, and flew around the top of the world in something like 91 hours.

A few days later, while Hughes and his crew were resting after their glorious achievement, a grinning youngster about the same age as Hughes took off from New York in a Curtiss Robin of ancient vintage which had cost him $900. Against all legal authority, he flew the Atlantic solo in 28 hours and 13 minutes, landing at Baldonnel Airport near Dublin in Ireland.

The difference between $900 and $17,000,000 is quite a sum in actual money, and the difference between Hughes and Corrigan is probably just as great. And yet both have their place in this strange business we call aviation.

I have been fortunate enough to have met Howard Hughes. He is a splendid chap personally. He is generous to a fault, keen as mustard in his own quiet way, and when he set out to fly around the world we all knew he would do it and do it right.

Out of the past come memories of a great ship—the wartime Spad 13. This particular plane was rebuilt and then flown in the filming of the new air epic "Men With Wings." This photograph was taken by Lee Enich, of Culver City, Cal.

It will be hard to state here just what either flight added to aviation. Hughes had equipment of the best and took no chances of any kind. That's commercial aviation at its finest. Whether he brought back any valuable information except the fact that certain instruments worked and that with proper ground work almost any flight can be a success, remains to be learned. He proved, at least, that money properly spent is well spent.

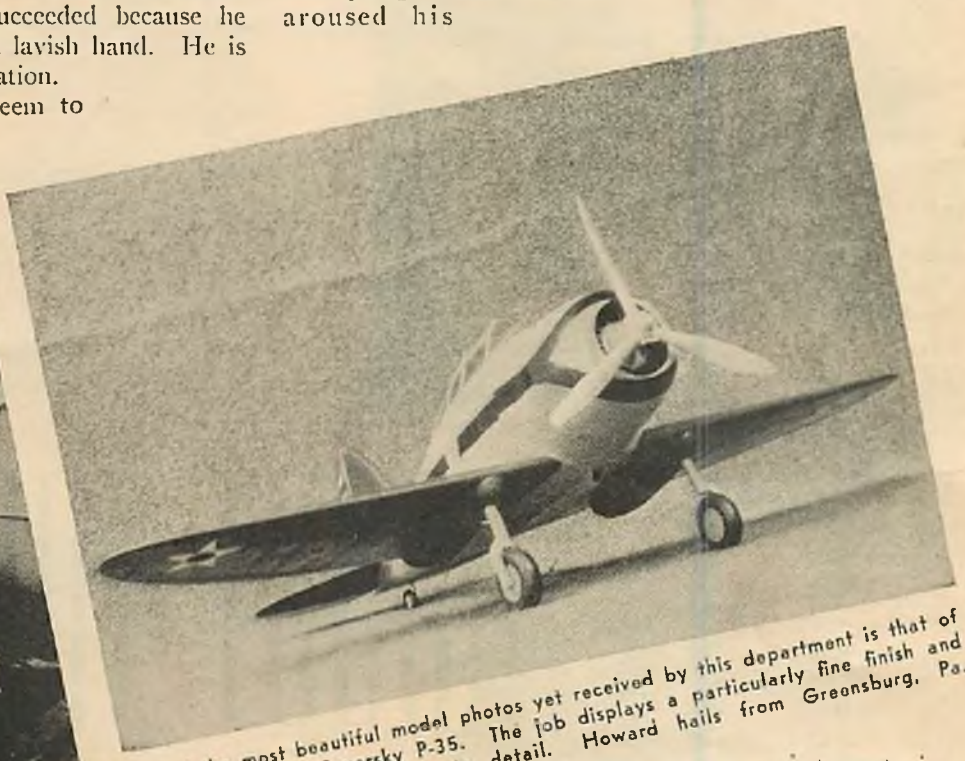
Corrigan, on the other hand, proved nothing. He admits his show was a personal stunt, something he always wanted to do, something he *had* to do, in spite of regulations. What he did do, however, was to satisfy us that courage is still a big thing in life, and that we

can have confidence in our ability and succeed against great odds. He is a happy throwback to the pioneer days, and he gave us plenty to think about. We do not suggest, of course, that Air Adventurers all dig up $900 and buy a plane with the intention of embarking on this short cut to fame and possibly fortune. One Corrigan is enough, but we do hope that this Californian's effort will make many of our members learn to rouse the latent energies at their command, make the most of their imagination, and have the courage of their own convictions—as far as their own personal ambitions are concerned.

Hughes wanted to fly around the world faster than anyone else had done it. He succeeded because he planned carefully and spent with a lavish hand. He is the spirit of sound, calculating aviation.

Looking back over it all, we seem to find much of the Air Adventurers' Creed in both Hughes and Corrigan. If you want any further proof, you are a hard man to convince.

Details are always interesting. This graphic shot shows the nose details of the Cub. By R. Lambert, Woodstock, New Brunswick.



One of the most beautiful model photos yet received by this department is that of Howard Smeltzer's Seversky P-35. The job displays a particularly fine finish and is accurate in the most minute detail. Howard hails from Greensburg, Pa.

But we want more Hugheses and more Corrigans in Air Adventurers, and we are again printing the coupon for you to fill out, or get that pal of yours to fill out. Just sign, add a dime and you'll be in line.

And so we'll leave you to your own reflections and dreams until next month. But don't let us down. Hughes and Corrigan didn't.

Your Flight Commander,

ALBERT J. CARLSON.

AIR ADVENTURERS NEWS

And now to go through the mail and find out what our members are actually up to.

One letter of a tone seldom received comes from John H. Dunn of Lake Yonkispin, Okla., who says: "I must confess that I am not a frequent reader of your interesting magazine, but I have always agreed completely with your pledge, even though I haven't sent in my application before now. I have always thought that the mere signing of a pledge cannot cause a man to do more for crime prevention than he would before he wrote his name on the dotted line—unless it woke him up to his responsibility as a citizen of his country.

"Recent vote-fraud events in my own town, publicized by the newspapers, made me think hard. I have since arrived at the conclusion that crime can only be prevented when everyone does his part to uphold the law and bring everyone equal before the law in spite of wealth, political connections or good lawyers."

Mr. Dunn is speaking, of course, of a personal experience involving one form of right. Our club pledge seems to have aroused his interest in clean government. In another person it may take another and equally important angle, but in the end the goal is the same. In other words, you have to play the game to get ahead.

(Turn to page 89)

Actual size of your Air Adventurers pin.

(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, 1938.)

Dress parade before the giant ship! Cadets of Morgan Park Military Academy before the flight.

NOT so many years ago it was considered quite an event if a school class was permitted to travel a hundred miles or so to visit some point of historical interest, or possibly some natural wonder.

Times change and so do means of transportation. Schools, too, have kept in tempo with progress. Consider the Morgan Park Military Academy, of Chicago.

Not as an extra-curriculum feature but as part of the regular field work, a scenic and educational trip by air was undertaken by this institution.

Chartering two of American Airlines' twenty-one-passenger Flagships, the cadet group entitled to this flight embarked on a 2,000-mile journey including stops at six cities en route.

Accompanied by officers of the school, the group visited the historical shrines of Gettysburg, impressing vividly upon their minds the scenes of early historical conflict. Next, a short flight spread before their eyes the never-to-be-forgotten panorama of the nation's capital before they landed to inspect the many important and traditional landmarks of Washington. A noteworthy incident of the Washington stop-over was the presentation to President Roosevelt by the group of a petition for a declaration of a National Week for the Prevention of Juvenile Crime. Again taking to the air, the cadets soon were watching the towers of New York evolve out of the distance.

ABOUT THE COVER

Seeing the highlights from one of the high-spots The cadet group inspecting the R. C. A. Building.

While in New York the group viewed many old-time favorite sights and also a number of the modern wonder spots. Visiting the *Queen Mary* at her dock was one of the trip's highlights, as well as being entertained by Jack Dempsey.

The only competition their striking dress uniforms and precision drilling met was from the famed Rockettes atop the Radio City Music Hall, where a friendly drill competition was staged.

On the return trip to Chicago, the sights of both Buffalo and Detroit were added to those already enjoyed.

The entire trip was possible only through the speed and efficiency of modern air travel, cutting days to hours and hours to minutes and enabling the journey to be made in one week with a maximum of comfort en route. Its success was such that a similar one is now planned for the West Coast, where many of the great aircraft manufacturing plants will be visited.

During the trip the students took numerous notes and pictures, for use in later class work.

It's a far cry from the famed and traditional little red schoolhouse to the modern academy, but each to its generation. The one, famed for its individuality and rustic thoroughness, and characterized by meager equipment, the other, for its equal thoroughness and modern standards, among which the speed and scope of present-day air travel is playing an important part.

A MAN'S GAME

BY GEORGE L. EATON

A COMPLETE BILL BARNES AIR NOVEL

EDITOR'S NOTE—Combining the unquestioned progress of the next few years, or even months, of aeronautical drafting and design with the skill of the author, these Bill Barnes novels are designed to entertain and to give you a prophetic glimpse into the future of aerial transport and adventure.

YOUNG SANDY SANDERS viciously plugged the dangling wires of his radiophone into the ear sockets of his white helmet. His angry eyes swept across his instrument panel and then fastened themselves on the wind sock atop Hangar No. 1 out on Barnes Field, Long Island. The next instant he slammed open the throttle of the Twin Wasp in the nose of the little fighter he called the Eaglet. The resultant roar matched the storm cloud on his freckled face.

He glared down the length of the rectangular field with its seven concrete and tarmac runways, probed the air above. As a light flashed in the control tower he lifted a hand above his head, releasing his wheel brakes at the same instant. The little ship raced down the north-south runway like a fawn with the devil at its heels.

Sandy took it up to eight thousand feet, then relaxed the least bit.

"Blow me down!" he exclaimed. "I won't do it. By gosh, I won't! If that flat-faced Pennsylvania Dutchman tells me I'm yellow again I'll knock his ears off!"

But slowly he began to wonder whether Shorty Hassfurther, Bill Barnes' chief of staff, was right after all. He began to wonder if he, as Shorty claimed, had quit because the going was too hard. The thought made him almost ill. And then it made him mad again.

He slammed the control column of the Eaglet forward as he opened the throttle. The nose dropped, and he laid it on an imaginary target far below. Down and down he plunged until it seemed nothing could stand such fearful pressure. His automatic pitch propeller was traveling faster than the speed of sound, to leave a vacuum behind. As the two continuous walls of air slammed against each other at the rear of the plunging ship the roar was like a constant clap of thunder. At five thousand feet he eased back on the stick, nosed up to a forty-degree angle, and leveled off. His stomach felt as though it had been dragged out of him.

But he felt better than he had when he started the dive. He knew in his heart that he wasn't yellow. He began to sing as he brought the little fighter up in a flashing Immelmann turn. He barrel-rolled, side-slipped, skidded, did wing-overs and split S's until his eyes were rolling in their sockets. He followed these with a low-speed loop, a climbing loop, a rocket loop and a zooming flick loop. He was about to do a vertical 8 when the scarlet light on his radio panel came to life. He threw the key and heard the voice of Tony Lamport, chief radio operator on Barnes Field, chanting his call letters.

"Listen, kid," Tony Lamport said, when he had acknowledged. "Bill just came in here raising hell. He wants to know what you're trying to do up there. He wants you down on the field, immediately! Report to his office!"

"Oh, my gosh!" Sandy groaned into his microphone. "Everything I do is wrong. O. K., I'll sit her down, Tony."

Two minutes later he locked his brakes, killed his engine and slid over the side to the ground.

As he opened the door of Bill's office he didn't see the man who sat in an overstuffed leather chair in a corner. He was too busy being surprised over the mild look on Bill Barnes' face. He had expected to be greeted by a tirade on the stupidity of risking his own neck and the Eaglet for no good reason.

Instead Bill grinned at him and said, "Mr. Coe here wants to have a talk with you, kid. I'll be running along. I'll be in the next room when you've finished, Mr. Coe."

Mal Coe, head coach of the Barford Institute of Technology football team, got to his feet as Bill left and came toward the amazed Sandy with extended hand.

"Hi, Sandy," he said quietly. "You quit coming to see me so I decided to come and see you."

"Hello, Mr. Coe. I—I'm glad to see you—"

"Let's sit down, kid. I guess you know why I'm here?"

"Yes," Sandy said. "I guess I know."

They sat silent for a moment and Sandy could feel Leatherneck Coe's eyes boring into him. He shifted uneasily in his chair and gazed out the window. Coe's voice startled him to attention. It was the voice he had heard so often on the football field during the past three years while he had been studying for a degree in aeronautical engineering.

"Why did you turn in your suit, kid?" Coe asked brusquely.

"You really want to know, Mr. Coe?" Coe grunted.

"The biggest reason was Pete Wren," Sandy said. "I've done the best I could for you, Mr. Coe. But you know and I know that a good quarterback can't hold a football team together if he repeatedly calls his own signal inside the twenty-yard line. That is what Wren has been doing all this year. Trying to grab glory. He didn't care about the team.

"But it wasn't only Wren. You rode me, too. Everyone rode me because I pulled a couple of boners. The sports writers took it up and rubbed in a little salt. I just got sick of it. Football isn't that important. I've made a pretty good reputation for myself right here on Barnes Field. I'm going to finish at Barford and get my degree because Bill wants me to. But I'm not going to play any more football."

"Yes," Leatherneck Coe said, "you've made a big name for yourself with Bill Barnes. An awful lot of kids younger than you look up to you, Sandy. They all think you're pretty swell. They're all following your football the way they've followed your flying, and because you're an idol to them your head has swelled a little. Your hat won't fit!"

Sandy's face turned crimson. He shrugged his shoulders and got to his feet. "I'll be trotting along, Mr. Coe." He had hoped that Leatherneck Coe would understand. But all that Coe wanted, evidently, was a winning football team.

"Sit down, kid!" Coe snapped. "You can't get away from things by running from them."

"I—" Sandy flared.

"Just a minute. I know how you feel. When I was in college I was pretty cocky, too. The coach took it out of me by using me for a tackling dummy. I was finally ready to quit when he came to me and explained why he had done it. He pointed out to me that life wasn't any set-up. He showed me that what I took away from the football field would be valuable to me all my life. It's different with you because you've made a reputation in the air. You're an idol to a lot of kids, Sandy. That's why you can't let them down."

"I'm not the one who is letting them down," Sandy said. "I'm willing to do my part, but—"

"Listen," Leatherneck said, "I didn't get onto Wren until two weeks ago. Then I switched him to fullback. He isn't really good without you blocking for him. I said last year that you would develop into one of the greatest backs I've ever coached. Then you made a liar out of me by quitting after the second game of the year."

"I'm sorry."

"Being sorry doesn't help. With Wren at full and Beasley holding down one half and you the other and young Colbert at quarter, we'll have a backfield that would make the Four Horsemen look like a quartet of pack mules!"

Sandy shook his head. "I'm all through, Mr. Coe. I really don't have time for football. I've got a job here to hold down. You know I fly back and forth from Barford to Barnes Field every day. I get back too late to study after football practice—"

A MAN'S GAME

A COMPLETE BILL BARNES AIR NOVEL

BY GEORGE L. EATON

"Sandy"—Coe's voice was cajoling now—"I've talked to Bill. He wants you to play. He says he can give you more time. Say—you like football, don't you?"

Sandy's eyes gleamed. "I'm nuts about it," he said vehemently.

"Then there's no hope for you," Coe laughed. "I'll expect you back in uniform tomorrow afternoon. You'll go big guns for the rest of the year, kid."

For an instant Sandy had a vision of mud-smeared faces, caught the smell of sweating, heaving bodies, heard the sound of cleats pounding on hard turf. Without realizing what he was doing he was shaking hands with Leatherneck Coe.

"I'll be back tomorrow, Mr. Coe," he said.

"I knew it, boy! Once it gets into your blood it's like flying. And you'll never be sorry."

"Thanks, coach."

"Leatherneck to you—when we're alone," Mal Coe said. He walked across the room and threw open the door to Bill Barnes' study. "Sandy says he is going to report for football practice tomorrow, Bill," he announced.

Sandy's eyes popped wide open as Bill came through the doorway followed by all of the members of his intrepid little squadron of fliers. Their ruddy faces were wreathed in smiles as they greeted Sandy.

It was Bill Barnes who first shook Sandy's hand, followed by his chief of staff, Shorty Hassfurther, who would gladly have given his right eye to Sandy at any time, but made Sandy's life miserable with his "ragging." Next came Eric (the Red) Gleason, a wartime pal of Shorty's, and then the brown-eyed Beverly Bates, who had learned his flying with Bill Barnes. The last to shake Sandy's hand was the dour-faced Scotsman, Scotty MacCloskey, head technician and major-domo of Barnes Field, who had proven his mettle with the Royal Flying Corps in those dim, gallant days of 1916-17.

"It's a foolish game, lad," Scotty said, "but it takes a stout heart to play it."

"I'm sorry about those things I said today," Shorty Hassfurther told him, "but I wanted to make you so mad you'd go back. I'm going to bet every nickel I own that Barford takes Dartmore in your last game."

"We'll win it for you, bozo," Sandy said. He was happy now as he had not been since the day two weeks ago when he had turned in his football togs after the Citadel game.

II—UNSETTLED SCORE

WHEN SANDY reported for football practice at four o'clock the next afternoon in the Barford Bowl, Leatherneck Coe assigned him to the second squad, as far separated from Pete Wren as possible. That suited Sandy. He wasn't looking for trouble.

He was happy in the fact that once again he had the opportunity to feel the plunk of leather against leather, hear the sharp bark of quarterbacks as they called signals after the huddle, and see footballs curving in long graceful arcs against the blue autumn sky. This, he said to himself, is something like it. You get your face pushed into the mud and like it and go back for more. It's a man's game.

Pete Wren nodded to Sandy as they lined up for scrimmage. It wasn't so much a nod as a warning. Sandy didn't bother to return it. But he marveled again at the physique of the man. Wren was built like a brick schoolhouse. Broad, powerful shoulders, broad hips, and legs like pistons. As soon as they began to scrimmage Sandy realized only too well the strength in Wren's body. He pulled him down time after time on the line and nearly had his teeth knocked out by the other's high-driving knees. He brought him down without gain as Wren tried to circle the ends. He brought him down from behind when the stocky back managed to get by the secondary and Sandy was playing safety man. It happened so often that everyone on the team began to comment on it.

Then the sullen Wren began to play dirty football. Sandy was making him look bad and he knew it. It was late in the afternoon when he lost complete control of himself and curved a left hook at Sandy's chin as he was getting up off the ground.

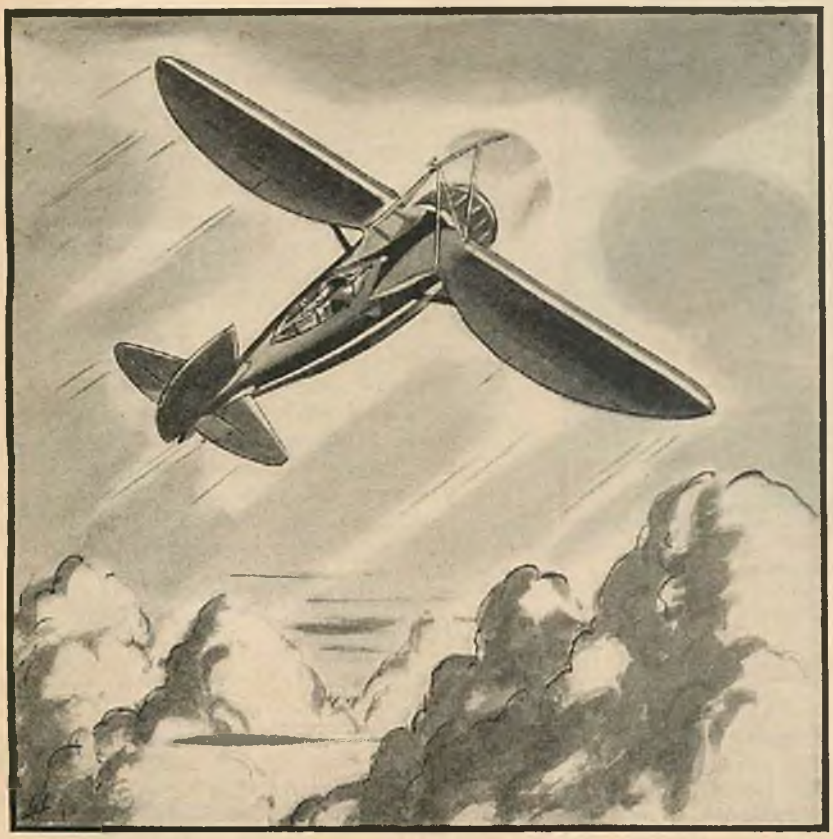
The blow rocked Sandy back on his heels. For a moment his knees sagged. Leatherneck Coe turned his back and pretended that he had not seen. The two teams waited with bated breath. But Sandy caught himself as he leaped toward Wren. He managed to grin and started back behind his own line.

"I'll be seein' you, Pete," he called over his shoulder.

Sandy dressed slowly after his shower and rub. He kept an eye on Wren and timed his dressing so that when Wren and another man left the gymnasium Sandy was just behind them. He caught up to them as they turned the corner of Hodgkin Hall.

"Oh, Pete," he said, "I want to talk to you."

Wren turned and his face was like a thundercloud. The man with him hesi-



He was about to do a vertical 8 when the red light on his radio panel came to life.

tated for a moment, and then walked slowly into the dormitory. He knew what was coming.

"Listen, Pete," Sandy said earnestly, "can't we get together? I'm not backwatering. But you know as well as I do that Leatherneck is counting on both of us. Let's forget our little troubles and see if we can't help Leatherneck turn out a team that will be invited out to California at the end of the season."

Wren's thick full lips curled into a sneer that ended in a short laugh of derision. "What makes you think he's counting on you?"

"A couplea fellows told me," Sandy said lightly. "We can make or break this football club, Pete. I came back because he asked me to. He told me his plans and I know what he expects of us."

Wren pushed his face close to Sandy's. "Look, smart guy, if you're Leatherneck's little darling and know all about his plans, why does he put you on the second team when you come back?"

Sandy for the life of him couldn't keep back his anger. "To stop big apes like you!" he said. "To stop 'em and show 'em how the game is played by someone who can play it!"

Sandy thought he was ready, but Wren's hamlike fist came at him too fast. He managed to roll with it so that it caught him on the cheek instead of the jaw. The left that followed he managed to duck.

"Here it is," Sandy said to himself. "There's no use in trying to put it off."

He was very calm of a sudden. He knew that he was giving away thirty-five pounds, that he had to stay away from Wren or be beaten to a pulp. As Wren rushed at him again with both fists pumping, Sandy jabbed him four times on the end of the nose—straight lefts that flashed out like the tongue of an angry snake. In the dim light afforded by the glazed bulbs in front of the dormitory, he could see the flush of fury on Wren's face. He came rushing in again and Sandy crossed a right to his jaw and ducked a roundhouse swing.

Then something plumped into Sandy's body and he knew that Wren had landed. Jabbing, ducking, shooting rights and lefts so fast that Wren couldn't get set to hit him, he got inside his guard. He laughed as Wren tried to grab him in his powerful arms, realizing the other could easily break his back with his terrific strength. The sound of his laughter seemed to drive Wren insane. He bellowed as he charged. Sandy took a sickening uppercut on the side of the jaw that for an instant sent his senses dancing with his feet.

"I think," he said, bouncing out of his chair, "that you're a dirty rat!"

A crowd of students had gathered about them as they fought around the corner of the dormitory and onto the campus. It filtered through Sandy's consciousness that they were cheering him on. He danced in and out, working on Wren's half-closed eye. A wild swing caught him in the mouth. They were both gasping for breath as they circled and feinted, ducked and jabbed. Suddenly Sandy went under Wren's guard with a right to the stomach. As the other's hands dropped, Sandy hooked a second right to the jaw with all the force of his hundred and sixty-five pounds behind it.

Wren toppled over on his side. His eyes were glazed as he rolled to a sitting position and began climbing to his feet. Sandy stepped back as Wren came upright and rushed toward him again. Certain now that he could take him, Sandy measured him for another right to the jaw. His brain had telegraphed the order to his right fist when that voice came to his ears.

It was a voice that was used to giving commands and used to having them obeyed. It made both Wren and Sandy step apart and drop their hands.

"Stop that!" Leatherneck Coe roared. "What the hell are you two trying to do—kill each other? Get up to your room, Wren! You come with me, Sanders. I want to talk to you!"

The coach pushed his way through the silent students with the panting Sandy in tow. Straight across the campus he walked and into the house where he lived.

His face was a thundercloud as he ushered Sandy in the front door. When he snapped on the lights, to Sandy's amazement he was laughing.

"I knew you could do it, kid!" he said. "Now we'll have a football team. And nobody will ever call you yellow again, kid. Oh, what a fight! What a fight!" His leathery face and his bald pate seemed to be smiling together.

"You saw all of it?" Sandy asked.

"All of it, son," said Leatherneck. "Right from the time he parked that left hook on your chin this afternoon. I followed you out of the gym. I knew it had to happen before we had a football team. He'll have a new respect for you now, kid. He didn't have to say 'uncle' so he'll kid himself into believing that he was winning when I cut in. But underneath you'll have the old Indian sign on him. He was jealous of you, Sandy. Now he'll respect you. You two'll get on."

A grin split Sandy's bruised lips as it came to him that old Leatherneck had really staged the fight.

"You go in at right half on the varsity tomorrow, Sandy," Coe said. "Wren will do your blocking for you now."

"Thanks," Sandy said. He ran the

tips of his fingers across his left eye, tapped around it. "Say," he exclaimed, "is this eye closing up?"

Leatherneck peered at it. "No. Why?"

"If I go back to Barnes Field with a shiner, Shorty and Red Gleason will kid the pants off me."

"You could get a shiner in scrimmage," Leatherneck laughed. He slapped Sandy on the back because he was bubbling over with good spirits. "We're going to town now, kid."

"Yeah," Sandy grinned, "but right now I got to get the Eaglet warmed up and go to Barnes Field."

III—PROFESSIONAL INTERFERENCE

THE SPORTS WRITERS turned their spotlight on Barford Tech after their next game with Brown. They played up the combination of Sanders and Wren after Sandy and Pete had scored thirty points against a Brown team that was no set-up.

During the week of practice before the Army game, Sandy and Pete Wren worked in perfect unison. Outwardly they were friends, but both knew that they would never be friends. Each realized that close coöperation was to their mutual advantage.

Whenever Sandy climbed out of the cockpit of the Eaglet in which he commuted to and from Barford, Massachusetts, he had a football in his hands. The mechanics and grease monkeys on Barnes Field who were not football-conscious watched him in amazement as he threw the ball in front of him, raced ahead to pick it out of the air, and then began a sprint in which he pivoted, sidestepped and hurdled toward the Administration Building or his rooms in the pilots' quarters.

Martin, the head mechanic, said, "I always knew he was nuts when he got in the air, but now he's gone nuts on the ground."

The Sunday after the Brown game Shorty Hassfurther dropped into Sandy's rooms to peer at him closely and ask him if he had seen the Sunday papers.

Sandy nodded his head and grinned.

"Forget all that tripe," Shorty barked at him. "What do those newspaper birds know about football players? Comparing a flat-footed cluck like you with Mahan and Jim Thorpe and Red Grange. Hell!"

Shorty snorted his disgust but Sandy continued to grin. He knew Shorty well enough to know that he was trying to deflate any swelled head he, Sandy, might have picked up after the rapturous accounts the papers had given his playing. He knew, too, that Shorty and Red and Bev Bates, and even Bill were covering every bet they could find that Barford would win from their old enemy Dartmore in the last game of the season.

"Don't worry, I'll live it down," he said.

Shorty grunted and showed him a diagram of a play he had worked out.

"See what Leatherneck Coe thinks of that one," Shorty said. "It's a variation of an old-time play we used when I was playing at Washington and Jefferson."

"Oh, yes," Sandy said, innocently, "you played in that first game of football between Princeton and Rutgers in 1876 when they had twenty-five men on a side, didn't you? You're pretty spry for such an old man."

Sandy managed to get through the doorway and slam the door behind him before Shorty could reach him.

Barford went into its sixth game against the Army without having had its goal line crossed. They had scored at least four touchdowns in every game except the two when Sandy was missing from the line-up.

The whole country listened in on that Army game over a nationwide hook-up. The final score was 20—0, with Barford keeping its goal line inviolate.

For once in his life Leatherneck Coe was satisfied with one of his football teams. To prove it he went about with a smile on his homely face. In fact, he was so pleased with his charges that he dismissed practice on Monday after the Army game and gave them a rest. He wasn't worrying about the Vandermore game on the following Saturday, as it had been scheduled as a "breather" between the Army and the Dartmore games.

But like many another soft spot it almost turned out to be quicksand. Sandy managed to intercept a forward pass to tally the one score of the day. Wren failed to kick the goal. The game, a lethargic exhibition in comparison to the previous games of the season, was attributed to the fact that Barford had struck its peak against the Army and was on the down grade.

Neil Swayze wrote in the New York *Public Ledger:*

In our humble opinion Mal Coe's Barford Tech team is on the toboggan. After wiping up all opposition in their six previous games and displaying power that has never before been seen on Hodgkin Field, they were barely able to eke out a 6—0 victory over little Vandermore on Saturday.

The set-ups from Vandermore started the game with the object of keeping the score against them as low as possible. Before the first quarter was over it was evident that unless Barford came to life Vandermore was more than a little likely to upset the apple cart. After shoving a listless Barford team all over the field for the first half Vandermore came out with fire in their eyes for the second half.

Only the wide-awake play of Sanders and Wren kept the hard-fighting underdogs from scoring. The lone tally of the game came when Sanders intercepted a Vandermore pass and raced for a touchdown.

According to the boys "in the know" along Broadway, the odds last week were 2 to 1 that Barford would take Dartmore. They have now tumbled to even money, with more Dartmore money than Barford in sight. Harry Boyle, the well-known maker-of-odds and Broadway betting commissioner, informs us that there is a lot of wise money being laid on Dartmore. He tells us that professional gamblers are going for college football in a big way and hints that a big syndicate of wise money is being laid all over the country on Dartmore.

Let us hope that professional gamblers do not succeed in doing to football what they did to big league baseball when the Chicago Black Sox listened to the siren song of crooked gamblers.

* * *

Sandy Sanders had finished his studies for the night and was just about to turn out his light and climb into bed. He ached mentally from the tongue-lashing Leatherneck Coe had given them that Monday afternoon after the Vandermore fiasco, and physically from the pounding the second team had given him during a long scrimmage.

A knock came on his door, and the appearance of Bill Barnes an instant later brought a tired grin to Sandy's lips.

"Listen, kid," Bill said, "did you read Neil Swayze's column in the *Public Ledger* this evening?"

"Yeah," Sandy said. "It's a lot of blarcom."

"I hope so, but you're going to have some callers in a few minutes and I don't like the looks of things after what Swayze wrote in his column."

"Who is it?" Sandy asked.

"An old-time pilot named Angel-face Holliday. He's as crooked as they come. He's flying a man here from Chicago who wants to see you. He made contact with Tony Lamport on his radiophone. He said he was bringing a man named Mattell to see you. Tony checked with me and I was going to tell him to tell Angel-face you couldn't see them when I happened to think about Swayze's column."

"What does that have to do with it?" Sandy wanted to know.

"Just this. Unless I'm mistaken, this man Mattell is a crooked Chicago gambler. He's just the kind Holliday would be mixed up with. I thought we ought to find out what they had on their mind."

A MAN'S GAME

A COMPLETE BILL BARNES AIR NOVEL

BY GEORGE L. EATON

"How soon will they be here?" Sandy asked, yawning.

"They ought to come in any time."

Suddenly Bill cocked his head on one side, and they both went to a window as the high whine of a plane came from above Barnes Field. A moment later a sleek, low-winged monoplane glided down on a runway and came to a halt on the tarmac. They could see it plainly under the glare of the floodlights.

"Do you see that machine-gun sight and the bomb racks underneath the center-section hatch?" Sandy said in amazement.

"I see 'em," Bill said. "That job is fast—retractable landing gear—it could do a lot of damage. There are three of those guys. Got an automatic here in your room?"

"Sure." Sandy lifted a blue-nosed Colt out of a table drawer and handed it to Bill. "Afraid they're going to steal your gold teeth?"

"Angel-face would steal anything," Bill said. He slid the automatic into his side coat pocket and sat down on the edge of the bed.

When a knock sounded on the door he called out a cheery, "Come in."

Anyone could have told why the man who first stepped into the room was called Angel-face. He was a big man with wavy, blond hair, a ruddy complexion and large, innocent blue eyes. His face cracked into a disarming smile as he said, pleasantly, "How are things going with you, Bill?"

Bill extended his hand reluctantly. "Fair. This is Sandy Sanders."

"Blow-me-down Sanders!" Holliday said. "This is Mr. Mattell, Sanders, and Bill Barnes."

Bill instantly recognized the thin-faced, beady-eyed man whose hand he shook as Max Mattell, big-time professional gambler. A half-dozen unsavory stories about him flitted through Bill's mind.

Holliday did not introduce the flat-faced man with the bullet head who was with them. He just nodded his head at him and said, "Sit down, Mike," as he threw himself into a chair. The man called Mike seemed to prefer standing.

"You got a nice place here, Bill," Angel-face said. "How about taking me on as a pilot?"

"You wanted to talk to Sanders?" Bill said to Mattell, ignoring Holliday's question.

"Why, yes," Mattell said, "but I want to see him alone."

"You see him with me here or you don't see him."

"I see," Mattell said, and he glanced out of the corners of his eyes at Holliday.

"Mr. Mattell just wanted to ask you what you thought about Barford's chances in the Dartmore game, Sandy," Holliday said, smiling. "He wants to get your opinion before he lays some bets—some big ones. How much is it you're going to put up altogether, Max?"

"Several hundred thousand if I can find takers," Mattell said. "What do you think, Sanders?"

"Why, naturally," Sandy said, "I hope we win. I think we will unless we have some injuries early in the game."

"Suppose you or Wren was injured before the game?" Mattell asked. "What then?"

"Well," Sandy said slowly, "there's no use in thinking about that. We're both O. K."

"Suppose you and Wren don't click on Saturday," Mattell said. "Suppose you both got careless and fumbled a couple of times on your own ten-yard line and missed a couple of important tackles. Dartmore would have a pretty good chance then, eh?"

"Yes," Sandy said, "it would. But both Pete and I carry a football every place we go. We're pretty used to hanging on to it."

"Listen, Sandy," Holliday put in, "you're going to Barford to get an engineering degree, aren't you? You're just playing football because you like it. You're not all filled with the old college spirit and Alma Mater stuff, are you?"

"No," Sandy said slowly. "I'm after my degree and what I can learn. I like football, but I've knocked around the world with Bill quite a bit and I can't get up the same enthusiasm and college spirit a lot of the kids have."

"In that case," said Max Mattell quietly, "don't you think you could stand losing if I gave you ten thousand dollars to fumble a few times when it would mean a lot to Dartmore?"

Sandy's face turned a deep crimson as he turned to look at Bill Barnes and then back at Max Mattell.

"I think," he said, bouncing out of his chair, "that you're a dirty rat!" He yanked Mattell to his feet, drove his fist into his face. The gambler slumped to the floor, blood spurting from his nose.

The man called Mike whipped an automatic out of a shoulder holster, and as Bill started to reach for the gun in his pocket, said in a flat voice, "Move them hands and I'll shoot hell out of you!"

The bloody-faced Mattell had climbed to his feet. "Hold your gun on him," he ordered, "while I fix this kid so he won't play football for anybody Saturday. I offered it to him the easy way. Now he'll have to take it the hard way. If he makes a pass give it to him in the stomach."

Mattell steadied himself, while Bill stood helpless, with his hands dangling at his sides.

Mike whipped out a gun. "Move them hands and I'll shoot hell out of you!"

A MAN'S GAME

A COMPLETE BILL BARNES AIR NOVEL

BY GEORGE L. EATON

Then Bill saw the door from the hallway opening slowly. He held his breath for what seemed hours as Shorty Hassfurther's broad face appeared in the crack. Shorty pushed the door open fast, took two steps and was directly behind the flat-faced gunman.

"Hold it and don't turn," he snapped. "Drop that gun and get your hands up. And you, Angel-face, keep your hands out of your pockets."

Mattell's bodyguard dropped his gun on the floor and Bill whipped Sandy's automatic out of his pocket and trained it on him. Shorty stepped out from behind the gunman and picked his gun off the floor.

As he straightened up he wiggled the index finger of his right hand. "Imagine shooting anyone with that," he said with a grin.

Bill reached for Sandy's telephone and got Tony Lamport on the wire.

"Send over a half dozen guards with sawed-off shotguns," he said to Tony. "I want them to escort Angel-face Holliday and his pals back to their ship. Tell Scotty to warm up the Charger and two Snorters on the apron, and check the ammunition, just in case."

He slapped the receiver on the hook and put the telephone down with a bang. His eyes narrowed to mere pin points as he regarded the three men in front of him. "So far," he said, "you lousy racketeers have left football alone. If you're wise you'll keep on leaving it alone. If anything happens to anyone on the Barford varsity between now and Saturday I'm going to put you three crooks behind bars."

"Listen, Bill," Angel-face began to whine as six uniformed guards with sawed-off shotguns in their hands and automatics on their hips came into the room, "we didn't mean any harm. We—"

"Scram!" Bill roared. "Get out of here and take those two rats with you before I get sore!"

IV—GAMBLERS' LUCK

SANDY was destined to be thankful for a certain bit of advice Bill gave him just after the unwelcome visit of Holliday and Mattell. At first he had scoffed at that advice, but finally gave in to Bill's insistence.

He did not, however, mention the incident that had taken place at Barnes Field to Leatherneck Coe. He had every intention of doing so the next day, but when he saw that the coach was nearly crazy with worry over the condition of his men he decided to keep quiet. Coe had his eye on him and Pete Wren more than on anyone else.

It occurred to Sandy that Mattell might try to buy Pete Wren. After watching Wren at practice Tuesday and Wednesday he came to the conclusion that if the gambler had tried he hadn't met with the least bit of luck. Wren was playing football like a maniac to make up for his poor showing against Vandermore. Playing wide on defense as a floating back, he was gliding in like a panther when the ball was snapped by the second team. He would sift through the interference like a shadow and hit the ball-carrier with a force that left him gasping on the ground.

"It's up to you now," Leatherneck told his men after practice Thursday night. "I want all of you out for a light practice tomorrow. Then, if you can't win this game Saturday you'll all go down in my book of memories as a bunch of—of— Hell, get out of here!"

Sandy still had a grin on his face as he climbed into the Eaglet for the trip back to Barnes Field. He knew that old Leatherneck was satisfied that everyone of them would give all he had to win the Dartmore game.

Then, as the Eaglet flashed over Hartford, struck out over the Sound, the thing happened. The monoplane with the twin covered cockpits and the machine-gun ports that had visited Barnes Field came suddenly roaring out of a cloud bank, its weapons yammering. Sandy had scoffed at the idea that the gamblers would try such risky and obvious tactics; the only thing that saved him now had been Bill's insistence that he load his own machine guns.

Those filled ammunition belts enabled him to hold the superior ship off after that first attack, gave him time to shout the field's call letters into the microphone, tell Tony Lamport what had happened. Luckily, Sandy's desperate plea was answered by Red Gleason arriving in a Snorter before the monoplane's guns found a vulnerable spot, and between them the two Barnes men quickly decided the other pilot to turn tail and run. But the Eaglet was a sieve.

On their return to the field Bill Barnes listened in silent fury to Sandy's account of the attack. When he had finished he lifted a telephone out of its cradle and asked Tony Lamport to get James Morton, the chief of the criminal investigation division of the department of justice, in Washington, on the telephone.

"Bill speaking," he said a few minutes later. "The Charger? She's something, Morton. She's everything I hoped she'd be. I'll hop down there soon and give you a chance to look her over if you'll promise not to pull one of those hot jobs of yours out of your inside pocket and ask me to take it on.

"What I want to find out now is whether you have any dope on Angel-face Holliday, his first name is Charles, I think, and Max Mattell, the Chicago gambler. See what you can find out about them and where they are now, if you can. I'll wait up until you call me back if it won't be too much trouble. . . . Thanks, Morton."

Bill laid the telephone back in its cradle and said to Sandy, "I'll fly you up to Massachusetts tomorrow morning and we'll stay there until after the game. Mattell is desperate, and even a desperate rat is dangerous. He and his playmates must have a lot of money on that game. Be on the apron at seven-thirty in the morning."

"Swell, Bill," Sandy said. "I wouldn't want to run into Holliday again, alone. I'm still jittery."

"We don't know it was Holliday," Bill said, grimly, "but we'll find out. You haul yourself off to bed now and forget about Holliday. We'll take care of him."

Dour old Scotty MacCloskey, Martin, the head mechanic, and a half dozen of their assistants were making a last check on the stainless steel monster Bill Barnes called the Charger when Bill appeared on the apron the next morning at seven-thirty.

The two single-blade, automatic-pitch propellers with their black de-icing spinners stared at him like the eyes of an armored war horse from the leading edge of the gleaming wings. From the tip of the 23mm. Madsen auto-cannon that projected from the nose of the fuselage to the trimming tabs on her double rudder fins, she was a thing of sleek streamlined beauty and tremendous power.

As Martin gunned the twin "pancaked" power plants that were completely inclosed within the thickness of the wings, and the thirty-six hundred horses roared to life, Bill shouted at Scotty MacCloskey:

"Did you check the ammunition?"

"I always check the ammunition, boy," Scotty said reproachfully. "All the tanks are full. Even the wings are on."

Grinning, Bill climbed into the pilot's cockpit that was in the nose, well beyond the propeller line. He dropped into the parachute chair, fastened the lap strap and shoulder harness of the parachute and plugged in his radio jacks. His eyes ran over his two main instrument panels that had a slot between them to give him a close view of the ground in landing.

Mounted on the vertical backs of the panels was a single landing light that

was in the extreme rounded plexiglass nose and could be adjusted in flight. Beneath the bank of engine instruments on either side of his seat was mounted a fixed .50-caliber Browning machine gun. These were easily accessible to his reach in case they jammed. They were both fitted with large ammunition reels and could be loaded from the outside or from the cockpit. The ammunition counters could be read at a glance.

By lifting a trapdoor immediately behind his seat, Bill or his navigator could get at the breech mechanism of the sleek, long-barreled automatic cannon that nestled snugly within the triangular section of the main beam of the ship. All his guns were aimed through a single telescopic sight. Beside it was a retractable infra-red ray telescope that permitted him to see through fog, rain or the darkness of the night.

The shining monster seemed to tremble in eager anticipation as Bill flipped his intercockpit telephone key and spoke to Sandy. "Strap yourself in, kid," he said. "I'm going to take the kinks out of her joints when we get upstairs."

"Let her ride, sailor!"

Bill released his wheel brakes and probed the sky above him as he blasted the big ship around into the wind and fed her soup. The twin Diesels welled into a mighty roar as she sped down the concrete runway. Floating up into air, seemingly, a yellow and green light flashed on the instrument panel as the main landing wheels and the nose wheel slid up into the belly and the Charger became a low-winged, cantilever monoplane of tremendous speed and amazing maneuverability.

At ten thousand feet Bill flicked his eyes across the instrument panel with its numerous gauges and rolled the big fighter over on its back. An instant later he dropped the nose and opened the throttles wide. Down and down they sped until the ship had reached terminal velocity and he pulled up the nose to a forty-degree angle before leveling off.

"Listen," Sandy said in his ear, "I'm supposed to play a game of football tomorrow!"

"Right," Bill laughed.

He nosed the Charger up to fifteen thousand feet and opened his throttles again. His tachometer registered 2550 r.p.m. as he laid the nose on Barford, Massachusetts. The airspeed indicator climbed to three hundred and fifty miles an hour, four hundred, and there he held her. A warm glow of satisfaction suffused him as it flashed through his mind that the Charger was now everything that he had ever hoped for in a long-range fighter.

A half-hour later he "flew into the ground" on the air field at Barford Tech, landing only on his two rear wheels at first, then as he applied his brakes the nose dropped slightly forward to rest on the nose wheel to complete the tricycle undercarriage.

When Bill told Leatherneck Coe about the visit of Max Mattell and Angel-face Holliday and the attack on Sandy, he was afraid that the tough old veteran was going to be stricken with apoplexy.

"Why, the lousy, low-lived sons of pigs!" Coe spluttered. He sat down heavily in a chair and began cursing.

Bill sought to soothe him. "Jim Morton, chief of criminal investigation in Washington, is trying to locate both Mattell and Holliday for me now. If we can find them I'm going to try to have them indicted for attempted murder."

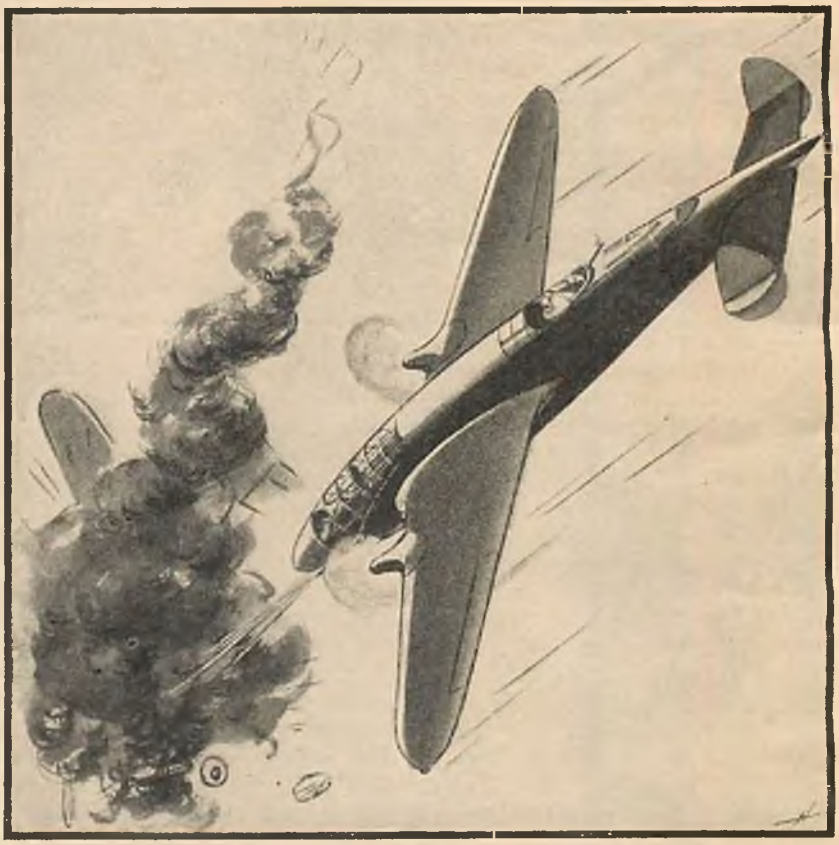
"Do you think they might try to get to young Sandy again?" Coe asked.

"No," Bill said. "I'm going to stay right along with him until that game starts tomorrow. But you'd better get in touch with Wren and warn him to be careful. You don't think Wren would sell you down the river, do you?"

"No," Leatherneck said slowly. "He isn't the man Sandy is, but he wouldn't do that. He loves football too much. I'll get in touch with him immediately."

But Leatherneck didn't get in touch with him. He didn't get in touch with Wren for the reason that he couldn't find him. He didn't worry about that during the morning because Wren had no classes scheduled until afternoon. When the fullback failed to appear for a two o'clock class he began to worry.

Bill was in the gymnasium with Sandy and the rest of the squad when Leatherneck appeared for "skull" practice. He could tell the instant he saw Coe's lined, haggard face that something had happened. He sauntered away from Sandy and the rest of the varsity as Leatherneck beckoned to him.



A terrific explosion and a great cloud of smoke took the place of the monoplane.

"Come into my office," he said to Bill.

Leatherneck fell into a chair after he had closed the door. His tanned face was pasty and there was an expression of fear in his sunken eyes.

"I'm afraid something has happened to Wren," he began. "Pete had a telephone call from the air field about ten o'clock this morning. He was still asleep in his room at his fraternity house when his roommate called him. He came back from the telephone and told his roommate some old friends from home had just landed in a plane to see the game. They wanted him to come over and get them. He jumped into some clothes and drove his car

over. Harris, his roommate, says he hasn't been back."

"Did you check at the airport?" Bill snapped.

"Yes, and I'm afraid the boy has been kidnaped from under our eyes, Bill. He went to the field and the manager directed him to a four-place cabin job that was idling on the apron. He ran over and climbed inside and a few minutes later the plane took off. It didn't come back. The manager thought it was odd because he knew Wren and thought it was peculiar that he would be hopping off on a joy flight the day before the Dartmore game. He said later that he didn't think the men in the plane looked like men who would be friends of Wren."

"Did he tell you what kind of a plane it was?" Bill demanded. "How it was marked?"

"Here are the license numbers. They don't mean anything to me. He said it was a Stebling four-place cabin job."

Bill read the license numbers the air field manager had written down and they didn't mean anything to him either. But he was certain that one of two things had happened. Either Wren had sold Barford down the river by pretending to be kidnaped for a pocketful of money or he had been forced into the plane at the point of a revolver.

"They may kill the boy, Bill," Leatherneck said. "Snatching him is a Federal offense. If we sick the Federal men on them they may think he's too hot to hold and cut his throat."

"Take it easy," Bill said, dropping a hand on Leatherneck's shoulder. "You go out to your squad and pretend that nothing has happened. Got a car outside?"

"A Ford sedan, tan, behind the gym."

"Good. You put the team through whatever you intended and don't tell 'em anything. I'll take your car and go to the air field and talk to the manager and make contact with Morton in Washington. I'll also send for my men. They'll be here in three Snorters within the next couple of hours and we'll find Wren if he's any place in the United States. If anyone asks about Wren, and they will, tell them you sent him to a hospital in Boston for an X ray, that he's all right and will be back in time for the game tomorrow."

Ten minutes later Bill flipped the radiophone key in the Charger and made contact with Tony Lamport.

"Tell Shorty and Red and Bev Bates to check the ammunition and fuel in their Snorters and report to me at the Barford airport as fast as they can make it," he snapped at Tony. "Then check with every air field in the country to see if you can locate a four-place stock Stebling. It's finished in black with red trim." He read off the license numbers. "After that make contact with James Morton in Washington and find out if he has learned anything more about Holliday and Mattell. Tell him also that Pete Wren, the fullback on the Barford Tech football team, was kidnaped from the airport here this morning in that same Stebling. Tell him to keep it quiet and put his men to work quietly. He'll probably get in touch with me or come here as soon as he hears from you. Do you get it?"

Tony whistled into the microphone. "You bet I get it!"

By seven o'clock that evening Beverly Bates, Shorty Hassfurther and Red Gleason had fishtailed their Snorters in on one of the short runways of the Barford airport. A little later James Morton arrived by plane from Washington.

They set up a little headquarters in a private office in the administration building of the airport where Morton could keep in constant touch with his operatives all over the country, through Washington, and where Bill could keep in contact with Tony Lamport. When Leatherneck Coe joined them it was decided that Sandy should spend the night in a downtown hotel instead of the fraternity house where he usually stayed when he was at Barford overnight. Bill was against telling the youngster about the disappearance of Wren unless it became necessary before the game the next day. He sent Bev Bates to spend the night with him and keep him under constant guard.

Throughout the night Bill and Shorty and Red whipped their ships off the airport to investigate reports that came to them from Tony Lamport or Morton's men. Each time they returned with defeat written on their faces. Angel-face Holliday, Max Mattell and the red and black Stebling had completely disappeared from the sight of man.

At dawn Leatherneck Coe had given up hope. "We've got to give it to the papers," he said. "So that at least the bets those rats have placed will be called off."

"No!" Bill and Morton snapped together.

"If we give it to the papers," Morton amended, "we'll never see Wren alive again."

V.—"THERE'S THE WHISTLE!"

SANDY spent the night unmolested, but the strain and tension over the coming game permitted him only fitful snatches of sleep. When he rose the next day he was more keyed up than ever.

It was just before game time that Leatherneck Coe came to him and told him about Wren. Sandy listened with wide, unbelieving eyes.

A MAN'S GAME

A COMPLETE BILL BARNES AIR NOVEL

BY GEORGE L. EATON

"But we don't have a chance without him," he said.

"Bill may get back here with him at any time," Coe said. "At ten o'clock this morning we got a real tip. It seems Mattell has a fishing lodge up in northern Michigan. We got reports of a Stebling sedan flying in that section yesterday. We've had a hundred clues, but this looks the most likely."

"If they're holding him up there Bill will get him," Sandy said. "He ought to be here any time."

"You've got to help Barron hold them together until Wren gets here," the coach said. "I'm going to tell the rest of the team Wren isn't back from Boston yet. It's a slim story but they'll have to swallow it. The truth will come out eventually."

The roar of the football crowd came rolling in from the stadium while Leatherneck talked to the rest of the team. The blare of the bands beat in Sandy's ears. Around him swarmed trainers, coaches, officials and his teammates. Attendants worked on bandages, taping joints and bruised parts. He put on his harness and shoulder pads and had a trainer tape his feet, running the tape under the instep and around the Achilles tendon. His fingers trembled as he tried to lace his shoes.

He knew that he mustn't let the rest of the team see the despair written on his face. If they thought Wren was coming they might play better than they knew how in order to hold Dartmore until he arrived.

"You've got to do the work of two men," Leatherneck said in his ear. "Save yourself. Relax whenever you can."

Sandy nodded. Relax! He felt as though he was going to choke to death. Grabbing at his blanket he stepped outside the dressing room and gulped the cool, fresh air.

Captain Barron appeared in the doorway. "Let's go take 'em!" he called over his shoulder. Sandy dropped in behind him and they raced on the field as the stands rose and gave forth a frenzied roar. The Barford band burst into the marching song as the ball came speeding back to Sandy from the center. He flipped it to Beasley, who ran wide and threw a forward to him as he cleared what would soon be the Dartmore secondary defense. With legs churning high, lungs gasping for breath, he plopped the ball on the ground. The

men scattered over the field to receive kicks that floated down in long arcs or sailed wide with the tricky curves of the wind.

Then Barron was out on the field with the Dartmore captain and the officials. A coin spun upward. The referee placed the ball on Dartmore's forty-yard line.

The man at the radio broadcasting microphone said:

"This is Ervin Mathews speaking, broadcasting the Barford-Dartmore football game through the courtesy of the Atlantic Seaboard Circuit, Station WXBM. We're all set now to give you an account of the greatest game the East has seen this year.

"For some reason Mal Coe, the Barford coach, is not using Pete Wren, his great fullback, in the starting line-up. Alcock is playing in his place. There are all kinds of rumors floating around as to why Wren isn't in there. But our guess is that Coe is holding him out so that he can study the Dartmore team for a few plays.

"There goes the whistle, folks, and there goes the ball. Beasley, the Barford left half, takes it and that boy Sanders has swung in beside him. They're on their way toward the side line. Sanders took out two men before he went down. Alcock is still on his feet. He's up to his own thirty. They're giving him fine protection. He's shifting out and *wham!* They hit him hard but he still has the ball.

"It's a good-natured crowd up here today. Everybody is keyed up, tense.

"They're lining up again. You know there is something about this Barford team of Mal Coe's that I like. They go into a huddle and then the quarterback calls signals like they used to do in the good old days.

"Beasley tried to find a hole off tackle that didn't get him anywhere. That's a great line of Dartmore's. Another buck failed. No—they made two yards this time. Sanders is back to kick. And boy, *what* a kick. A fifty-yard punt that is taken by Captain Roberts on his own ten. He is coming up—five—ten—fifteen—twenty—twenty-five—thirty-five yards before Barron of Barford brings him down. That was a sweet run, folks.

"Ha! Dartmore using a reverse made nine yards with a run off tackle. Number fourteen, Wood, made that gain. They're taking the sticks out on the field to measure it. It's a first down. The first down of the game is credited to Dartmore. The Dartmore stands are wild. Roberts, the Dartmore captain, is back. They say he's a marvelous passer. There go his ends down the field. Wood is cutting out to the right. There goes the pass. It's traveling like a bullet. But that boy Sanders came out of nowhere and batted it down just as it looked as though Wood had it with a clear field ahead.

"Another pass, Roberts to Wood. And it's *good!* A beautiful flat pass that nets another fifteen yards. Sanders brought Wood down with a hard tackle. That boy Sanders is all over the field. That is another first down for Dartmore. They're well into Barford territory.

"Sanders knocked down *another* pass. This is a fast game. There goes a line buck that didn't do 'em any good. The Dartmore captain is back again. It looks like a pass. No. He is going to kick. It's a beaut. Out of bounds on the Barford two-yard line! That's a tough spot for Sanders to kick from. If they break through and block the kick it'll be too bad for Barford. Sanders takes the pass behind his own goal line. The Barford line holds and he gets off a honey of a sixty-yard punt. Captain Barron of Barford nailed the receiver in his tracks at midfield.

"Barford is fighting hard. Dartmore didn't make a yard. In fact, they lost one on a cut-back through center. There went a pass that Colbert knocked down. Barford is raging now. Another pass that Sanders goes into the air to knock out of Wood's hands. Gosh, that boy is pretty to watch!

"Roberts is back to kick. The ball goes high and goes over the goal line. It comes out to the twenty-yard line to be put in play.

"The pass from center goes back to Sanders. Beasley is in front of him. They're going around the end. No! They cut through tackle, through a hole you could move your furniture through. Sanders is still going. Beasley is down but Sanders is cutting toward the side line. And wham! The Dartmore safety man slapped him on the turf so hard you could hear it way up here. But he picked up twenty-five yards on that run. That was a sweet run. Hear the Barford stands giving him a hand!

"There he goes again. He is sweeping around left end and they said he couldn't run to the left. Talk about your ballet dancers, folks! Two of them trapped him then and did they hit him! But he's all right.

"They're in the huddle again. It looks like a pass. Yep—Sanders is streaking down the field and Colbert is dancing back behind his interference until he gets clear. There it goes. He has— Oh, oh, oh! Roberts, the Dartmore captain, went into the air and snared it and he is streaking for the far corner of the field. Sanders is after him but he isn't gaining. Oh, boy, is that Dartmore captain moving. And there he goes! He dove the last five yards to get away from Sanders. The ball is two feet over the goal line for the first score of the game!

"The crowd has gone mad and so have the Dartmore players. They are clapping their captain on the back. Listen to that roar! Mal Coe had better

Instead of walking down the road he went through the woods behind the cabin.

get Wren out there on the field if he wants to win this ball game.

"Roberts also kicked goal and the score is seven to nothing with Dartmore leading in this battle between Barford and Dartmore in the Barford Stadium at Barford, Massachusetts.

"Dartmore is kicking to Barford. Colbert, the Barford quarter, takes the kick. He managed to run it back ten yards before they threw him. Those Dartmore ends get down the field like scared rabbits. Dartmore is kicking the ball away from Sanders when they can. They know that anything might happen if he gets his hands on it. The experts have been saying that Sanders couldn't get any place without Wren blocking for him. I wonder what they think now.

"Alcock plowed through for ten yards on a spinner for a first down. They're lining up again. The ball goes back to Colbert, who starts around the end but laterals to Sanders. Sanders is fading back waiting for his receivers to get clear. There it goes! A bea-u-u-utiful thirty-five-yard pass to Barron who pulled it down just as two Dartmore men hit him. They shook him up plenty.

"And there goes the whistle for the end of the first quarter. And what a quarter it was. I'm all in from just watching it."

A few minutes later the broadcaster finished his summary of the first quarter and took up the play again as the second quarter began.

"Sanders is going around right end this time, folks. And look at him go. Alcock, his interference, can't keep up with him. He is away like a flash of lightning after two strides. There is only one man between him and the goal line now. The stands are one mass of mad humanity. The Dartmore safety man got him again.

"The Barford stands are howling for a touchdown. Beasley tries the line and gets nowhere. Oh, *oh!* Barford draws a fifteen-yard penalty for holding.

"But they're mad now. Sanders is talking to them. They are ready to play again. It's another pass. A triple pass, Colbert to Sanders to Barron. And Barron takes it and goes *over for a touchdown!* Sanders faded away back and threw a pass that Barron couldn't have muffed if he tried. He was clear and over the goal line when he took it.

"What a game! One minute it looks like Dartmore and the next like Barford. Sanders drop-kicked the goal, which makes the score 7—7 and it's still anybody's football game. They're right back where they started from except they have both proved that they can score.

"Here, I'll turn the mike around so that you can hear that Barford band play—"

Just before the end of the second quarter Leatherneck Coe yanked Sandy out of the game and sent him to the dressing room for a rest.

Aching in every part of his body, Sandy dropped on a rubbing table more dead than alive. He knew that unless Wren appeared for the second half to bear a share of the burden, Dartmore would run over them.

A trainer sponged off his face while another massaged his aching thighs and legs. Sandy wondered if he could stand another thirty minutes of such terrific pressure. The hopelessness of getting anywhere without Wren engulfed him. Beasley and Colbert were just a couple of backfield men. Colbert was a good quarterback—cagy and cool under fire—but he couldn't block. Alcock was the kind of man Mal Coe used when a game was on ice— Sandy buried his face in his arms.

VI—ACROSS THE BORDER

BILL BARNES set his gyropilot to work and flipped his radio key for the tenth time as the little city of Oswego flashed under his wings and he started over the expanse of Lake Ontario.

"Calling BBS . . . Calling BBS . . . Calling BBS," he chanted into the microphone. An hour before he had sent Shorty Hassfurther to investigate a red and black Stebling that had landed at a small airport north of Sault Ste. Marie, Ontario, the day before, with four men in the cabin. He was sure now that the Stebling that had been reported in the lake country of northern Michigan where Mattell had a fishing lodge was the one for which they were searching. And he supposed that it was the same one that had made a landing in Ontario. He was trying desperately to contact Shorty so they could go in together to get Wren.

His pulse quickened as Shorty's voice answered.

"I'm over Lake Ontario," Bill told him. "I'm on my way to a fishing lodge Mattell owns south of Cheboygan in northern Michigan. Check it on your maps. I'll give you the true position." He studied his chart for a moment and gave Shorty the location of the lodge as he had worked it out. "He has a private air field there. Where are you?"

"Over Georgian Bay."

"Cut west," Bill directed. "We're both looking for the same ship. I'll meet you there."

"O. K.," Shorty said. "Don't forget your gat."

"Right! Watch out for Holliday. I'm signing off."

Bill kicked his rudder and stuck the nose of the Charger full into the northwest gale that greeted him as he left the lake behind. He fought his controls almost constantly for the next hour. At length he pulled the ship out of a flat spin and began to check his bearings. He knew he was some place over Lake Huron, but he wasn't sure where. The storm had abated when he had finished taking his position. He was taking an automatic pistol out of a side pocket to examine it when a sharp, staccato sound came out of nowhere. It brought him straight up in his seat, and his eyes became mere pin points as he probed the air around him.

Then he could feel machine-gun bullets driving into the tail surfaces of the Charger, and he yanked the wheel back as he heard a screaming prop dive beneath him. He caught a glimpse of the black monoplane Angel-face Holliday had landed on Barnes Field a few days before. The urge for conflict with Holliday was racing through his blood like fire now. This was something he understood.

He was half around in a vertical bank when the black fighter zoomed upward beneath him. The twin guns, mounted along its engine housing, spewed out burst after burst of fire. The lead chewed through the leading edge of his left wing before he could slip the Charger out of range. He cursed softly as the black ship roared above him and he recognized Holliday in the pilot's cockpit.

The monoplane zoomed above him and chandelled back to the attack. Bill yanked the wheel back and raced to meet it. The two ships roared at one another. Bill's fingers tightened on his gun trips. His tracers told him that his aim had been bad as the black ship side-slipped out of his line of fire.

"He always was good," Bill gasped to himself as he opened the throttles of the 1800 h.p. Diesels in the wings of the Charger and hung it on its props.

The air above the low-hung clouds over Lake Huron seemed alive with machine guns and roaring motors as they settled down to a vicious, slashing duel such as only two masters of their craft could stage. It did not seem that either of them could survive as they skidded, zoomed and dove in lightning maneuvers to avoid each other's terrific fire.

Down and down they fought while they each tried with desperate zooms and climbing turns to regain the altitude that would give him an advantage.

Minutes, which seem like hours in air

A MAN'S GAME

A COMPLETE BILL BARNES AIR NOVEL

BY GEORGE L. EATON

combat, ticked away. Then Bill got the black ship's nose under his sights for that fleeting second that should have been enough. His bullets drove into the fuselage and crept back. He waited for the black monoplane to yaw and for the nose to drop as it took its last long plunge.

But the nose didn't drop. He saw it come up and over in a dazzling Immelmann turn and saw Angel-face Holliday laughing over the side as he rolled level.

Bill cursed as the black fighter roared at him again. Then he shook off his anger and lined the ship up in his sights with that cool precision that had saved his life a hundred times.

For the necessary fraction of a second he had the nose of the monoplane under his sights again. This time he tapped his rudder lightly as his finger clamped down on the trigger of his 23mm. Madsen cannon. There were three explosions as the shells drove into the engine block of the racing monoplane. Then a terrific explosion and a great cloud of black smoke took the place of the monoplane. Orange and saffron flames shot out of the smoke, and bits of debris hurtled toward the lake below. The smoke slowly dissolved into nothing, and what had been a black monoplane plunged into Lake Huron in a thousand pieces.

Bill wiped the perspiration out of his eyes as he watched the wreckage disappear from sight.

"He's where he belongs," he grated as he threw his radio key and chanted Shorty's call letters into his microphone.

"O. K., Bill," Shorty said. "I've been trying to get you. I'm down on the ground at Mattell's place. You can't help finding it. I saw what I think was that same monoplane Angel-face landed on Barnes Field come out of here when I first sighted the place. It went east and I came in to take a look around. The Stebling is here—repainted. There is no one around unless they are at the house."

"It was the same monoplane you saw," Bill cut in. "You had better be careful there."

"I'm watching it," Shorty said. "Things aren't as they should be. I don't like—"

Shorty's words were suddenly cut off, and the choking sound that came over the ether left Bill rigid with horror. He chanted Shorty's call letters and Shorty's name into his microphone, then threw the key and opened his throttles wide as he began to check his bearings again.

Five minutes later he nosed down through a hole in the clouds to see great stretches of woodland and swampy land ahead. Off to the west he saw Mullet Lake, and then he picked up a great white arrow painted on a small level field along its edge.

He stuck the nose of the Charger down and circled the little field twice while he confirmed the direction of the wind from the orange wind sock atop the single galvanized iron hangar. He saw Shorty's Snorter sitting on the ground near the hangar, but there was no sign of life around it.

He flew the Charger into the ground and dropped the nose on the forward wheel as he applied his brakes slowly. He rolled up beside the Snorter and killed his engines while he carefully peered in every direction. He slipped two automatics into the leg pockets of his overalls and dropped over the side. He saw a long log cabin along the lake front a quarter of a mile away, but there was no sign of people there either.

After peering into the hangar to find it empty, he started toward the log house. But instead of walking down the narrow road that led to it he went through the woods behind it. He ran across a short stretch of lawn and flattened himself out against the house.

Moving stealthily he paused at each window to listen as he crept along the side. Nearing the end he heard the rumble of two voices coming from within. He could tell by the thickness of the men's voices that they had been drinking. For a moment he hesitated, then pushed the door open and stepped inside.

The two men who sat there stared at him for a brief second, and in that time Bill recognized one of them as the man Mattell had brought to Barnes Field with him.

As Bill started to speak, Mattell's gunman moved as only a big, fast man can move. He seemed to glide over the floor to throw a fist into Bill's face before he could either block it or duck. Bill rolled his head with the punch, but it drove him back, halfway out the door. Then his own right flashed out to land flush on the nose of the gunman. A split fraction of a second later his left spun him around, and Bill closed in to use him for a shield as the second man snapped a gun out of a shoulder holster and tried to get in position to use it.

Bill's right arm curved around the gunman's throat while his left sought and held the man's hand that had the automatic. While he half-strangled him with his right forearm Bill brought the other's left arm up and up until the bone snapped. At the same instant he threw him at the other man, and they crashed against a table and sprawled on the floor together.

A bullet fanned Bill's cheek as a gun spat orange flame from the floor. Then one of Bill's guns was in his right hand and he emptied a full clip into the two men on the floor.

He threw open a door leading from the kitchen and raced down the hallway until he found a room that was closed and locked. He smashed on it with the butt of his automatic once and heard a smothered cry from inside. He half-tore the door from its hinges as he threw his two hundred pounds against it.

Shorty Hassfurther's red-rimmed eyes gleamed at him from a face that was bruised and bloody. He stripped the tape off Shorty's mouth and cut the ropes that bound him.

The next instant he was bending over Pete Wren on the bed. He shook him, and when his eyes opened Bill did not have to be told that he had been drugged.

"What happened?" Bill asked Shorty.

"They jumped me while I was talking to you," Shorty said. "They knocked me around and then threw me in here with Wren a few minutes ago."

"Are there any more of them here besides the two down in the kitchen?"

"Mattell and three more of them left in that Stebling just after they grabbed me," Shorty answered. "They had repainted it green and changed the license numbers. Mattell was going to Chicago to collect his bets."

"We've got to get Wren back there fast so he can't collect on them," Bill said. "I've got some stuff in the Charger that will bring him around. Can you fly your Snorter?"

"Hell, yes, I just can't talk. They almost pushed my larynx out through the back of my neck. What about those lugs downstairs?"

"They won't bother us," Bill said. "I think they're both dead."

He turned and lifted Wren out of the bed and put his feet on the floor. "Can you walk?" Bill asked him.

Wren stared at Bill for a moment and then nodded his head. Bill stepped over beside him and slapped him on both cheeks so hard that his fingers left welts on his face. For an instant he stared at Bill and then he tried to struggle to his feet with his fists clenched.

"You'll do!" Bill said, and he was laughing. "Come on! We've got to get back to Barford."

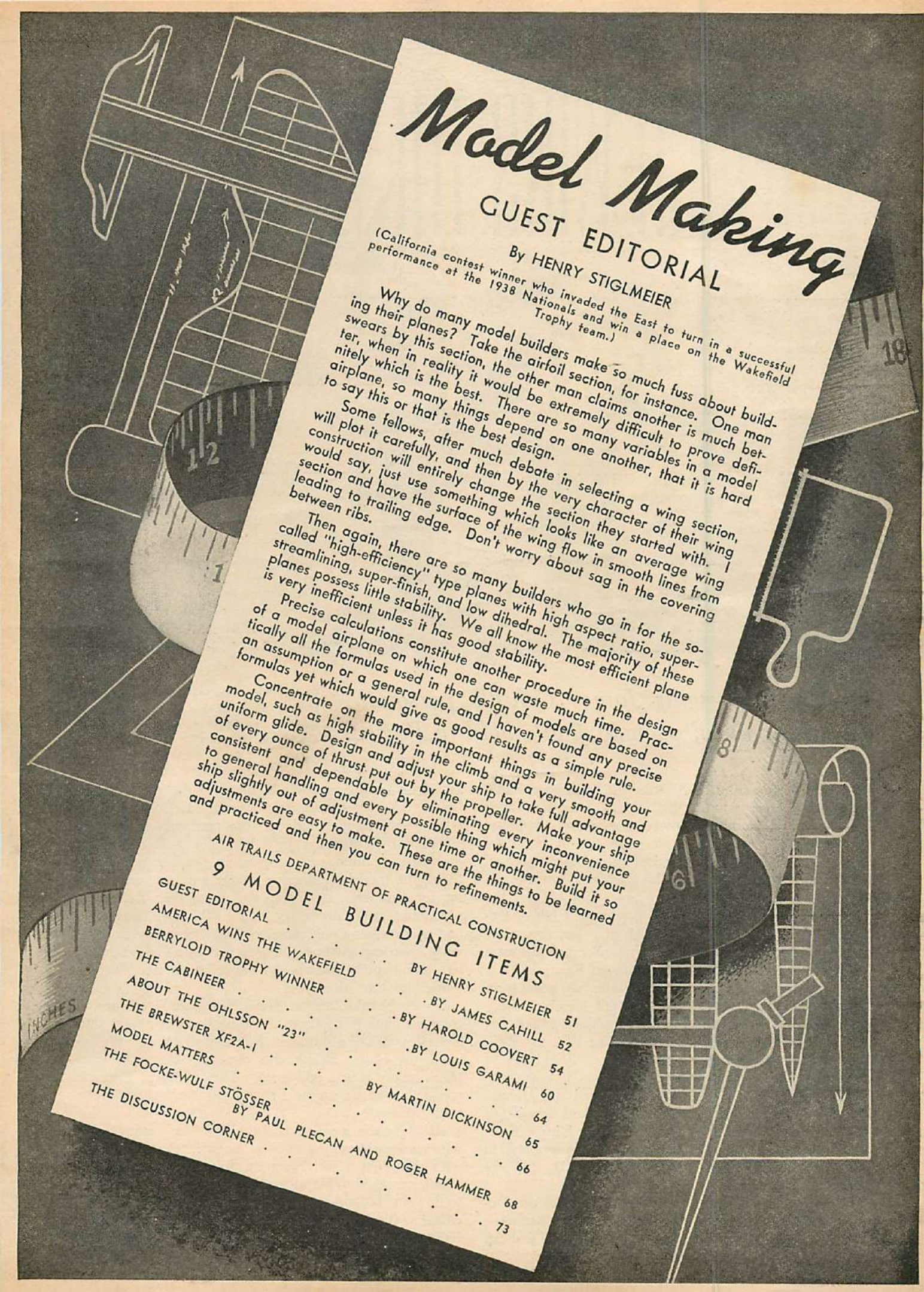
Wren's eyes lost their vacant stare at the word Barford and he shook his head helplessly.

"Where am I? How did I get here?" he asked.

"I'll tell you on your way back," Bill said.

Fifteen minutes later the Charger became a shimmering streak of silver light as Bill opened his throttles and sped eastward. He left Shorty far behind as he threw his radio switch and made contact with Red Gleason at Barford.

(Turn to page 96)



Model Making

GUEST EDITORIAL

By HENRY STIGLMEIER

(California contest winner who invaded the East to turn in a successful performance at the 1938 Nationals and win a place on the Wakefield Trophy team.)

Why do many model builders make so much fuss about building their planes? Take the airfoil section, for instance. One man swears by this section, the other man claims another is much better, when in reality it would be extremely difficult to prove definitely which is the best. There are so many variables in a model airplane, so many things depend on one another, that it is hard to say this or that is the best design.

Some fellows, after much debate in selecting a wing section, will plot it carefully, and then by the very character of their wing construction will entirely change the section they started with. I would say, just use something which looks like an average wing section and have the surface of the wing flow in smooth lines from leading to trailing edge. Don't worry about sag in the covering between ribs.

Then again, there are so many builders who go in for the so-called "high-efficiency" type planes with high aspect ratio, super-streamlining, super-finish, and low dihedral. The majority of these planes possess little stability. We all know the most efficient plane is very inefficient unless it has good stability.

Precise calculations constitute another procedure in the design of a model airplane on which one can waste much time. Practically all the formulas used in the design of models are based on an assumption or a general rule, and I haven't found any precise formulas yet which would give as good results as a simple rule.

Concentrate on the more important things in building your model, such as high stability in the climb and a very smooth and uniform glide. Design and adjust your ship to take full advantage of every ounce of thrust put out by the propeller. Make your ship consistent and dependable by eliminating every inconvenience to general handling and every possible thing which might put your ship slightly out of adjustment at one time or another. Build it so adjustments are easy to make. These are the things to be learned and practiced and then you can turn to refinements.

AIR TRAILS DEPARTMENT OF PRACTICAL CONSTRUCTION

9 MODEL BUILDING ITEMS

GUEST EDITORIAL . . . . . BY HENRY STIGLMEIER 51
AMERICA WINS THE WAKEFIELD . . . . . BY JAMES CAHILL 52
BERRYLOID TROPHY WINNER . . . . . BY HAROLD COOVERT 54
THE CABINEER . . . . . BY LOUIS GARAMI 60
ABOUT THE OHLSSON "23" 64
THE BREWSTER XF2A-1 . . . . . BY MARTIN DICKINSON 65
MODEL MATTERS 66
THE FOCKE-WULF STÖSSER . . . . . BY PAUL PLECAN AND ROGER HAMMER 68
THE DISCUSSION CORNER 73

AMERICA WINS THE WAKEFIELD!

Air Trails presents James Cahill's personal account of the Wakefield finals held in Paris.

Competing were teams from the United States, nine other countries, Australia, Canada and South Africa. Shown above are some entrants with their models.

MEMBERS of the 1938 Wakefield team soon found out that going to the Wakefield Contest in France required something more than merely building models. Winning a place on the team at the eliminations held at the National Meet in Detroit seemed like an empty honor at first. There were no funds available to send a team to France. James Bohash was the only one assured of a trip. The Exchange Club of Detroit tightened its belt another notch and vowed to raise funds for his trip. But the other members of the team left Detroit with little hope of getting to France.

As it later turned out, the United States had a full team of six in France for the meet. Team members were James Bohash, Detroit; George DeLaMater, Oneonta, N. Y.; Gordon Wisneiwski, Milwaukee; William Pfeil, San Antonio, Tex.; and myself. Henry Stiglmeier of Inglewood, Cal., won a place on the team but was unable to finance the trip. First alternate Ted Just, Johnstown, Pa., arranged the trip in his place and flew Stiglmeier's model. Frank Zaic, of New York City, accompanied the team. All the team were hard pressed to get to New York for the sailing date, July 20. My experiences were typical.

When I got back home to Indianapolis from the Detroit meet there was just a week left before sailing—that is, if I was to get to France in time for the contest. H. Weir Cook immediately took up the fight to raise funds. Working with the Chamber of Commerce and other model-minded citizens, the necessary money was collected by Saturday, July 16. The boat sailed four days later. Sunday was spent in preparing and test-flying the models. Monday was spent in town arranging for passports, steamship tickets, clothes, model supplies, and other necessary items. Time was precious, and again Weir Cook came to the rescue. He arranged with American Airlines for a free trip to New York. I left Indianapolis Tuesday morning and arrived in New York late that afternoon.

I met Frank Zaic in New York, and together we completed the last-minute details. We met Wisniewski, Bohash and DeLaMater at the passport office. We just made the boat. Frank was the last across the gangplank before it was pulled up. The *President Roosevelt* was at last on its way to France and the Wakefield Contest.

All the team were aboard the *Roosevelt* except Pfeil, who was unable to get to New York on time. He sailed with the *Niew Amsterdam* on July 23.

We managed to get an extra stateroom for a workshop to do some building. But our enthusiasm for models declined as the trip progressed. The day before we landed, four of the six of us spent the entire day in our bunks.

As George DeLaMater groaned, "Why, oh, why is Paris so far away?"

Ted Booth of the Canadian Model Aircraft League and Desnoes of France met us at the customs office, and we were soon comfortably settled in a Paris hotel.

We test-flew our models two days before the contest. Taxi fare to the airport and back was six dollars. What a time we had packing eight people and all our Wakefield jobs into one French taxi! We learned a certain trick and used the same technique throughout our travels in Paris. Some of us would stand on the curb and hail the taxi. Then the rest of us would jump out of a doorway, throw in the model boxes, and we'd be firmly entrenched in the taxi before the startled driver could say anything. And when he did question us, we pretended we couldn't understand French (which was no trouble at all).

Saturday afternoon all the contestants took their complete models to contest headquarters, where they were weighed, checked, and measured. They were put in our boxes and sealed. (The boxes were to be opened at the contest in the presence of an official.) Following this there was a contestants' meeting. All the teams were introduced. Team managers drew the order of flight. I drew fifth for the American team. Incidentally, we Americans were all dressed in polo shirts and slacks, while all the other contestants were dressed much more formally for the occasion.

The contest got under way Sunday morning about

James Cahill and his Clodhopper 2. With this model he won the 1937 Moffett, was high man in the American Wakefield eliminations, and then won the Wakefield Trophy in Paris. Left—The mug itself. Clodhopper appeared in November, 1937, issue.

By James Cahill

ten o'clock. We left for contest headquarters by bus at eight thirty. The Caudron-Renault Airport was about twenty miles from Paris. It was a splendid place—ample space, with no scheduled transport operations to interrupt our flying. All the countries had their own pits. A take-off board—wooden frame and canvas-covered—was mounted on a turntable for varying wind conditions.

The weather was warm with a clear blue sky until about one thirty, when cumulus began forming. There was practically no wind. Chasteneuf, of the English team, was the first off for a long flight (nine minutes) which landed his ship just outside the airport. Ted Just flew Stiglmeier's entry for our first official flight. It was a nice flight but didn't catch any helpful currents. Then a proxy flyer flew a Canadian job out of sight with eleven minutes and it looked as though the British Empire was going to have a field day. After the first man on each team (fourteen countries entered) had flown, we started rotating the No. 2 men. At eleven thirty I was called to fly.

Clodhopper II took off nicely and climbed fairly well, but did not reach any terrific altitude. The propeller folded back, and it was evident that the model was in a thermal. It drifted slowly from the field, making fairly small circles. After seven minutes it looked as though it was going to come down, and was *(Turn to page 94)*

BERRYLOID TROPHY WINNER

An unusual gas model distinguished for its beautiful construction, finish, and stability.

By HAROLD COOVERT

Harold Coovert and his Berryloid Trophy Winner at Detroit, where the ship won acclaim.

THE event for the best-finished gas model attracts an impressive line-up of ships. At first glance they all seem to be perfectly finished—the beautiful finish that most builders dream about but few realize. Each model represents hundreds of hours of work. Two hundred and fifty hours were spent building and finishing the model described in this article. Thoroughness is the main thing. No detail can be neglected. Each individual item must be given careful attention, since every part contributes to the appearance of the finished model.

This model is a successful flier and is worth the investment of a good finish. With a little careful judgment in flying, there is no reason why the finish should be marred by crack-ups and subsequent repairs. The instructions for finishing can readily be applied to any model. Or if you're more interested in flying than beautifying a model, this design certainly rates attention, since it earned the title of a successful gas model before it took additional honors for the best finish.

FUSELAGE

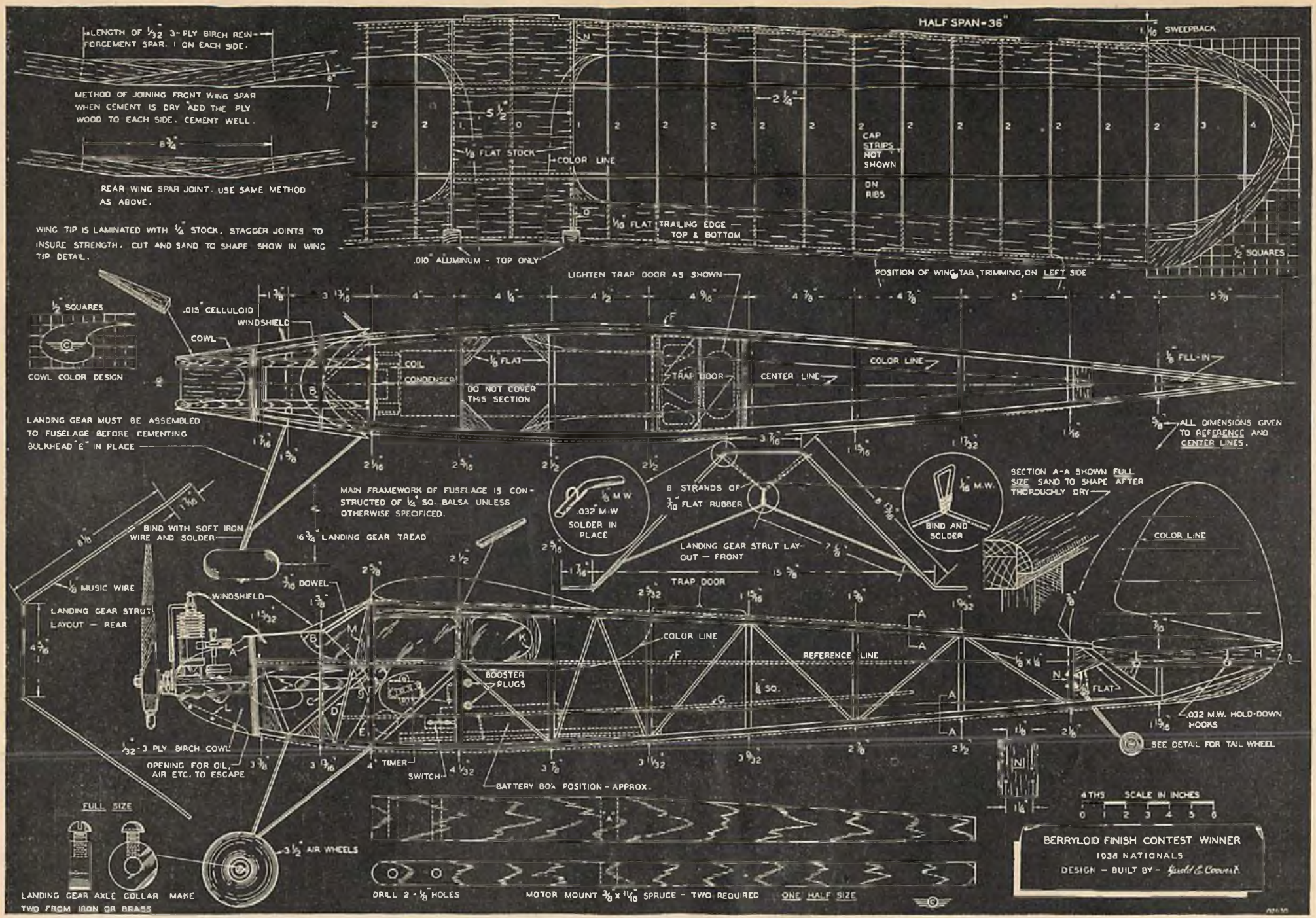
It is a practice of most model builders to get the hardest part of the model finished first, so general instructions will follow. For the fuselage, a full-size side view should be laid out on wrapping paper. Notice that the dimensions are given to the reference line. The ¼" square longerons are pinned to the drawing to hold them firmly in place while the cement is drying. The upright pieces are also cut to the proper length from ¼" square balsa. The diagonal pieces are cut from ⅛" x ¼" stock. The ⅛" fillets, part H and the fairing piece below are cemented so as to be flush with the outside when completed.

When side frames are thoroughly dry, the cross-members are cut from ¼" square and cemented in place. It is best to start at the windshield and work back, being sure to keep the fuselage lined up properly. Parts F and G are cut from ⅛" flat stock. They are ¼" wide at the windows, tapering back to ⅛". Formers B, C and D are cut from ⅛" stock. They are shown full size on the pattern sheet. Refer to Section A-A for the next step. ⅛ x ¼" strip stock is used full length for this. Cement in place as shown. Sand to cross section given. These should not be rounded off where the wing rests on the fuselage. The $^{3}/_{16}$" dowel window braces are cut and placed. Former A and E are cut from ¼" three-ply fir (full-size patterns).

If the swiveling tail wheel is used, part N is cut from ¼" balsa stock. Drill the four $^{3}/_{32}$" holes before cementing in place. Former E is not cemented in place until the landing gear is assembled to fuselage. The motor-mount pieces are cut and drilled as designated on the drawing, as well as the ¼" V-piece at side of motor mounts. The trapdoor is cut from ¼" flat balsa and lightened as shown. It should be strengthened with ⅛ x ¼" strips of bass wood on the bottom as shown in dotted lines. This is not necessary if a fine finish is not desired. Aluminum tubing, $^{1}/_{16}$" outside diameter, is sunk into the leading edge of door, and pieces of L-shaped .032" music wire form the complete hinge. It is held in place with a pin on each side at the rear. The cowl is cut from $^{1}/_{32}$" three-ply birch. A full-size pattern is given. Do not attach at this time.

LANDING GEAR

The main part of the landing gear is formed from ⅛" music wire. Study the drawings before doing any actual work. It is a good plan to make a full-size layout to assure a good job. The V strengthening piece, front view, is bent from $^{1}/_{16}$" music wire. When all three


LENGTH OF 1/32" 3-PLY BIRCH REINFORCEMENT SPAR. 1 ON EACH SIDE.
METHOD OF JOINING FRONT WING SPAR WHEN CEMENT IS DRY ADD THE PLY WOOD TO EACH SIDE. CEMENT WELL.
8 3/4"
REAR WING SPAR JOINT. USE SAME METHOD AS ABOVE.
WING TIP IS LAMINATED WITH 1/4" STOCK. STAGGER JOINTS TO INSURE STRENGTH. CUT AND SAND TO SHAPE SHOW IN WING TIP DETAIL.
HALF SPAN-36"
1/16 SWEEPBACK
5 1/2"
2 1/4"
1/8 FLAT STOCK
COLOR LINE
CAP STRIPS NOT SHOWN ON RIBS
1/16 FLAT TRAILING EDGE — TOP & BOTTOM
.010" ALUMINUM - TOP ONLY
1/2" SQUARES
POSITION OF WING TAB TRIMMING ON LEFT SIDE
LIGHTEN TRAP DOOR AS SHOWN
1/2" SQUARES
.015" CELLULOID WINDSHIELD
COWL
COWL COLOR DESIGN
COIL
CONDENSER
1/8" FLAT
DO NOT COVER THIS SECTION
TRAP DOOR
CENTER LINE
COLOR LINE
1/8" FILL-IN
5/8"
ALL DIMENSIONS GIVEN TO REFERENCE AND CENTER LINES.
LANDING GEAR MUST BE ASSEMBLED TO FUSELAGE BEFORE CEMENTING BULKHEAD "E" IN PLACE
MAIN FRAMEWORK OF FUSELAGE IS CONSTRUCTED OF 1/4" SQ. BALSA UNLESS OTHERWISE SPECIFICED.
1/8" M.W. .032" M.W SOLDER IN PLACE
8 STRANDS OF 3/16" FLAT RUBBER
1/16" M.W. BIND AND SOLDER
SECTION A-A SHOWN FULL SIZE SAND TO SHAPE AFTER THOROUGHLY DRY
BIND WITH SOFT IRON WIRE AND SOLDER
16 3/4" LANDING GEAR TREAD
LANDING GEAR STRUT LAY-OUT — FRONT
COLOR LINE
1/8" MUSIC WIRE
3/16" DOWEL
WINDSHIELD
LANDING GEAR STRUT LAYOUT — REAR
TRAP DOOR
COLOR LINE
REFERENCE LINE
BOOSTER PLUGS
1/8 SQ.
1/8 x 1/8
FLAT
.032 M.W. HOLD-DOWN HOOKS
SEE DETAIL FOR TAIL WHEEL
1/32" 3 PLY BIRCH COWL
OPENING FOR OIL, AIR ETC. TO ESCAPE
TIMER
SWITCH
BATTERY BOX POSITION - APPROX.
4THS SCALE IN INCHES
0 1 2 3 4 5 6
FULL SIZE
3 1/2" AIR WHEELS
LANDING GEAR AXLE COLLAR MAKE TWO FROM IRON OR BRASS
DRILL 2 - 1/8" HOLES
MOTOR MOUNT 3/8 x 1 1/16 SPRUCE - TWO REQUIRED
ONE HALF SIZE
BERRYLOID FINISH CONTEST WINNER
1938 NATIONALS
DESIGN — BUILT BY - Guild & Conover

pieces are finished, they are bound tightly with #24 soft iron wire and soldered well. Add the small circular pieces, .032" music wire, at the top of the front strut which holds the rubber from slipping down. When finished, it is attached to the fuselage by wrapping with string and cementing generously. Proceed to cement bulkhead E in place.

The drawing on the tail wheel is self-explanatory, except that a piece of inner tube can be put in back of the main assembly C. This greatly helps the shock-absorbing effect.

STABILIZER

The ribs are drawn out first to conform to the shape given in the full-size pattern drawing. The spars are cut from 1/8" flat stock to the dimensions given on the drawing. The trailing edge is cut from 1/4" flat stock. If 2"-wide stock is used it will have a splice as shown on the drawing. Let dry thoroughly before sanding to the given shape. The center section is covered with 1/16" sheet on both sides. Notice the .032" music wire hooks to hold the stabilizer in place. They circle the spars and are cemented well. Sand the leading edge to the section shown on the side view. The fillets that appear in front are cut from 1/8" stock. Sand flush to the rib curve. Note the slot in the center section to receive the rudder spar.

Ribs #1, 2 and 3 are cut 1/16" smaller on both sides to allow for the sheet covering.

RUDDER

The leading edge is laminated from two pieces of 1/4" medium balsa. A full-size pattern of rib #3 is given. Cut the others to conform to this. Ribs #1 and 2 are cut 1/16" under size on both sides to allow for the sheet covering. The trailing edge is cut from 1/4" stock. It is best to shape the trailing edge before assembling. When the rudder is completed it is sanded smooth and cemented—use a generous amount—to the stabilizer.

A close-up of the nose detail of the model, showing timer switch, engine installation, and the one-bladed propeller.

WING

The first step is to cut the pattern (#2) and paste it to thin cardboard. Twenty-four of these ribs are required, but it must be noted that the spar slots are located differently on each rib. A full-size layout would save a lot of time in this operation. The leading edge is 1/4" square hard balsa set in at 90 degrees. The trailing edge is two pieces of 1/16 x 2" soft balsa. Note "Detail of Wing at Center" for this step. The tip is laminated up of 1/4" soft balsa, cut and sanded to shape before being assembled. Assembly itself starts with the construction of the spars. Note how the joints are made with an addition of plywood on each side for added strength. These joints should be cemented well.

The front spar is constructed from 1/8 x 1", while the back is made from 1/8 x 1/2" hard balsa. The ribs are cemented in place on one side at a time, pinning the spars in place to assure proper alignment. The 1/4" leading edge is followed by the trailing edge. It may be necessary to pin each rib to the trailing edge until the cement dries. When dry, proceed with the opposite side, followed by the center-section ribs, which are cut clear through, 1/32" wider on each side for the extra thickness of the spars at this point. The 1/16" balsa covering is cemented in place with the grain running perpendicular to the ribs. Note detail "Making the Leading Edge" for this step. Tip ribs #3 and 4 are given full size. Notice from front view that top of wing is straight. The tips of the spars have to be built up as shown to connect up to the tip. Cap strips of 1/16 x 3/32" are cemented top and bottom of each rib. Sand the entire structure smooth. This is very necessary for a good covering job, as every imperfection shows up when doping the model. Particular care should be given to cemented joints.

BATTERIES AND IGNITION SYSTEM

Batteries are carried in an adjustable battery box. The details are shown with dimensions. Notice that there are two clips on one end of the box and one on the opposite end on the outside. The brass strip makes the connection on the inside. The plus end of the battery rests against this strip. When the batteries are in place in the plane there is nothing except a crack-up that can move them. The slide itself is constructed from a piece of 1/8 x 3 x 12" balsa stock strengthened on the bottom with pieces of 1/8 x 1/2", the grain running perpendicular to the slide. The side view shows the proper location of the slide. After the location is determined for the box it should be clearly marked. When wiring up the model, the wires to the box will have to be made long enough to allow sliding the box in at the rear.

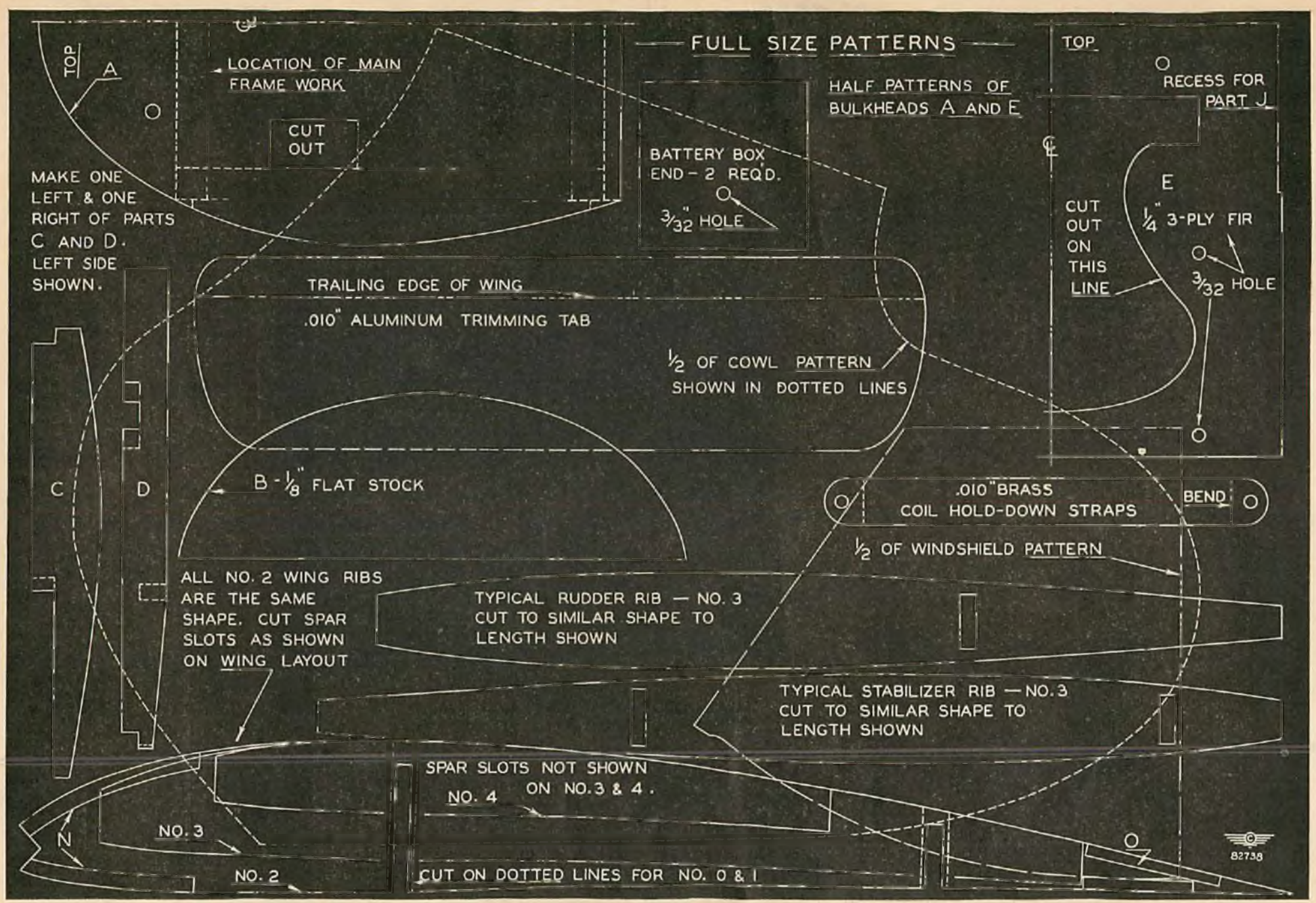
FINISH

The finishing of the model is a very interesting part, but one that requires a great deal of patience and time.

The model is covered with silk with a color scheme of yellow with brown trimming. A 1/32"-wide pin stripe outlines the colors, setting it off very nicely.

A word should be said about working conditions. Try to do the finishing in a dry room of about seventy degrees temperature, and above all, dust-free. A cold, damp room will retard proper drying and tend to cause "blushing" (turning white).

As balsa wood is very easy to sand, the entire model should be carefully gone over, being sure that there are

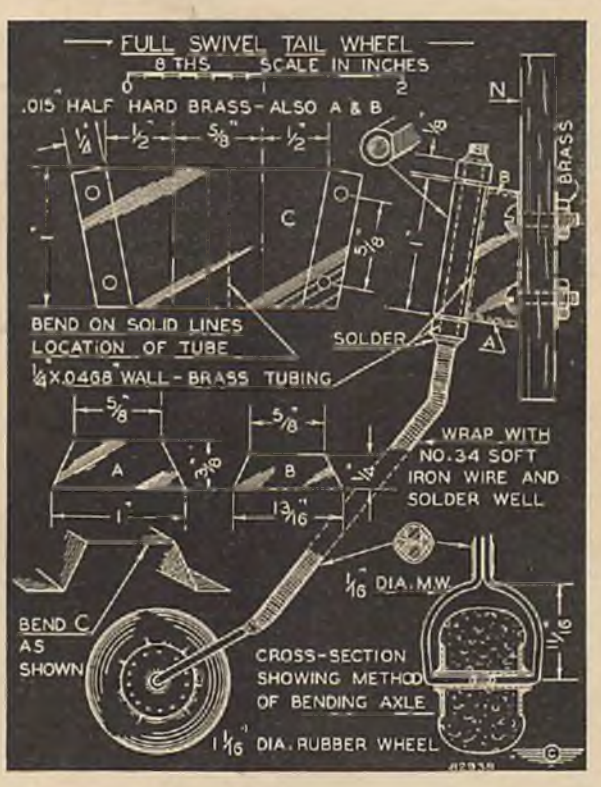

FULL SIZE PATTERNS
TOP
A
LOCATION OF MAIN FRAME WORK
CUT OUT
MAKE ONE LEFT & ONE RIGHT OF PARTS C AND D. LEFT SIDE SHOWN.
BATTERY BOX END – 2 REQ'D.
3/32" HOLE
HALF PATTERNS OF BULKHEADS A AND E
TOP
RECESS FOR PART J
E
1/4" 3-PLY FIR
3/32 HOLE
CUT OUT ON THIS LINE
TRAILING EDGE OF WING
.010" ALUMINUM TRIMMING TAB
1/2 OF COWL PATTERN SHOWN IN DOTTED LINES
C
D
B - 1/8" FLAT STOCK
.010" BRASS COIL HOLD-DOWN STRAPS
BEND
1/2 OF WINDSHIELD PATTERN
ALL NO. 2 WING RIBS ARE THE SAME SHAPE. CUT SPAR SLOTS AS SHOWN ON WING LAYOUT
TYPICAL RUDDER RIB — NO. 3 CUT TO SIMILAR SHAPE TO LENGTH SHOWN
TYPICAL STABILIZER RIB — NO. 3 CUT TO SIMILAR SHAPE TO LENGTH SHOWN
SPAR SLOTS NOT SHOWN ON NO. 3 & 4.
NO. 4
N
NO. 3
NO. 2
CUT ON DOTTED LINES FOR NO. 0 & 1
82738

no uneven places. These show up very prominently and often spoil an otherwise beautiful model. No. 400A wet or dry sandpaper was used for the final going-over. See that your brushes are of good quality. A ⅜" and ½" soft camel hair brush was used. All the finish is applied with the brush. A good workman can do no better work than his tools will allow. Berryloid finishes were used throughout.

The silk should be applied to the framework with heavy dope, being careful to keep all wrinkles out and keeping it taut. The covering was not water-doped, but given a very thin coat of clear dope. Let this dry thoroughly before continuing.

This is followed by five or six coats of clear, or until all of the pores, which appear when doping silk, are covered. After drying for at least six hours it is sanded lightly with No. 400A sandpaper. Do not rub very hard over the ribs and edges of the framework, as it is very easy to go through. The dope should be thinned about fifty per cent for this operation.

The pigmented dope is thinned to about one part thinner to two parts dope. Twelve coats were applied, sanding very lightly between every other coat. The last coat is thinned fifty per cent and flowed on, being careful not to cause any runs. Leave to dry for at least twenty-four hours. The last coat is rubbed with Berryloid Super-fine Rubbing Compound. Caution must be used when rubbing over ribs and sharp corners so as not to go through the silk covering. A little practice will acquaint you with its use. After the surface is wiped free of all dirt and oil which the compound makes, the white pin stripe is applied. A draftsman's ruling pen is used, leaving the dope fairly heavy. A straight edge and celluloid curves are used as a guide. The final operation is a rub-down with Simoniz, which gives the finish a very high luster.



FLYING

For ordinary flying, the Brown Junior motor should be set at about one-third throttle. If more power is used, more down-thrust will have to be used to prevent stalling. Two degrees' positive incidence is used in the wing, with the tail surfaces neutral.

Up to date the model has had twenty flights, all of which were very successful, seven being made before the Nationals.

A word about balance. The battery box is shifted back and forth until the nose is slightly heavy. This may be determined by holding the model under the wings, halfway out and third way back, using your index finger. Unless you use a timer on your plane, don't fill the gas tank more than enough to run the motor about one minute. It is not advisable to test-fly your model on a windy day, as it is too hard to make adjustments and very dangerous for the model.

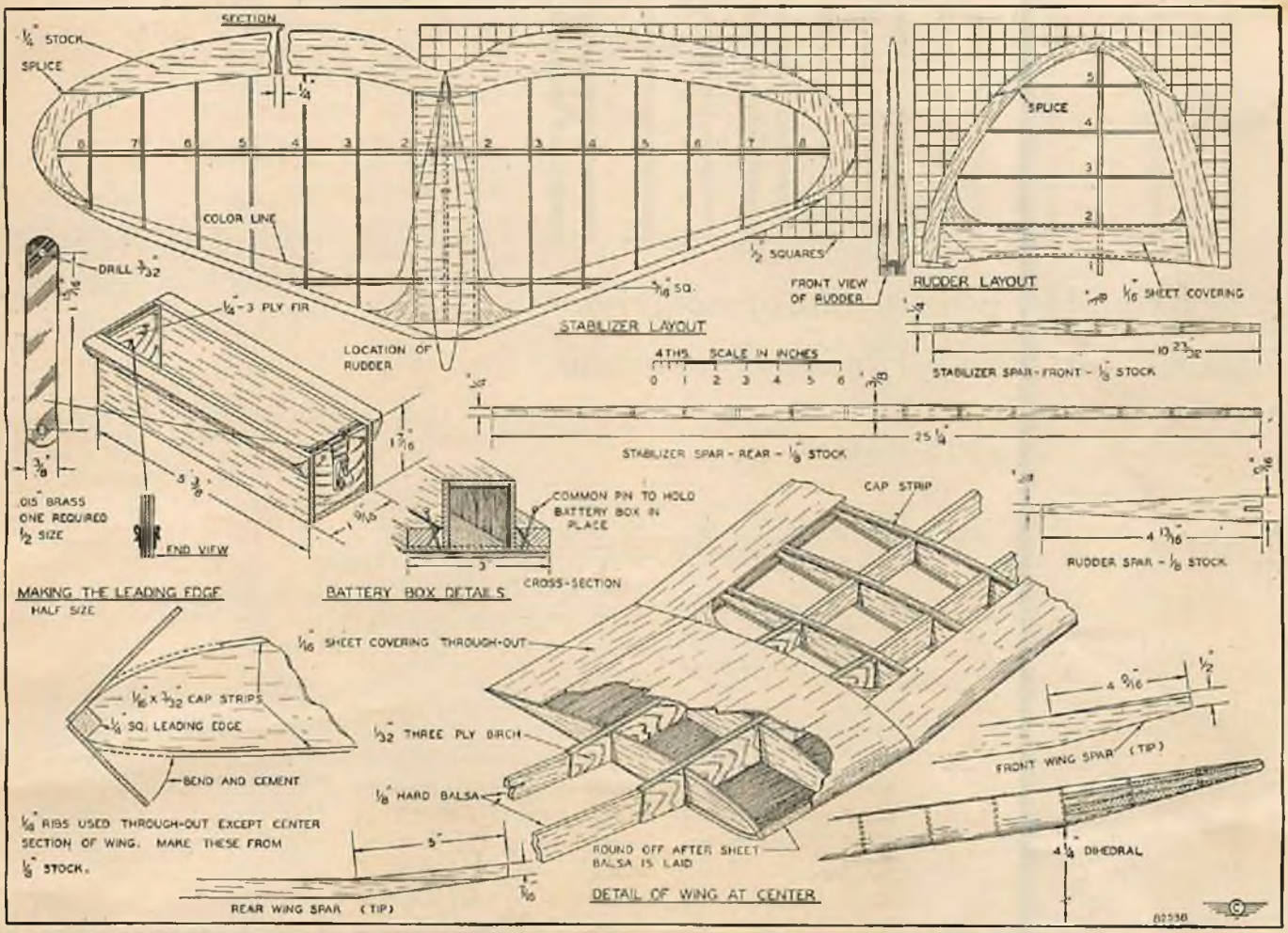
Take it easy, work very carefully, and you will have a model worth your efforts. Happy landings!

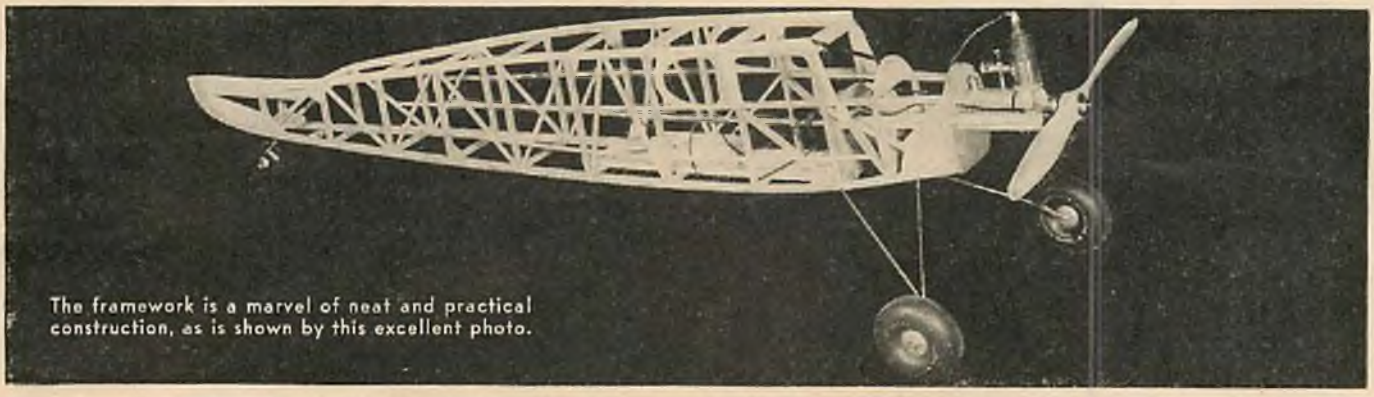
MATERIAL LIST

(Balsa unless otherwise noted)

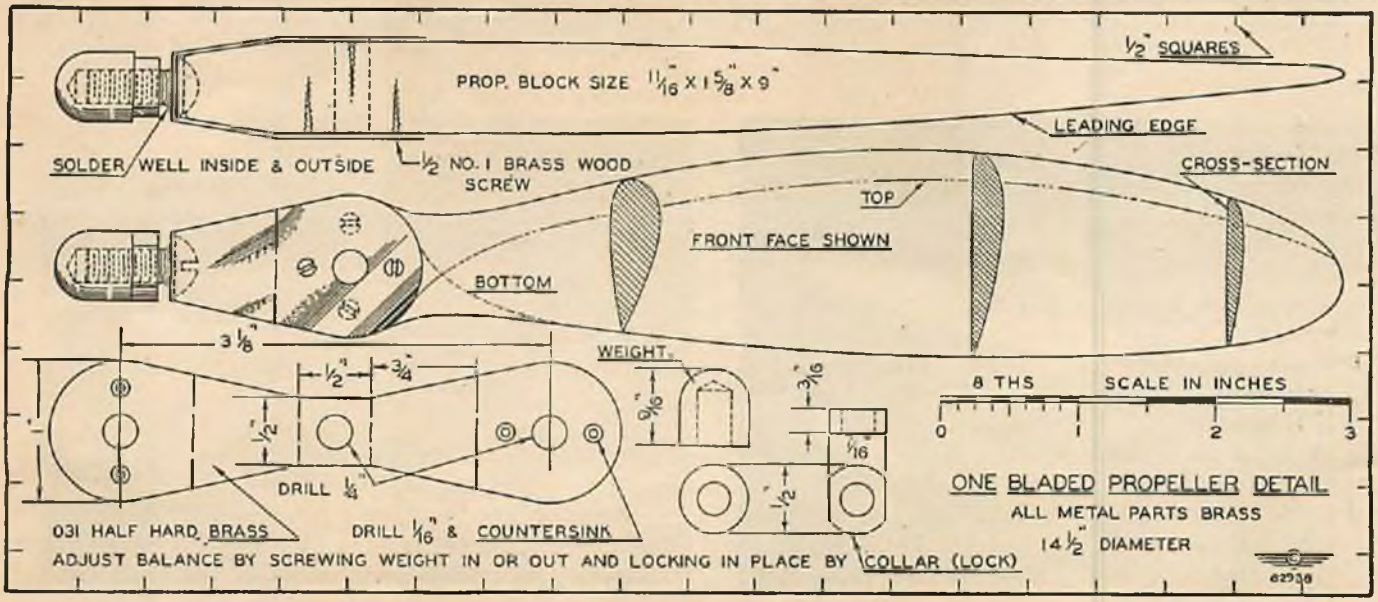
10 pcs. ¼ x ¼ x 36", fuselage, leading edge of wing
14 pcs. ⅛ x ¼ x 36", diagonal braces in fuselage, fuselage fairing
10 pcs. 1/16 x 2 x 36", ribs, leading edge of wing, trailing edge of wing, covering for wing center section, also for stabilizer and bottom of rudder
1 pc. ⅛ x 3 x 12", battery-box slide
1 pc. 3/32 x 2 x 24", cap strips for the ribs
2 pcs. ⅛ x 1 x 36", front wing spar
2 pcs. ⅛ x ½ x 36", rear wing spar
2 pcs. ⅜ x 11/16 x 9¼" (spruce), motor mounts
1 pc. 1/32 x 9 x 13", (3-ply birch), cowl and wing spar stiffeners
1 pc. ⅜ x ⅜ x 12", side of battery box
1 pc. ⅜ x ¾ x 24", battery-box slide
1 pc. ¼ x 4 x 10" (3-ply fir), bulkheads A and E, also ends of battery box
2 booster plugs
1 knife switch
1 timer (any type)
1 pc. .010 x 1½ x 6½" aluminum, wing tab and trailing edge of wing
1 pc. .032 music wire, tail wheel, trapdoor, stabilizer hold-down hooks
2 pcs. 1/16 dia. x 36" music wire, landing gear and tail wheel
1 pc. ⅛" dia. music wire, landing gear
1 pc. .015 x 8 x 12" celluloid, windshield and windows
1 pc. .015 x 1½ x 2" brass, battery box and tail-wheel parts
1 pc. .010 x .314 x 3½" brass, coil hold-down straps
1 pc. #24 soft iron wire, landing gear
1 pr. 3½" air wheels
1 1 1/16" sponge-rubber wheel
3 yds. silk covering
1 qt. pigmented dope, color desired
1 qt. thinner
1 pt. pigmented dope, color desired (trimming)
10 ft. 3/16 x .030" rubber, to hold wing to fuselage
3 ft. ⅛" rubber, to hold stabilizer in place
Berryloid Super-fine Rubbing Compound
4 battery-terminal clips (small)

Material list is not given for the one-bladed propeller, as it is an optional feature. The drawing gives all the necessary dimensions and the kind of material. The one-bladed prop proved itself quite successful.





The framework is a marvel of neat and practical construction, as is shown by this excellent photo.



THE CABINEER

A new method for construction of monocoque fuselages — a high-performance sportster.

By LOUIS GARAMI

ALMOST every model builder has an imaginative hour when he uses pencil and scrap paper rather than balsa wood.

"What a plane I drew up last night!" he shouts to a friend, waving a slip of paper, and for the next three hours a spirited discussion ensues that can be heard for three blocks.

Being always a sucker for sheet balsa construction, one of my attacks of daydreaming centered upon a monocoque sheet balsa body.

"Looks like sheet balsa poured over a bunch of hot air," said somebody, looking in through the nose of the finished model. And he was nearly right, because nobody could make a better guess as to how it had been made.

I have been using this method and procedure of construction for a period of several months now, and have built at least a dozen models along the same lines, mainly to gather helpful suggestions which are needed whenever a new idea is introduced.

For this reason I advise a study of the instructions before any material is secured. Much of the success also depends on the type of wood used for the body, which is stronger per weight than any other in existence. The rest of the model is of conventional construction. On account of its lightness and strength, excellent performance and long life are assured.

BODY

The selection of balsa sheets used for the body blanks is important. Even grain with no weak spots or streaks when held up to the light is the first requirement. The wood should be soft and pliable, therefore no quarter-grained stock can be considered. The thickness of the sheets may be 1/32" or 1/20", depending on how soft the wood is.

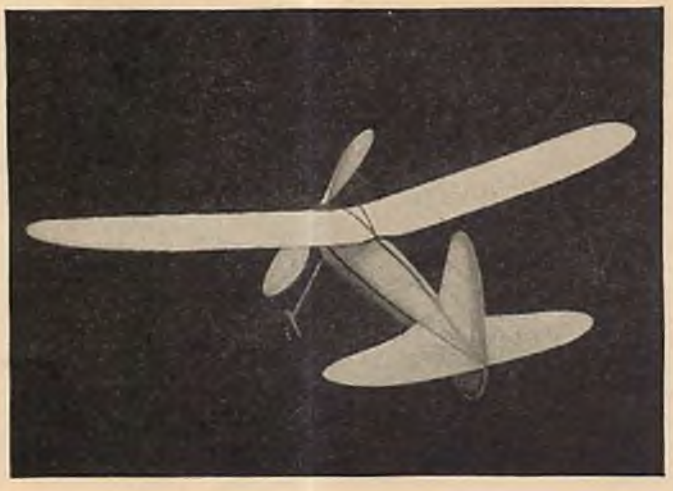
The first step is to cut out two of each blank carefully and sandpaper the edges even in pairs while they are held together either by hand or pins. Now separate them and apply a coat of dope with a brush to the inside of each pair, in order that a left and a right side may be produced. After ten minutes of drying a second coat of dope is applied in this same manner. In most cases two to three coats of dope are sufficient to make the blanks curl up so that the depth of the curvature is at least 3/8". Allow a twenty-minute drying period before measuring for correct depth (3/8").

The foundation of the whole body is the lower part, which is made out of the two No. 1 blanks. Pin and cement the lower edges by easy stages with as little forcing as possible. The angle at which they stand to each other is about 70 degrees. If a good job is done the seam, looking over it from the front, presents a perfectly straight line.

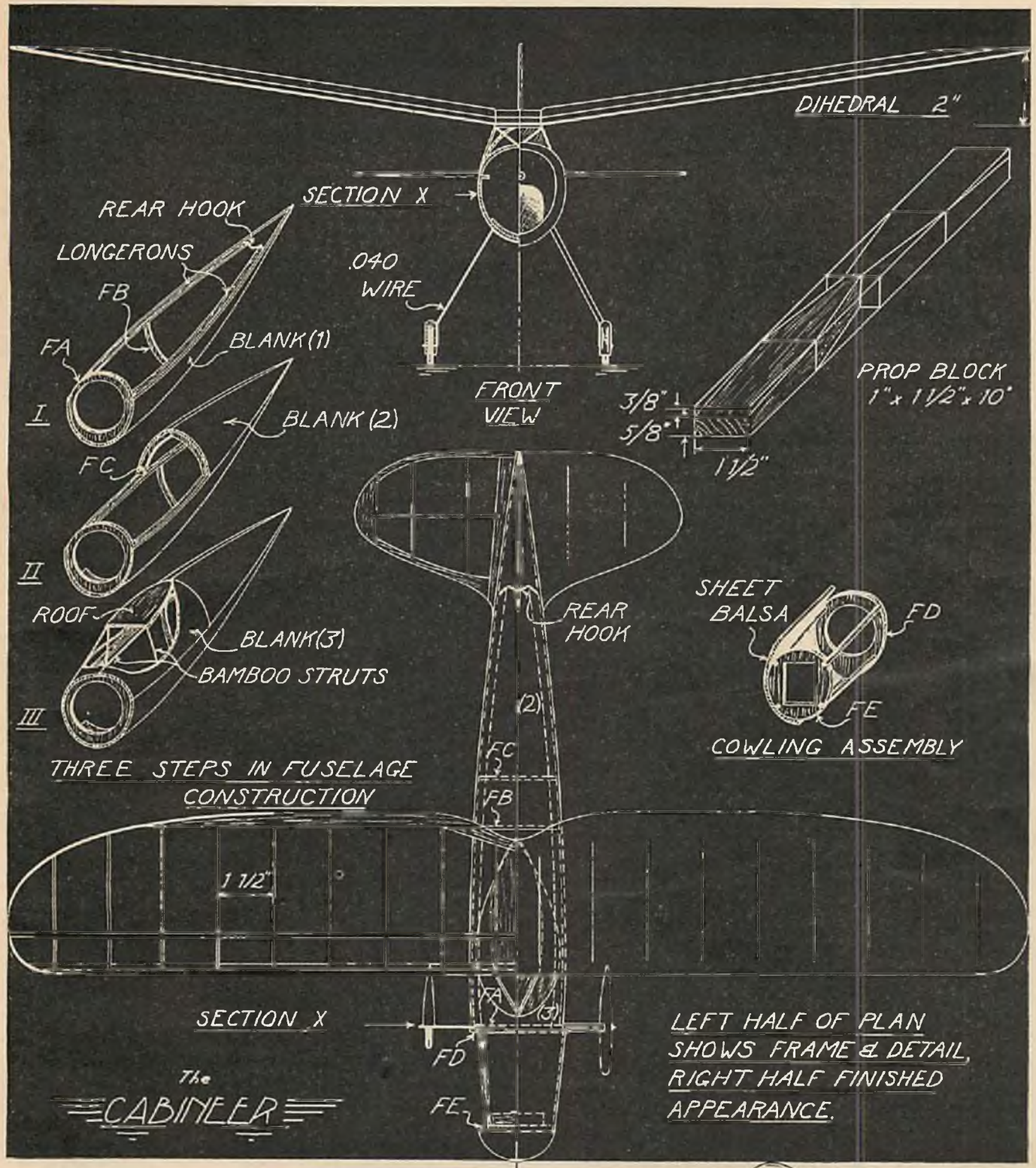
It is of no advantage to wait for the glue to dry any longer than specified here, in order to preserve some flexibility until a new part is added. This will eliminate a lot of unnecessary forcing, since the seams can change their angle slightly without springing apart.

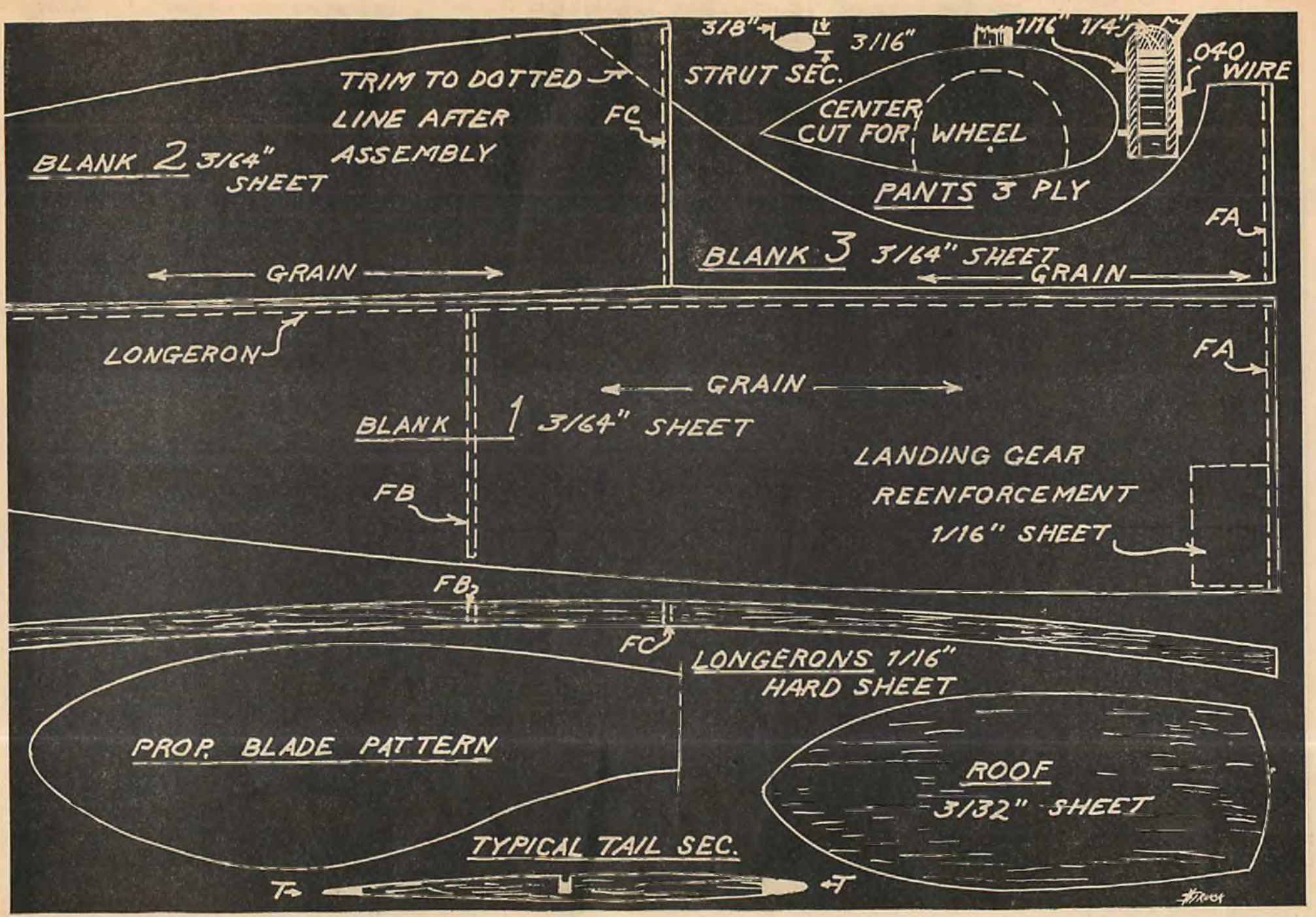
Wait only three minutes and proceed by spreading cement on the longerons and pinning them into their places, the top line of the blanks. Next the rear hook is cemented in, followed by the front former F A, which is forced into place after the front of the longerons are cut 1/16" to make room for it. Now the half formers F B are added. A small length of 1/8" square should be placed above them, to serve as a spreader until the whole thing dries, and then removed. *(Turn to page 88)*

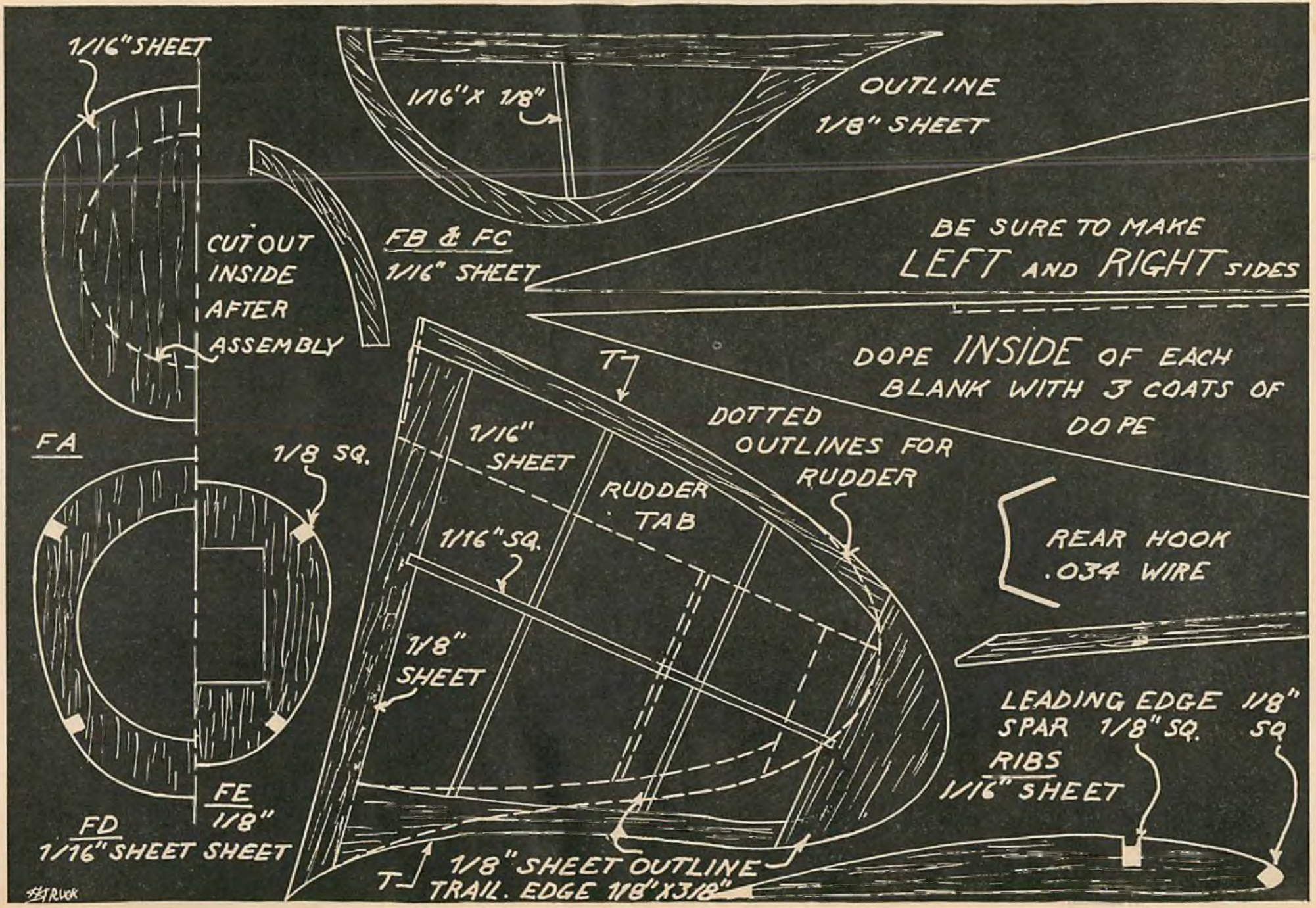
The clean sweep of line, the plan form of the flying surfaces, and the neat monocoque fuselage are shown here to good advantage.



The Cabineer jumps off to a flying start from the hands of its designer, Louis Garami. Note his individual method of launching.


DIHEDRAL 2"
SECTION X
REAR HOOK
LONGERONS
.040 WIRE
FB
FA
BLANK (1)
BLANK (2)
FC
I
II
III
ROOF
BLANK (3)
BAMBOO STRUTS
FRONT VIEW
3/8"
5/8"
1 1/2"
PROP BLOCK
1" x 1 1/2" x 10"
REAR HOOK
SHEET BALSA
FD
FE
COWLING ASSEMBLY
THREE STEPS IN FUSELAGE CONSTRUCTION
(2)
FC
FB
1 1/2"
SECTION X
FA
(3)
FD
FE
LEFT HALF OF PLAN SHOWS FRAME & DETAIL, RIGHT HALF FINISHED APPEARANCE.
The CABINEER
SECTION X
TOP VIEW
(3)
FC
(2)
FE
FD
FA
(1)
FB
LANDING GEAR REENFORCEMENT
SIDE VIEW
SCALE 1/4" = 1"


TRIM TO DOTTED LINE AFTER ASSEMBLY
FC
BLANK 2 3/64" SHEET
GRAIN
3/8"
3/16"
STRUT SEC.
1/16"
1/4"
.040 WIRE
CENTER CUT FOR WHEEL
PANTS 3 PLY
FA
BLANK 3 3/64" SHEET
GRAIN
LONGERON
FA
GRAIN
BLANK 1 3/64" SHEET
LANDING GEAR REENFORCEMENT 1/16" SHEET
FB
FB2
FC
LONGERONS 1/16" HARD SHEET
PROP. BLADE PATTERN
ROOF 3/32" SHEET
TYPICAL TAIL SEC.
T
T


1/16" SHEET
1/16" X 1/8"
OUTLINE
1/8" SHEET
CUT OUT INSIDE AFTER ASSEMBLY
FB & FC
1/16" SHEET
BE SURE TO MAKE
LEFT AND RIGHT SIDES
DOPE INSIDE OF EACH BLANK WITH 3 COATS OF DOPE
T
DOTTED OUTLINES FOR RUDDER
FA
1/8 SQ.
1/16" SHEET
RUDDER TAB
1/16" SQ.
REAR HOOK .034 WIRE
1/8" SHEET
LEADING EDGE 1/8" SQ
SPAR 1/8" SQ.
RIBS
1/16" SHEET
FE
1/8"
SHEET
FD
1/16" SHEET
T
1/8" SHEET OUTLINE
TRAIL. EDGE 1/8" X 3/8"

ABOUT THE OHLSSON "23"

Answering requests for information about the small-bore gas engines, Air Trails presents complete technical data on a typical motor.

Midget gas models are becoming more and more popular every day. Entry lists at all prominent contests indicate that special categories may soon be necessary to accommodate builders who specialize in small designs.

The sale of kits for constructing smaller-size models shows that the popularity of gas modeling is based principally on small-ship activity.

Inherent in changes and developments in the model hobby is the horde of requests for information received by our model editor. From them, Air Trails has come to realize that reader interest is centering on the new small-engine field. It is impossible to endeavor to give out this information by mail. For every letter answered, a dozen more questions are received.

An analysis of recent mail shows that chief among interesting motors is the Ohlsson "23," a newcomer to a popular field. All the information that could be gleaned about this little engine has been incorporated here in the hope that our readers will find "dope" sufficient to their needs.

After two years of engineering research and testing, Ohlsson Miniatures, Los Angeles, have placed on the model-airplane market the Ohlsson "23," a small running mate to the already popular and well-known Ohlsson Gold Seal Miniature.

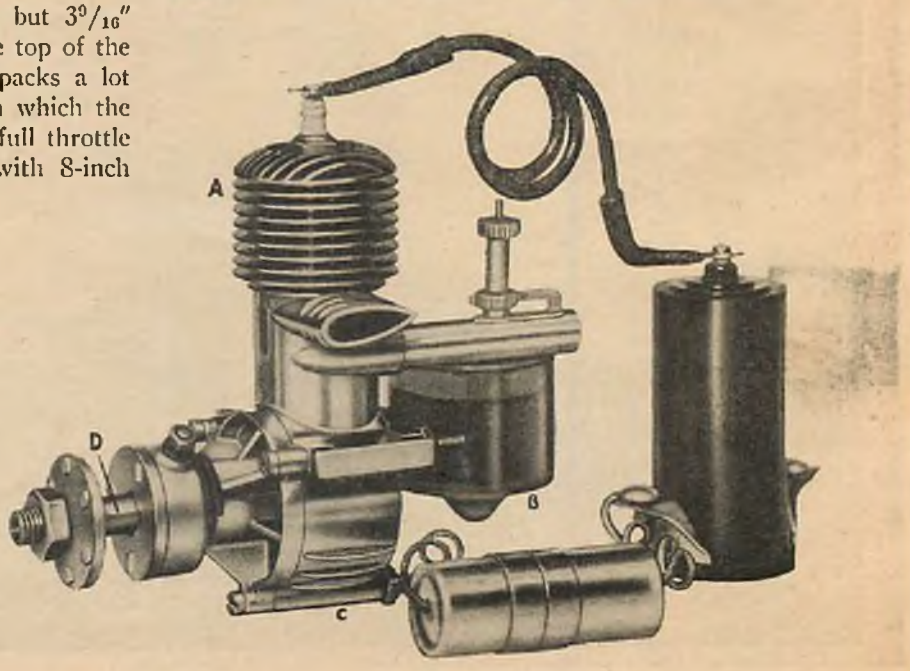
Weighing only 4½ ounces, and standing but $3^{9}/_{16}$" high from the bottom of the crankcase to the top of the spark plug, the Ohlsson "23" nevertheless packs a lot of power and speed. Its displacement, from which the name was derived, is .23 cubic inches. On full throttle the motor will turn an 11-inch propeller with 8-inch pitch at 5500 r.p.m. Flexibility of the little motor from full throttle to idling speeds is said to be amazing.

Material specifications for the Ohlsson "23" are identical to those of the larger motor. It features combination radial or lug mounting, dural I-beam connecting rod, tubular steel full-floating wrist pin and bronze bearings. The cylinder, machined from one block, is alloy steel. The front prop hub is of hardened steel, and the fully counterbalanced crankshaft is machined from solid stock. The piston is of hardened mono steel. A visible gas tank completes the important specifications. All parts are completely interchangeable from one motor to another, and precision finishing of parts to .0001 inch tolerance assures perfect motor performance and long life.

The Ohlsson "23" is designed primarily to handle smaller models, and is said to have ample power for flying a 3-pound model, yet is light enough to fly a 20-ounce job.

Indication that the motor is meeting a long-felt demand is shown in the fact that more than 5000 model fans recently participated in a contest for naming this new model.

Erwin Ohlsson, president of Ohlsson Miniatures, states that production facilities are being increased to handle the expected demand for this new motor.

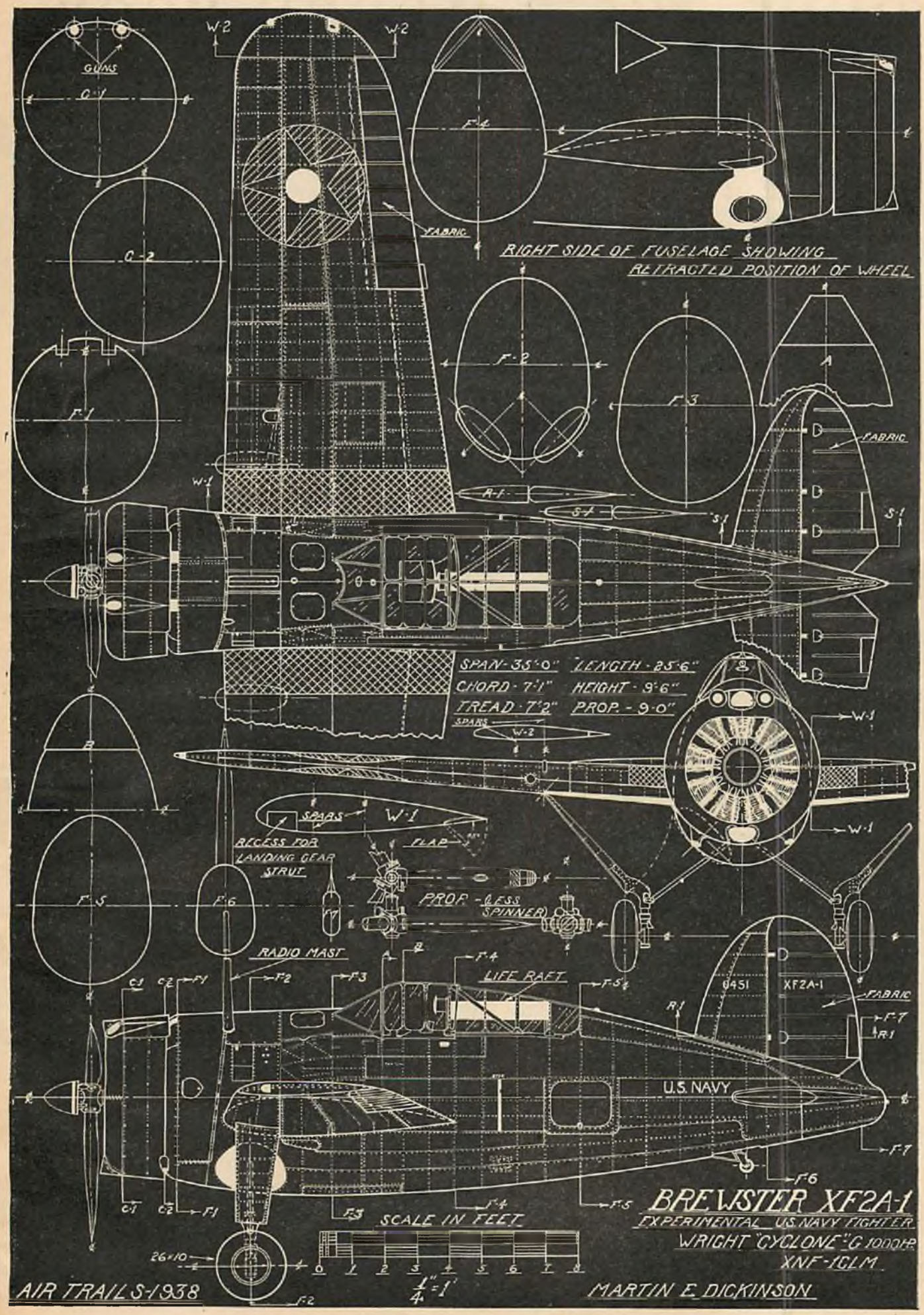


A—Cylinder machined from one block, alloy steel. An adequate number of fins insure efficient cooling. Piston is hardened mono steel.

B—Transparent fuel tank.

C—Lug or radial mounting permits designer's preference in motor installations.

D—Fully balanced crankshaft machined from solid stock. Parts finished to .0001 inch tolerance.


GUNS
C-1
C-2
F-1
W-2
W-2
F-4
FABRIC
RIGHT SIDE OF FUSELAGE SHOWING
RETRACTED POSITION OF WHEEL
F-2
F-3
A
D
FABRIC
W-1
A-1
S-1
S-1
SPAN-35'0" LENGTH-25'6"
CHORD-7'1" HEIGHT-9'6"
TREAD-7'2" PROP.-9'0"
SPARS
W-2
B
SPARS
W-1
W-1
W-1
RECESS FOR LANDING GEAR STRUT
FLAP
PROP.-(LESS SPINNER)
F-5
F-6
RADIO MAST
C-1
C-2
F-4
F-2
F-3
LIFE RAFT
F-5
0451
XF2A-1
FABRIC
R-1
F-7
R-1
U.S. NAVY
F-7
F-6
C-1
C-2
F-1
F-3
F-4
F-5
SCALE IN FEET
0 1 2 3 4 5 6 7 8
1/4"=1'
26x10
F-2
BREWSTER XF2A-1
EXPERIMENTAL U.S. NAVY FIGHTER
WRIGHT "CYCLONE" G 1000 HP
XNF-1CLM
AIR TRAILS-1938
MARTIN E. DICKINSON

FLIGHT RECORDS AND CONTESTANTS IN COMPETITIONS.

model

MISS. VALLEY MEET. Three hundred and twenty-eight entrants turned out for the Mississippi Valley Meet on August 14. This was the sixth annual meet and was sponsored by the Stix, Baer and Fuller Department Store of St. Louis, the Chamber of Commerce, and the Park Air College.

A high wind kept contestants on their toes and reduced many models to matchwood. Contestants came from considerable distances and most of the top-notch fliers were present. Contest Director Bob Sommers worked out the details of a new type performance contest which seems destined to replace the conventional duration events now widely held. Points are awarded on take-off, flight, and landing.

Roy Marquardt of Burlington, Ia., won this event with a Riser Rider, a model of his own design. (Detailed in Air Trails, June, 1938.) Marquardt won the Mississippi Valley Gas event in 1937. Champion Carl Goldberg repeated his usual championship performance by winning the duration event for gas models.

Following the meet, a dinner was given the contestants. Good entertainment and speeches by outstanding guests featured this affair.

The Mississippi Valley Meet is second only to the National Meet itself. The success of this annual event is the result of the energetic efforts of Bob Sommers, model director of S. B. & F. He's done much for the hobby in St. Louis as well as throughout the rest of the country.

Winners of the meet:

Gas Performance—1. Roy Marquardt, Burlington, Ia., 256.5 points; 2. Jack Reed, Mattoon, Ill., 234.55 points; 3. S. R. Jackman, Little Rock, Ark., 234.25 points; 4. Robert Miller, Webster Groves, Mo., 216.14 points.

Gas Endurance—1. Carl Goldberg, Chicago, Ill., 2:22; 2. Karl Schunke, Milwaukee, Wis., 2:14.8; 3. Frank Neklmkin, Chicago, Ill., 1:47.2; 4. E. J. Williams, Nashville, Tenn., 1:45.8

Cabin Fuselage (Senior)—1. George Girouard, Tulsa, Okla., 3:16.5; 2. James McCleary, St. Louis, Mo., 1:44; 3. James Craig, St. Clair, Mo., 1:16.

Cabin Fuselage (Open)—1. Roy Wriston, Tulsa, Okla., 4:17.5; 2. David Seltzer, St. Louis, Mo., 1:32; 3. Jacob Friedman, St. Louis, Mo., :57.6.

Gold Cup Amateur Sweepstakes—1. Harold N. Hedrick, Tulsa, Okla., 2:38; 2. Guy Williams, Neosho, Mo., 1:36.5; 3. Paul H. Scott, Tulsa, Okla., 1:33.

Special Award (for outstanding design)—1. Don Lueke, St. Louis, Mo.

Stix, Baer, and Fuller Trophy (for best St. Louis entrant)—1. David Seltzer, St. Louis, Mo.

BABY CYCLONE AID. E. T. Robinson, of Broadacre, Ohio, sent some helpful advice for those who own Baby Cyclone motors. He writes: "I own a 1936 model Cyclone which is minus a tension clip for the needle valve. As a result, the vibration causes the valve to turn—thus speeding up and slowing the motor at various intervals, which finally causes the motor to stop. Furthermore, I broke a needle valve with my finger nearly every other time I spun the prop, because the long needle valve had no support at its end and was close to the propeller.

"The following little idea remedied both faults at the same time. I put a pin hole through a large rubber eraser and forced it over the needle valve, gluing it to the side of the motor mount, and making certain that the needle valve was in perfect alignment with the valve seat. This acted as a

The Comet Clipper appears on floats. A beautiful ship on land or water, the Clipper is popular because of its fine performance.

matters

CLUB NOTES AND NEWS OF MODEL ORGANIZATIONS.

Gas model entrants at the Mississippi Valley Meet wait in line for their turn to fly. The Mississippi Valley annual contest is a nationally prominent affair.

LEBANON, PA., CONTEST. The Sixth Annual Outdoor Flying Meet took place at Lebanon, Pa., August 27th. It was sponsored by the Exchange Club and sanctioned by the National Aeronautic Association. Eighty-six entrants turned out for the rubber and gas-powered events. An unfortunate accident occurred when a flooded motor backfired and set fire to a model, burning it completely.

The meet was directed by Exchange Club member George Landgraf. Perfect weather resulted in high times in all four events. Following are the high-place winners:

Gas-powered—1. Robert Jacobson, Philadelphia, Pa., 7:39; 2. H. M. Fitzcharles, Phoenix, Pa., 4:57; 3. Robert Gable, Reading, Pa., 4:17.3.

Fuselage—1. Robert Gable, Reading, Pa., 5:54.2; 2. Ted Just, Johnstown Pa., 4:58.6; 3. Earl Stahl, Johnstown Pa., 3:29.6.

Stick—1. Salem Barrack, Harrisburg, Pa., 4:47.8; 2. Fred Honeker, Reading, Pa., 4:11.4; 3. Jack Minassian, New York City, 2:16.

Glider—1. Stephen Kowalik, Wilmington, Del., 1:55.8; 2. Henry Struck, New York City, 1:46.0; 3. John L. Ogilvie, New York City, 1:40.0.

bushing and prevented the frequent breaking of the needle valve while the friction of the rubber on the valve prevented its turning.

"The most important points to watch are to have clearance between the crooked end of the valve and the eraser for allowing easy adjustment of the needle valve in the seat and to see that the needle valve is perfectly straight. Then you'll be all set."

A remarkable action shot of Dr. A. L. Evans of Gary, Indiana, getting off his Cub at the last Northern Indiana Gas Model Meet.

P. A. L. AND T. A. M. B. E. OF N. Y. C. The Fifth Annual Model Meet of the New York Police Athletic League and The Airplane Model Builders Exchange (T. A. M. B. E.) was held September 3rd at Marine Park, Brooklyn, in New York.

The program included five events for rubber-powered and glider models. The meet produced several outstanding flights. Designs, for the most part, were conventional. Folding and free-wheeling propellers predominated, with a few one-blade propellers making their appearance. Tow-line gliders, for the most part, were two to three-foot span. Speed models seemed to emphasize clearly that a strong fuselage, to avoid buckling together, and a fine finish, are the requirements for a winner.

The Police Department was represented by Lieut. Murphy of the 63rd Precinct. Dave Lynn, Director of T. A. M. B. E., directed the meet.

Winners were:

Hand-launched Glider—1. H. Schindelman, Bronx, 3:00; 2. Alvin Felmeister, Jersey City, 2:54.
Tow-line Glider—1. Herb Friedlander, Brooklyn, 6:02 (O. O. S.); 2. Gus Jung, Jersey City, 4:15.
Cabin Fuselage—1. Gordon Murray, Brooklyn, 6:41; 2. Isadore Schaffer, Brooklyn, 6:02.
Stick—1. Isadore Schaffer, Brooklyn, 8:44; 2. Morton Kaufman, Brooklyn, 6:33.
Speed—1. Jack Minassion, Long Island City, 120 ft. in 1 sec.; 2. Tie among Henry Struck, Maurice Schoenbrun, and Howard Beltchman all of N. Y. C., 120 feet in 1.2 sec.

Herb Friedlander was high-point winner with a total of 28. Morton Kaufman was second, and Jack Minassion, third.

Members of the Jersey City Airwheels, *(Turn to page 80)*

FOCKE-WULF STÖSSER

Complete plans and directions for building a high-performance miniature of a world-famous German sportster.

By PAUL PLECAN and ROGER HAMMER

Any model builder who has looked for a model that was one hundred percent scale and yet stable enough for flight with the scale tail surfaces, will know how rare such a model is. The Focke-Wulf Stösser fills the bill. Scale outlines of the tail surfaces are shown on the plans, as they have been proven to be of sufficient size for a stable flying model.

Used mainly for training purposes, the Stösser mounts an Argus inverted V-6 engine which gives it a top speed of 167 miles per hour. The cruising speed is 154 m.p.h., and the landing speed is 56 m.p.h. The Stösser is a familiar sight to many, as it was brought over by Gerd Acheglis for participation in the acrobatic events at the past few National Air Races. The plans reproduced on the next few pages will produce an accurate model of Gerd Acheglis' original ship, that is, if they are followed explicitly.

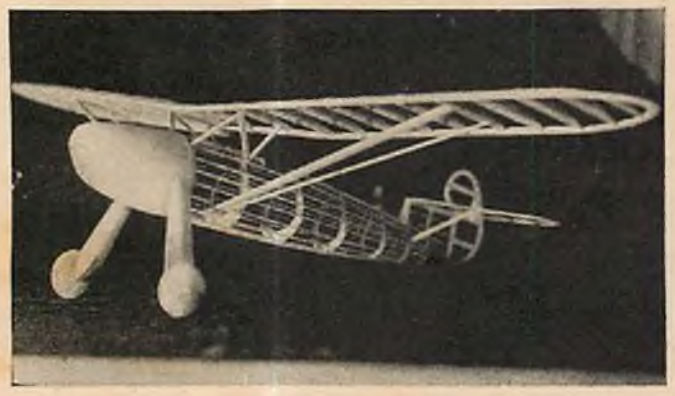
FUSELAGE

Since the fuselage is the toughest part, let us tackle it first. Cut out the master stringers and formers. Before proceeding any further, note that there are two notches in the tail end of each side master stringer. Mark off the positions of all the formers on each master stringer, and cut the grooves in the formers. After assembling, check the whole unit for alignment, as some of the master stringers are bound to be slightly warped. The tail hook-tail skid may be bent to shape and cemented in place now, as there are no stringers to impede your work. After this has been done, cement the $\frac{1}{16}$" square stringers in their respective places. Check again for alignment, and correct if any warps are apparent. Trace the side view of the engine nacelle (or cowl) on a soft balsa block measuring 2x2⅛x3". After shaping to conform with the side view, repeat the process for the top view. Cut down the outside of the cowl to the correct cross-section and sand until smooth. Apply dope (wood filler is better for this if it is available) and sand very smooth when dry.

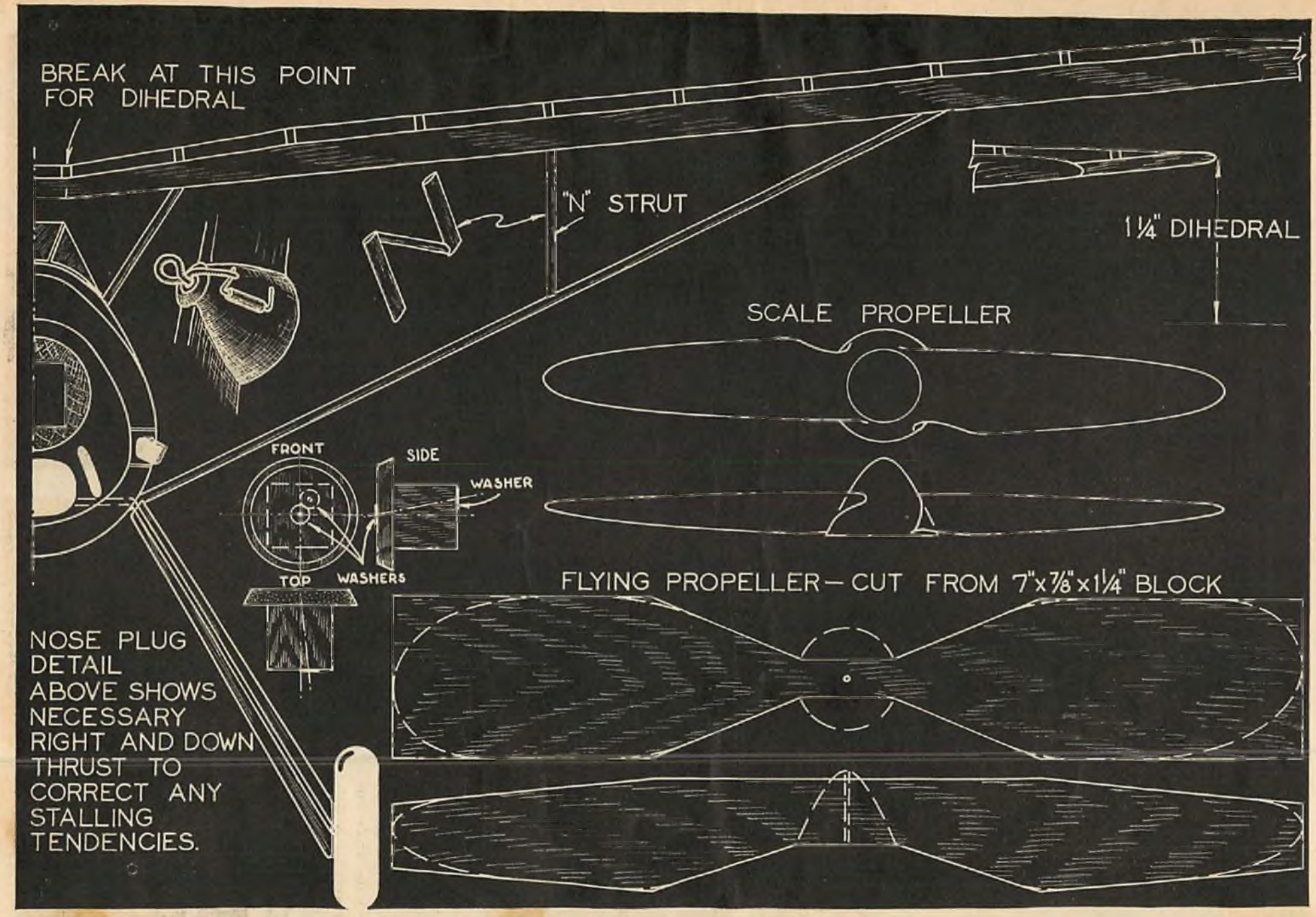
The cowl should be cut in half now, and hollowed out to the thicknesses shown on the plans. Cement together, and conceal the saw mark where the cowl was cut in half by applying successive coats of dope and sanding. The nose plug can also be made at this time, and care should be taken to have it fit quite snugly, as adjustments are easier this way. The front portion should be of very hard balsa, as it will take a lot of abuse. Cement the two parts together and add the two washers. (Note the slight right thrust and larger amount of down thrust.)

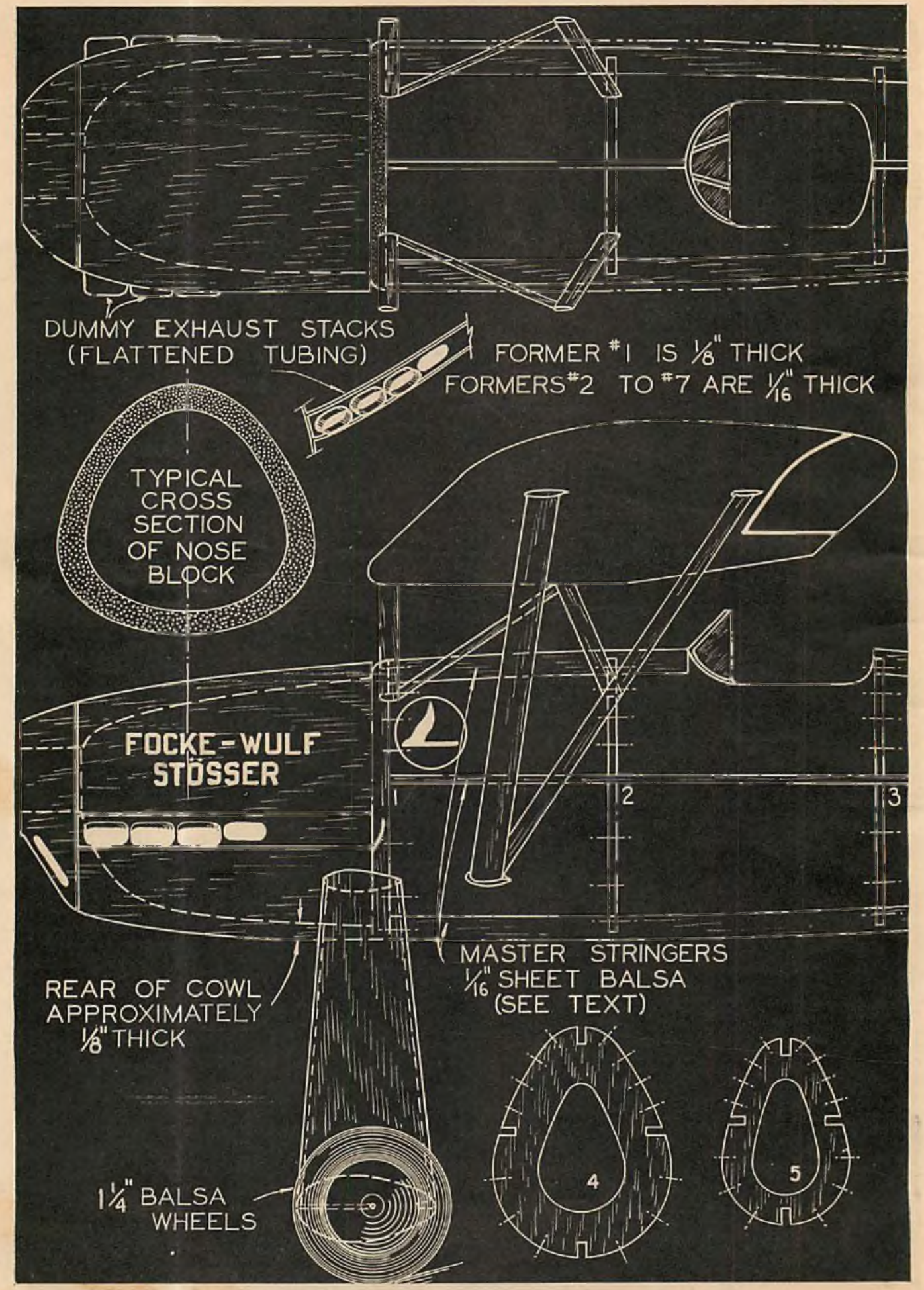
The landing-gear struts should be bent to shape and cemented to the fuselage. The front wire strut is bent back at the bottom to provide an axle for the 1¼" balsa wheel. Cut the balsa strut to the right size and insert between the two wire struts, cementing *(Turn to page 88)*

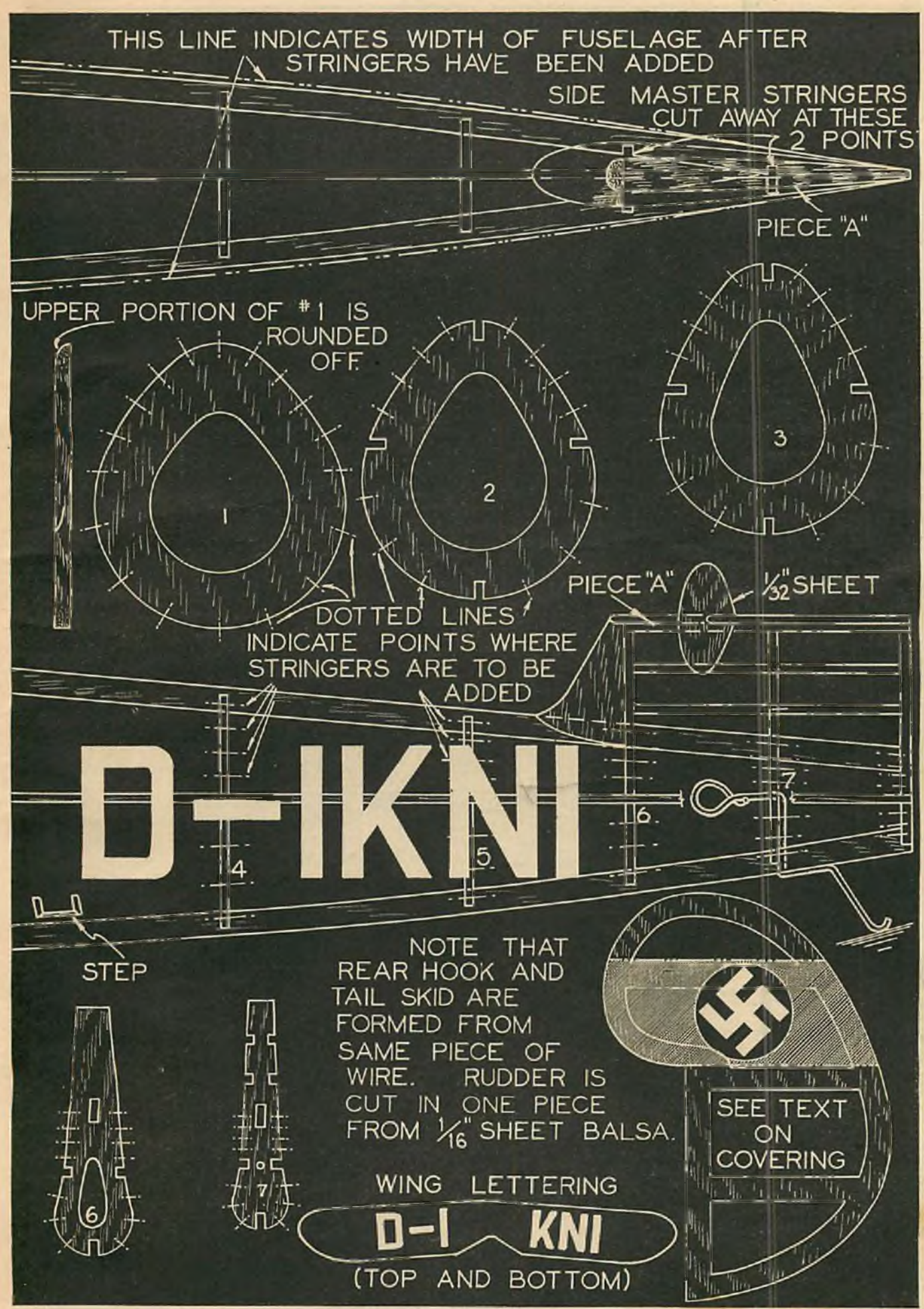
The framework of the model is distinctive. Master stringers make fuselage construction simple. The nose block and sturdy landing gear legs make a sturdy ship. Note the position of the stabilizer.

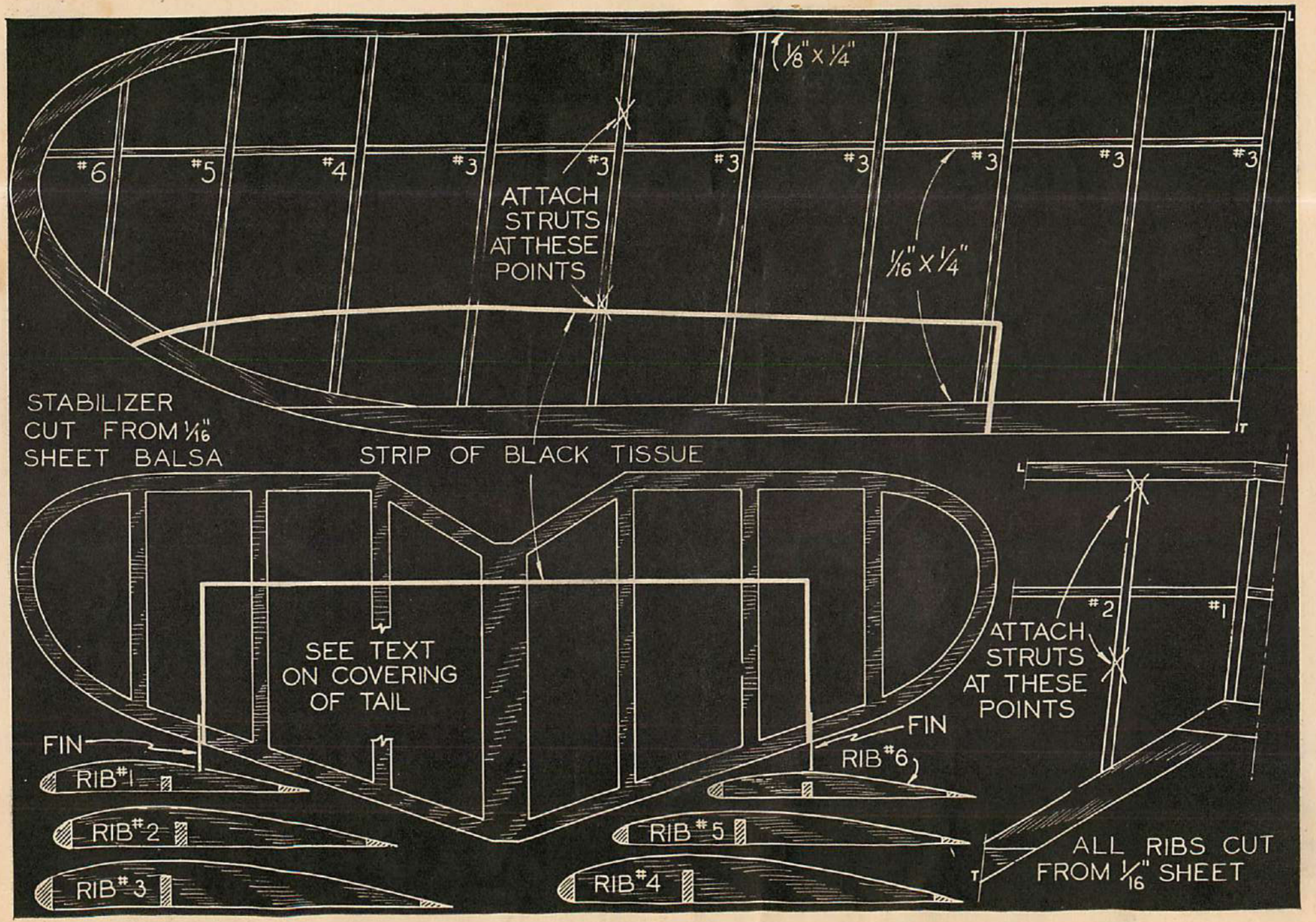


When covered, the model becomes difficult to distinguish from the real ship. The parasol arrangement affords a really stable job. The sweepback increases longitudinal and directional stability.


BREAK AT THIS POINT FOR DIHEDRAL
"N" STRUT
1¼" DIHEDRAL
SCALE PROPELLER
FRONT
SIDE
WASHER
TOP
WASHERS
FLYING PROPELLER—CUT FROM 7"x⅞"x1¼" BLOCK
NOSE PLUG DETAIL ABOVE SHOWS NECESSARY RIGHT AND DOWN THRUST TO CORRECT ANY STALLING TENDENCIES.


DUMMY EXHAUST STACKS (FLATTENED TUBING)
FORMER #1 IS 1/8" THICK
FORMERS #2 TO #7 ARE 1/16" THICK
TYPICAL CROSS SECTION OF NOSE BLOCK
FOCKE-WULF STÖSSER
2
3
MASTER STRINGERS 1/16" SHEET BALSA (SEE TEXT)
REAR OF COWL APPROXIMATELY 1/8" THICK
1 1/4" BALSA WHEELS
4
5


THIS LINE INDICATES WIDTH OF FUSELAGE AFTER STRINGERS HAVE BEEN ADDED
SIDE MASTER STRINGERS CUT AWAY AT THESE 2 POINTS
PIECE "A"
UPPER PORTION OF #1 IS ROUNDED OFF.
1
2
3
DOTTED LINES INDICATE POINTS WHERE STRINGERS ARE TO BE ADDED
PIECE "A"
1/32" SHEET
D-IKNI
4
5
6
7
STEP
NOTE THAT REAR HOOK AND TAIL SKID ARE FORMED FROM SAME PIECE OF WIRE. RUDDER IS CUT IN ONE PIECE FROM 1/16" SHEET BALSA.
SEE TEXT ON COVERING
WING LETTERING
D-I KNI
(TOP AND BOTTOM)


1/8" x 1/4"
#6
#5
#4
#3
#3
#3
#3
#3
#3
#3
ATTACH STRUTS AT THESE POINTS
1/16" x 1/4"
L
T
STABILIZER CUT FROM 1/16" SHEET BALSA
STRIP OF BLACK TISSUE
SEE TEXT ON COVERING OF TAIL
FIN
RIB #1
RIB #2
RIB #3
FIN
RIB #6
RIB #5
RIB #4
#2
#1
ATTACH STRUTS AT THESE POINTS
ALL RIBS CUT FROM 1/16" SHEET

THE DISCUSSION CORNER

The model art progresses through the exchange of ideas. The Discussion Corner is a monthly sounding board for your opinions. 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.

THIS MONTH'S TOPIC: In the flying of gas models, do you believe youngsters are necessarily more reckless than their seniors? Do you believe that, to them, the relative value and work involved in building a gas job would insure their responsibility in this phase of model activity?

NEXT MONTH: Recent contest rules and the 30-second motor run.

FOR JANUARY: Do contestants object to paying a non-returnable entry fee with the understanding it will be used to help defray the expenses of the meet? What should be the limits of the fee, $.25 or $.50? Answers must reach us by October 20th.

PRO

Specific examples have led me to believe that younger boys use as much, if not more, caution than some of the older gas modelers. The youngsters appreciate the value of the finished product more than the oldsters because of the greater effort put forth, and the seemingly greater importance of the money involved. In most instances it is more difficult for them to get the financial backing, with the result that they are greatly concerned with having something successful as proof of the good investment. An older friend of mine has just sold his gas job for a trivial amount—the result of a washout due to carelessness. This is less apt to happen to youngsters.—Bud Booton, Sioux City, Iowa.

There seems to be no basis for the claims that youngsters are more reckless than their elders. Whether or not a person is reckless depends solely on his individual mental state. Age has no particular effect upon recklessness. The great amount of effort and expense involved in building a gas job naturally has a sobering effect upon a youngster flying a gas job. And seniors are inclined to the other extreme—recklessness because they feel immune to after-effects of some foolish action.—Warren Oberhaus, San Francisco, Cal.

Youngsters are not more reckless than their seniors. By youngsters I mean those between the ages of 15 and 19. Most young gas modelers have a much harder time getting the money needed for such a job. Therefore, the money and work involved would make them take better care of their model than older builders, who have money to build new models whenever they want them.—Andrew Antolosky, Jr., Windber, Pa.

I wouldn't go so far as to say that all youngsters can safely handle a gas model. Nor would I say that some of them aren't perfectly capable. It is my belief that any person, regardless of age, who can build a successful gas model is perfectly capable of flying it safely. Months of labor is not to be wasted.—Richard Dunbar, Shelton, Wash.

Youngsters who build gas jobs tend to be more careful when flying their jobs than older boys because of their inexperience in flying models. Older boys have a tendency to become slack when it comes to flying a model because the experience is no longer new and they are familiar with the methods of repairing—in case of accident.—Jack Peters, Vancouver, B. C.

CON

Young modelers are very reckless in flying their gas models. They use an excessive amount of fuel for a controlled flight and frequently many of them never recover their models again. I believe that the relative value and work involved in building a gas model should insure responsibility, but the thrill of watching their model fly out of sight is too great a temptation for the younger modelers to pass up. Those of you who have opportunity of seeing informal flying know this to be the case.—Joseph Saliskas, Chicago, Ill.

I don't think the average junior builder has the required patience for a gas job. At meets they are a great hindrance to judges. A senior spends weeks and months while the youngster rushes through the construction slap-bang, and the model is "ready." The senior finishes his work carefully down to a $\frac{1}{32}$". But such accurate measurement means nothing to the youngster. His flights show the same carelessness that marks his methods of construction.—George Adams, Toronto, Can.

I think youngsters are more reckless than seniors. They are inclined to underestimate the value of their work in model construction with a resulting lack of responsibility when it comes to flying.—John J. Mahan, Jersey City, N. J.

Youngsters in general are somewhat excited when flying a gas model. They become so intent on getting a flight that possible consequences are not seriously considered. Their lack of experience prevents them from making satisfactory decisions as to where and when their gas model should be flown.—Roger Duperron, Manchester, N. H.

It is difficult to decide who is more reckless—the youngster or the oldster. I feel the youngster gets the unfavorable decision on the basis of his inexperience. Of course there are "horrible" examples to be found in both these groups. Assuming a newcomer enters the hobby with no gas model experience, we'd rightfully expect a more safe and sane policy if he was a senior than if he was a junior. And in practically all instances, this is true. A senior will at least consider consequences of his actions.—Ted Bozenski, Wyandotte, Mich.

CATAPULTING

(Continued from page 28)

plane is promptly hoisted on board with a crane, or if the seas are rough, the catapult ship proceeds slowly forward, trailing a large mat which smooths the water in its wake and provides a safe landing place for the flying boat. The latter then taxies up on the mat, whence it is an easy matter to hoist it on board. Up to the end of June, 1938, Deutsche Lufthansa had completed 359 regular scheduled catapult flights across the South Atlantic, carrying about 800 pounds of mail each trip.

When airmail service across the North Atlantic was contemplated, different conditions were encountered. For one thing, the distance is considerably greater, and in addition the weather on the 2,400-mile route between New York and the Azores is not as favorable as in the South Atlantic. The project involved building bigger planes, with larger catapults to launch them. The larger planes presented no difficulty, and for the longer route, Blohm & Voss Ha-139 four-engined seaplanes, carrying a crew of four and powered with Junkers Diesels, were constructed. Two new catapult ships had to be built, however, and ultimately the *Ostmark* and the *Friesenland,* equipped with catapults which had a capacity up to eighteen tons, came into existence. When they were ready, the *Ostmark* was assigned to duty with the *Westfalen* in the South Atlantic; while the *Schwabenland,* equipped with a more powerful catapult, was stationed at Horta in the Azores as teammate to the *Friesenland* at New York. The length of the catapult tracks on all the vessels is the same, namely 115 feet. Since the large four-engined seaplanes have a greater power-to-weight ratio than the smaller twin-engined flying boats, their acceleration is greater and they attain their flying speed in about the same distance. Increased air pressure is also used to catapult the larger planes.

Deutsche Lufthansa had to use catapult ships rather than land catapults for their transoceanic operations, due to necessity rather than choice. Their overwater flights terminate in countries where Germany has no territorial rights, and so they have nothing to offer other countries in exchange for landing facilities. In their case, the catapult ship has much to recommend it. Not only does it provide them with a self-contained airport where facilities for servicing, refueling and repairing the planes are available at a moment's notice, but it also functions as a meteorological and radio station for guiding the planes in flight and establishing communication with them. In the event that a plane makes a forced landing on the ocean, the catapult ship can readily proceed to its assistance, hoist it on board and even make the necessary repairs while it is returning to its station.

The catapult itself consists of two rails spaced about 7½ feet apart, terminating at the stern of the vessel. The cradle rests on these well-greased rails, and supports the airplane on two sturdy thrust arms, with a balancing arm a little behind them. Below deck are the operating cylinder and its piston which pulls on the cables connected to the cradle, and the compressed-air cylinder containing air at a pressure of 2,500 pounds per square inch. The twin cables connecting the piston and the cradle are of steel, and are about two inches in diameter. They run around a series of grooved pulleys of large diameter, and around a block-and-tackle device which gears up the movement of the piston so that for every foot the latter travels the cradle moves forward six feet. At the outer end of the track is a powerful arresting gear for the cradle which can be brought to rest quickly and smoothly in a distance of less than fifteen feet. The controls for the catapult mechanism are on a small panel on the deck, near the catapult rails.

When an airplane is to be launched, the catapult ship is maneuvered so that the airplane will head into the wind to increase its lift and facilitate its take-off. While this is being done, the mechanics make a thorough examination of the plane, see to it that the fuel and oil tanks are full and that the luggage of the crew and their provisions are carefully stowed away. After the four members of the crew have gone on board, the engines are started up and roar into life, and then settle down to a healthy drone. First, the two inboard engines are run up to their maximum speed, and then the outboard pair, to see that they are functioning perfectly. A hush of expectancy spreads over the onlookers as they anxiously await the moment of departure. At last, the pilot signals down to the catapult engineer that he is ready to leave, lights flash on the instrument panel and the engineer moves the handle which opens the valve and admits the compressed air to the operating cylinder. Slowly at first, and then with incredible swiftness, the airplane moves along the track and is in the air, while the cradle comes to rest in the arresting gear. In less than two seconds the huge seventeen-ton plane has attained its flying speed of 90 miles an hour, and has commenced its long journey across the ocean.

As the crew of the airplane are prepared for this sudden departure, they can brace themselves in their well-padded seats and so do not feel any ill effects from this rapid acceleration. After the airplane leaves the cradle, there is no appreciable drop as the engines are running at full power and the plane is then in normal flight. But this sudden acceleration is too fast for passengers, and only well-trained men can stand such a quick transition from the stationary to the rapidly moving state. For passengers, the runway would have to be at least five times as long, and when passenger planes are to be launched in this manner, the advantages of the land catapult will have to be considered. Airport runways and stretches of smooth water of adequate length for the take-off of the huge airplanes now being built and projected are becoming more and more of a problem. Catapulting, or accelerating these air giants with their heavy loads to get them safely and quickly into the air, may soon have to be resorted to at transoceanic airports.

Land catapults have been tried out in a number of countries, and for large passenger-carrying aircraft where a long track is required they may prove to be highly desirable. Great Britain has done considerable experimenting in this direction, and at the Royal Aircraft Establishment at Farnborough, large twin-engined bombers, weighing as much as nine tons, have been accelerated for their take-off. To do this, the plane was supported on a special four-wheeled cradle connected to a long cable which passed around a pulley at a distant point, and then was brought back to a high-speed winch near the point of departure. Compressed air cylinders on a portable truck furnished the power for the winch, and when this was rotated rapidly the cradle and the plane were pulled forward with increasing velocity until the latter attained its flying speed and took to the air.

Germany has adopted land catapulting for the launching of military planes, using portable equipment and a short turntable track, and has also experimented recently with the accelerated launching of passenger planes.

An interesting idea, which appears to have possibilities, recently was suggested for accelerating the take-off of aircraft. Briefly, it consists of a high, sloping track something like the "water chute" at an amusement park, built so that it faces the ocean with its tracks running down to the water's edge. Starting from the top, the plane would be accelerated down the slope by gravity and the assistance of its engines, and would take to the air about two thirds of the way down where a slight hump would launch it outward at the right angle for flight. On its return, the plane would land on the water and discharge its passengers, and then taxi up on a ramp and be hauled up to the top of the slope by cables.

LIGHT PLANES

(Continued from page 30)

is likely to discourage you if you really are planning to fly.

In the first place let us analyze the actual figures of those who are taking or have taken flying lessons.

At the present time about 35,000 persons hold student permits, those intriguing bits of paper which allow a person to take flying instruction under government supervision. How many of these will complete their course and go as far as an amateur ticket is a big question, and it is one that may hold the answer to the success or failure of the light plane game.

Since 1927, when the Department of Commerce first began keeping anything that represented records, about 150,000 persons have started to take flying lessons. Some of them have gone so far as to gain their first ticket, but most of them have given up for various reasons, and as you all know there are about 18,000 licensed pilots of the various categories in this country at the present time.

This year, if figures are reliable, about 35,000 persons started to learn to fly. How many will have completed a course by the time we light the Christmas tree will be interesting to learn next April when the Bureau of Air Commerce publishes its figures. The betting is that not 10,000 will still be haunting "the line" for hops under government supervision.

Somewhere in all this, then, lies the answer to the light plane sport. Why is it, if light plane flying is such a thrilling and comparatively safe sport, so few actually go through with it, or stay in long after they have earned their private or amateur tickets?

Is it the so-called danger of flying that discourages so many?

Hardly. From the best figures available, we learn that during the years 1935 and 1936 less than 200 persons were killed in the very wide and flexible brackets known as "pleasure flying," and of these less than 150 died (out of possibly 50,000 who took out student permits) in crashes during their instruction periods. On the basis of this, then, light plane flying, or light plane instruction flying, cannot be considered a hazardous sport.

I am also told on good authority that at the Roosevelt Flying School, for instance, which has turned out more than 1,000 pilots out of some 1,500 students since 1929, has had but five accidents worth serious consideration, and at this writing only one actual death. Since 1931, as a matter of fact, up until the last available figures released, they had had no serious accident and not one death! While this school is particularly good, among the twenty or so listed as government-approved schools all over the country, it is obvious that any training taken under licensed and experienced pilots and in approved aircraft is not dangerous.

What, then, is the drawback to flying as a sport?

The cost of flying must have something to do with it, and herein lies a story.

As stated above, there are about twenty government-approved schools like Roosevelt, Boeing, Dallas, Parks, Ryan, Spartan and Air College scattered all over the country. These schools are government approved because they cooperate with the Bureau of Air Commerce and meet certain requirements as to instructors, planes and ground-school equipment. Flying instruction under such conditions naturally is high (about $17.50 an hour dual and $12.50 an hour solo), but you are getting the absolute best, for in order to keep their rating 90 per cent of their students *must* pass their license requirements when the school officials send them out for their ticket under the observation of a Bureau of Air Commerce man.

On the other hand, of course, you can go to a friendly transport pilot who has his own plane and get flight training for as little as two dollars for a short period of instruction. By dibs and dabs you can get in enough time to get by for a private license, but it is obvious that this man cannot give you the same complete ground and theoretical training as can the approved schools, and you will get little chance to take cross-country work, instrument flying or night flying.

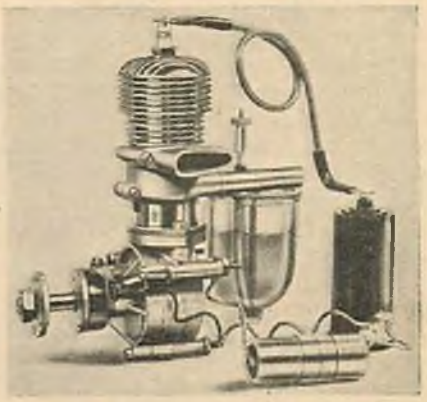
To explain this point further, we should state that at the present time there are about 500 registered pilots who have been given "instructor's" ratings, who can legitimately sell instruction and in all probability teach you to fly as well as the instructors in the approved schools. Some of these men are natural teachers, far better teachers than they are pilots, in many cases. And if you can hook up with one of these latter you are lucky, for you'll learn to fly, and fly well—make no mistake about that.

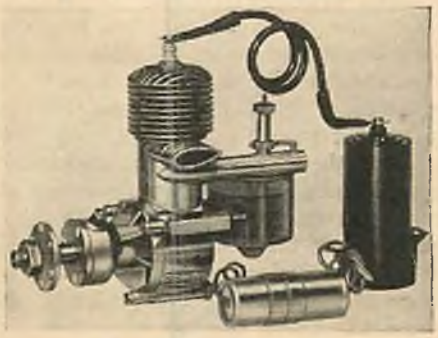
On the other hand, in the approved schools you will be taught by men who are approved, trained and experienced instructors. The school can afford to pay good instructors, and you are certain of finding them there. You will also find specialists in "first solo" work, specialists in primary aerobatics, specialists in instrument flying and specialists in night flying. No one pilot, no matter how clever he may be, can offer you all these qualifications. Furthermore, no one pilot has all the equipment the schools offer.

But flight training under these ideal

NOW! *TWO* OHLSSONS

TWO THOROBREDS!





***the* OHLSSON "Gold Seal"**

Winner of all major Pacific Coast model meets for the past two and one-half years. The standard of miniature motor performance throughout the world. Fully pre-tested and guaranteed. At your dealer's or by pre-paid parcel post.... $18.50

***the* OHLSSON "23"**

More than two years in development. A rugged little running-mate to the Ohlsson "Gold Seal." Light enough for a 20-oz. job—rugged enough for a 3-lb. model. Fully pre-tested and guaranteed. At your dealer's or by pre-paid parcel post.... $16.50

Ohlsson Miniatures are precision-built from the finest materials the market affords. Among model fans who know motors, Ohlssons are first choice—always. See your Ohlsson dealer for Ohlsson motors, kits, and parts.

OHLSSON MOTOR DISTRIBUTORS AER-O-KITS (Sheffield), Hanover Works, 136 Scotland St., Sheffield 3, England; BOND'S O'EUSTON ROAD, LTD., 357 Euston Road, London, N. W. 1; MODEL AIRCRAFT STORES, 127b Hankinson Rd., Bournemouth, England; R. STAH, 25 Rue des Petit Champs, Paris, France; HONOLULU PAPER CO., Honolulu, T. H.; MODERN AIRCRAFT (PTY.) LTD., P.O. Box 1906, Capetown, South Africa.

OHLSSON MINIATURES 630 NORTH ALVARADO STREET LOS ANGELES, CALIFORNIA

conditions costs money, and this may be the main reason for the dropping off of interest once a certain stage is reached.

But let us assume that you do go through with it and obtain your amateur ticket. You are ready to fly now, and naturally we should look at your mount. We all know what a light plane costs and we have some idea of the cost of maintenance. But we usually figure on a new ship, with gleaming prop, spang-new motor, a safety-first chunk of insurance and no prospects of service expenses for some time. It is on this plane we have been figuring our performance and fuel consumption. Not the same ship six months later, after it has gone through a summer of novice flying, a few thud-landings, and after a half-year's accumulation of dust, muck and what comes under the head of general depreciation.

Our light planes in the amateur or fun-flying category include the Cub, Taylorcraft, Aeronca, Arrow Sport, Porterfield and a few lesser known types, representing what we consider the average $1,500 airplane.

How many of these light planes are in the hands of private owners?

This may come as a strange question at this point, considering there are so many persons who hold some form of flying license. I was startled to find out that less than twenty per cent of all the Cubs in general circulation were in the hands of private owners. The rest, according to Mr. Piper of the Cub company, are in the hands of airport operators and flying schools.

So, we see, there aren't so many private owners as we were led to believe. And here's the reason.

Once a man has passed over the touchy peak of his first solo, he is buying time from the operators, and if he still likes flying it is natural he will begin to look about for a plane of his own. He buys one.

Then, with a certain number of hours under his belt, he begins to feel the call of adventure. He wants to get away from the confines of the airport. He can fly, he can land and he knows by now that his ship, if properly rigged, will fly itself smoother and straighter than he can if he lets it alone. Naturally, he thinks of a trip, perhaps about three hundred miles.

In the catalogue, his plane may have a cruising speed of 75 m.p.h. and a fuel consumption of—well, let's say a range of 200 miles, plus a slight safety margin of possibly 50 miles. But that was on a ship delivered by the company, not on the plane he has been flying all summer. Now, with aviation engines in the 40 to 50 h.p. category, there must be a certain amount of wear and tear. So he discovers, once on his way, that his cruising speed is not 75 m.p.h. but probably nearer 65, and that his consumption of gas and oil are correspondingly higher because of this same wear and tear.

If, on the day he has selected for his great adventure, he runs into a thirty-mile-an-hour headwind, his cruising speed drops from 65 (surface speed) to 35 m.p.h., and he finds also that his trip, which he had figured to take about four hours with only one stop for refueling, will take him nearer nine hours, and he will have to make possibly four refueling stops to play safe.

They tell me that long flights in light planes are not comfortable, and we must face the fact that the light plane in the $1,500 category is nothing more than an introductory ship, suitable for instruction, or sport flying within a limited area from a central take-off point. Once our light plane fans find this out, they become discouraged and quit—or they accept the inevitable and graduate to a class that offers more cabin comfort, greater power and a broader operating range.

Mr. C. G. Taylor of the Taylorcraft company has said this much through the public prints, and we believe our readers should get the benefit of the opinion of the man who makes one of the finest light planes in the world.

It is reasonable to assume that a man who has paid out from $300 to $600 for flight training and then $1,500 for a plane believes he is entitled to a mount that can be used for cross-country, business or week-end vacation trips. A few hardy and skilled pilots manage to do this within a reasonable degree, but the average light plane owner simply is not capable of it. The average light plane, as we all know, is about as powerful as the average motor car, and while the general run of light plane engines are rugged and very efficient, this ruggedness and efficiency are often their undoing, for instead of attending to the necessary twenty-hour and fifty-hour checks, the owners often skimp on their overhauls, with the result that within an unreasonably short time, the engines are throwing oil, getting clattery and falling short of the honest claims of the manufacturer as to performance.

It costs from $20 down to about $7 an hour to learn how to fly, but that only assures you of sufficient skill to take off, fly within certain limits of the airport and get back on the ground again. To fly cross-country requires more than a skimming of navigation, knowledge of weather maps and a superficial knowledge of the country over which you intend to fly.

A great pilot may not be a good instructor, and you will do well to spend a little more and get the best, even though the extra money means the difference between a new and a second-hand plane.

You can figure depreciation on your light plane at about $1 per hour flown and a complete write-off after 1,500 hours. You can figure hangar rental at $15 a month and engine overhauls and repairs at $80 for every 200-hour period. Insurance covering theft, fire, land damage or any accident which might overtake the plane on the ground, will cost about 4% of the value of the plane. Your operating costs will most likely run about $3.50 an hour or about 4½ cents a mile if you have a ship that *has a 75* m.p.h. cruising speed.

Light planes cannot be expected to meet the primary conditions of air transportation, which are speed, capacity and flight range. They can be used economically and efficiently for straight flight instruction. Whether they are open cockpit jobs or cabin planes, once you put in two people you limit yourself to a baggage capacity of approximately 50 pounds.

If you are really considering flying as a regular sport, or for business, you will be better off learning to fly at an approved school in light planes and graduating to the Ryans, Monocoupes, Luscombes or Fairchild-24's before you give up formal instruction, and then try to get one of these types from the second-hand market.

And—if you can afford only the light plane, you can still get more than your money's worth out of a Cub, Taylorcraft, Aeronca or Porterfield, if you accept the ship for what it is and treat it accordingly.

LIST OF CLUBS IN U. S.

Lack of space prevented our inclusion of this list as promised last month. It is the most complete list we have been able to gather, collected from light-plane organizations, manufacturers, schools and international registry volumes. Clubs not represented here are advised to send us their names and addresses.

A. B. C. Glider Club of Detroit, 25-902 Lafayette Bldg, Detroit, Mich.
Aces-Up Flying Club, Inc., 5017 Pensacola Ave., Chicago, Ill.
Aero Club of New Brunswick, Somerset & Bethany Sts., New Brunswick, N. J.
Aeronca Flying Club, 120 Exchange St., Portland, Me.
Aeronca Flying Club of Peoria, 311 Central Nat. Bank Bldg., Peoria, Ill.
Aero Sportsman Club, Akron Municipal Airport, Akron, O.
Airhoppers Glider Club, 29 Astoria Bldg., Astoria, Long Island, N. Y.
Airport Glider Club, Salt Lake City Airport, Salt Lake City, U.
American Ace Flying Club, Lovell Field, Chattanooga, Tenn.
American Eagle Aeronautical Club, 534 Broad Street, Newark, N. J.
American Soaring Association, 116 West 75th St., N. Y. C.
Amherst Flying Club, Alpha Delta Phi, Amherst, Mass.
Anniston Flying Club, P. O. Box 297, Anniston, Ala.
Arnot Gliding and Soaring Club, 163 McCauley Ave., Elmira, N. Y.
Ashland Flying Club, Ashland, Ky.
Aviation Country Club of California, 1215 Rives-Strong Bldg., Los Angeles, Cal.
Baldwin Park Flying Club, 116 E. El Monte St., Baldwin Park, Cal.
Balmar Flying Club, Baltimore Airport, Rutherfield, Woodlawn, Md.
Belknap Aero Club, Laconia, N. H.

(Turn to page 98)

ATTACK IS SUDDEN

(Continued from page 25)

coast. Here again a complete technical listing of its purposes and methods would be confusing to anyone but a military strategist. And the practical definition is quite simple. Attack really means ground attack—a direct assault at near ground level against troops, airplanes, vehicles and other light targets on the ground. Of the four branches of aviation in our army, only observation and bombardment have names that definitely describe the work they do. The words attack and pursuit might apply to almost anything, whereas pursuit planes are intended for combat against enemy planes in the air and attack planes only for use against certain targets on the ground at close range.

Misunderstandings often result from the fact that bombardment targets are also on the ground, and the additional fact that attack planes carry bombs. Confusion is most noticeable among newspapermen, some of whom seem to be always misinformed about things pertaining to aviation. To the great disgust of attack pilots, the newspapers are always referring to them and to their planes as bombers. They do carry bombs, that's true, but so do some of the latest pursuit planes, and attack pilots are no more bombers than they are gunners, gassers and smokers. Bombers do their work with only one weapon (their guns are solely for defense), while attack planes can employ four. The bomb has become the most important aerial weapon, but that does not require all military airmen to be bombers, any more than all soldiers on the ground are gunners.

Most of the differences between bombardment and attack result from the fact that they work at entirely different altitudes. Bombers must have at least a few thousand feet before their bomb sights can begin to operate accurately, and, of course, this makes the use of any other type of weapon entirely impossible. Attack planes, on the other hand, get right "down and at 'em." Not only can they "lay" the smoke and chemicals, but they also lay down a thirty-caliber barrage and they can even lay their bombs just as gently as eggs in a nest! This is accomplished by means of parachutes attached to the bombs which delay the descent and the consequent explosion long enough for the planes to get away and escape self-destruction.

Remember that attack planes fly and fight and do all their maneuvering *on the level.* This is a surprising fact, and at first it seems so illogical that attack pilots in training have to be reminded of it continually. It means that attack does not dive at its targets, either to shoot at them or to bomb them. All the diving and zooming is performed by pursuit, which accounts for the fact that other airmen in the army refer to them humorously as the "dive and roar boys."

Attack, like artillery, lays down a barrage of lead which is intended to cover the whole target area, a purpose which would be defeated by diving, since that would restrict its fire to a small area. Bombs are dropped as the plane passes over after the shooting, in the places where the pilot thinks they will be least wanted by the enemy. The idea is to get there fast and get away fast. Diving and pulling up makes an impressive show, and enemy machine gunners on the ground would enjoy it immensely since it would give them a chance for some fine shots.

The formation that stays low and level is in sight and in range for the shortest possible space of time. Attack can go in under the very lowest ceiling, it has almost a perfect horizontal view of its target, it can be attacked only from above, and its low and flat formations are extremely difficult for hostile pursuit to locate. But its greatest advantage is surprise, its low, hidden, sudden approach that gives an enemy so little time for dispersion or defense.

So the important and distinctive thing about attack is the fact that it flies so low. The approach to its target at altitudes of less than a hundred feet makes possible the use of guns, smoke and chemicals as well as bombs. But a complete loading of all these weapons can be scattered in a very short time, a complicated process, to be sure, but not as important from the pilot's standpoint as the low flying and the necessarily level maneuvering which must go on for hours without a pause.

And don't let anybody tell you that flying low is easy. Sometimes young bombardment or pursuit pilots shrug their shoulders and say "anybody can fly low." They are right, anybody can, just as any pilot can fly high and just as almost everybody could fly if they knew how. But the satisfactory performance of a highly specialized flying job is a different matter entirely. Now that we've watched low flying from the ground and understand its military importance, let's take a look at it from the cockpit.

You are at the controls of an A-17A and you are flying it at a constant altitude of about a hundred feet. Everything is favorable; the weather is warm and clear, the country is fairly level and visibility is excellent. But you can never completely relax. You can scarcely even look at a map, since you are only a second or so above the ground and the air at this low altitude is almost always rough. It's all right to look to one side or the other for a few seconds at a time, but remember that the horizon is coming toward you at the rate of one mile every twenty seconds and there are many things on the earth's surface that stick up higher than a hundred feet. Unfortunately for your peace of mind, some of these things can not be seen from any great distance, even with the best of visibility. You must keep reminding yourself that power lines are sometimes strung from hill to hill, that rivers are crossed repeatedly by everything from telephone lines to ferry cables, and that any tall structure such as a radio tower or an oil-well derrick is likely to have guy wires extending in every direction. Older attack pilots could hardly forget all these things if they tried, since most of them can recall one or two good friends of the past who did forget once too often.

After many months at this kind of work you have ceased to actually worry about hitting something, since there is little chance of your doing so as long as you are very careful. And extreme caution has become an unconscious habit. But you must remember to watch not only everything ahead but also your engine pressures and temperatures and especially your gasoline gauges. The mere matter of being a little slow at switching gas tanks could easily end your flight.

The slightest indication of a failing engine will make you as thirsty for altitude as a deep-sea diver with a broken hose line. You've got to keep the speed and direction of the wind constantly in mind, as well as the quickest way to open the hood, lower your landing flaps and cut the switches all at the same time. All your thinking about a possible forced landing has to be done ahead of time when you are flying at attack altitudes, since there is no time for thought after the motor stops. At a thousand feet or even at five hundred feet you might look around for the best field and also try to find the cause of the trouble. At one hundred feet you just head for the nearest open space and start pumping down the landing flaps.

There is no time for getting the wheels down, but it's actually a great advantage to have them up. Attack pilots looked forward for years to the time when they would finally get a plane with retractable gear, not so much for greater speed as for increased safety in forced landings. In an ordinary rough or plowed field the landing gear of the older types served merely to trip

them over on their backs, and a low-wing monoplane is not designed for the pilot's comfort when upside down in a soft field. I have never had the experience of standing on my head and scratching for daylight, but my neck aches every time I listen to a fellow who has. Most of them were soon rescued by helpful farmers or by loyal mechanics who were able to escape from the rear cockpit, which was kept off the ground by the vertical stabilizer.

Planes with retractable gear are not inclined to tip over, and these things have almost ceased to happen. Furthermore, a plane landed on its belly slides only a few yards, so the size of the open space required for a safe landing is greatly reduced. Forced landings have always been surprisingly rare among attack units, and today with the best of equipment they have almost ceased to happen, but the attack pilot must still be prepared to ease his plane into some kind of open space if it should ever become necessary, or at least to mush it down upwind into the softest trees in sight when no open space is available.

There are other problems involved even in straight and level flying at a low altitude, and straight and level flying is often interrupted by necessary turns. Not only must all obstacles, hills and steep slopes be foreseen and avoided, but attack planes engaged in peace-time practice must also dodge all cities and towns and thickly populated areas. Whenever possible, they even try to avoid frightening livestock. Such dodging complicates the already difficult problem of navigation.

Maneuvers close to the ground must be nearly perfect. Flying at thousands of feet, pilots can, and careless ones often do, lose a couple of hundred feet in steep turns without even bothering to notice. At a hundred feet above the ground you don't have that much to lose. In a fast and heavy plane at that altitude there must be no slipping or skidding of the type so common among poorly trained or careless pilots. And handling a heavy plane near the ground is just about as thrilling as acrobatics until you get used to it. You have to depend a great deal more on feel, since the wind drift during a turn is so obvious that you appear to be slipping or skidding in relation to the ground when your turn in the air is quite correct. And your reaction time on the stick gets to be pretty rapid, for surface air in rough weather sometimes tosses you about in the most unpredictable manner, and you are down where you can see your ups and downs as well as feel them. You soon learn to keep your banks at less than vertical to avoid the sensation now and then of being tipped almost on your back, and to avoid the downwind sides of hills, where most of the air currents are descending. You must be relaxed and sensitive to everything, even though the average pilot gets more and more tense as he nears the ground. No wonder "steadiness" as well as "smoothness" is considered a prime requirement for attack pilots.

Now that you are acquainted with some of the major difficulties of low flight while alone with all the air to yourself, remember that this is merely elementary. Flying any fast plane in military formation presents all these problems and many others. Most military pilots on duty with tactical organizations consider a flight alone to be a privilege, almost a vacation. In a formation flight they must do practically everything required of them when flying alone except navigate, and in order to keep track of their position they must even do a certain amount of navigating.

Each type of military formation has its own peculiar problem. Pursuit planes, being smaller and more maneuverable, are the easiest of all to handle, but the climbing and diving turns practiced by pursuit formations are far from easy. Bombardment pilots seldom perform any sudden or violent maneuvers, but the big weight-lifters they fly actually require more time and more room for their movements than any of the others. In the kind of maneuvers it performs, attack stands somewhere between the two. Its planes are larger and more heavily loaded than those of pursuit, but they can be handled far more rapidly than bombers. Attack pilots learn to fly formation just as closely and neatly as pursuit pilots and they perform turns just about as rapidly and even more suddenly than pursuit. They attempt no climbing or diving turns, for two reasons. In the first place, they have little use for them, since most of their actual work is done at the lowest possible level, where climbing would be foolish and diving would be fatal. In the second place, climbing and diving turns are rendered virtually impossible by the very peculiar type of formation they fly.

Military air formations have become standardized in a great many respects. But attack formation differs from all the others in one detail which is very simple but very important. It is so simple that most uninformed observers fail to notice it, and so important that it requires a great deal of special training and practice. It has been the cause of a great many thrilling incidents and experiences, but in this connection I shall try merely to explain it and the reason for its importance.

As you know, practically all military formation flying is based on the three-plane "element," consisting of one plane in the lead with another plane slightly to the rear on each side. A normal flight consists of three or these elements, with the second and third elements stacked up to the rear and to one side of the first. When the first element turns, the second and third elements must cross over during the turn, to the opposite side of the first element. This is necessary in order to equalize the distance around the turn, so that the elements behind will not "head off" the leader when they start on the inside or be left behind when they start on the outside. In other words, when the lead element turns away from them the others must cut across in order to catch up. This is not particularly difficult. But when the lead element turns toward them, they must cross almost directly above it and get on the outside of the turn in order to stay behind where they belong. And this is not easy.

This crossing over is doubly difficult in an attack formation for the reason that, where other formations are supposed to take plenty of room between elements, an attack formation is supposed to keep as low and as compact as possible. It might be useless to remain hidden by hugging the ground for a great distance only to have the last element climb high enough to be seen for miles while crossing over during a turn.

AIR TRAILS ADVERTISERS—NOVEMBER, 1938

Aero Industries	Back Cover	G. H. Q. Motors	95
Aircraft	Third Cover	G M S	95
All American Fencer's Guild	97	Gun Model Co.	87
Aviation Institute of America, Inc.	7	Heathe Model Airplane Co.	91
Berkeley Model Supply Co.	83	Imperial Model Aero Supply	87
California Flyers, Inc.	5	Lincoln Airplane School	79
J. Carozza	95	Lionel Corp.	93
Delta Mfg. Co.	95	Mechanix Universal Aviation Service	87
Diamond Model Airplane Co.	91	Megow's	Second Cover
Fleischmann's Yeast	97	Model Research Labs.	95
Ohlsson Miniatures	75		
Payne Aircraft Corp.	97		
Quiz System	95		
Ronald Press	3		
Roosevelt School	89		
Royal Typewriter Co.	79		
Skyway Model	93		
Stephen's Novelty	95		
Universal Aircraft	95		
Waterbury Model Builders	95		
Wm. Yeager's Aircraft Photo Service	79		

So the attack pilots at Fort Crockett learned to cross just above the tails of the element ahead. For this reason, and because of the nearness of the ground, the three planes in each element turn in a manner entirely different from that practiced in any other type of flying.

In an ordinary element, when the lead plane tilts or banks for a turn, the plane on the inside of the turn drops down and the plane on the outside of the turn pulls up, so that the entire element is banked or tilted at the same angle as the lead plane. The wing men, as the pilots on each side of the leader are called, may change their position in relation to the ground, but they never change their position in relation to the leader. Their wings are always in line with his wings. When three racing cars running close together round a well-banked turn the same thing happens. The one on the inside is lowest and the one on the outside is highest as they round the turn.

Naturally, this spreads the element in a vertical direction, and when there are three elements crossing one above the other they must have plenty of vertical room to allow for the "expansion." In the path of the planes, as in a track for racing autos, width becomes height on the turns. And attack avoids this height in a way which is simple enough for everybody but the pilots who have to do it. In an attack element the inside man does not drop below and the outside man does not rise above the leader. Each plane must tilt, or bank, as it turns—that's a law of physics. But in an attack formation the elements themselves do not bank. They round a turn not as racing cars do, but as speedboats do—all on the same level. And if you think that is just as easy, watch speedboats scatter as they turn.

There are several reasons why this type of turn is especially difficult for planes. The differences in the distance around the turn are far greater. In a steep-banked turn in a normal formation, everybody is turning on approximately the same radius. But with speedboats and attack formations the inside man travels a much shorter distance and the outside man a much greater distance. Consequently, the inside man on an attack turn must cut his throttle suddenly when the leader *turns toward him*, in order not to get ahead, and he must turn suddenly and sharply in order to avoid a collision. And the outside man must speed up suddenly or be left behind.

And once in a turn, attack pilots find themselves confronted with a strange circumstance. They are all on the same level, but the inside man must peer over the side of his cockpit to see the leader who is suddenly "beneath" him, while the outside man must tilt his head back and watch the same leader "above." It sounds silly, and it feels silly, too, until you get used to it. There is a constant temptation to rise or descend with the leader's wing nearest you, but it may be your last temptation if you do. In an attack formation there may be other planes close above you and other planes or the ground below.

In the old A-3s the outside of the turn was more difficult because that airplane was slow at picking up enough extra speed to keep up, and because the leader was almost completely hidden by your own top wing. In the new A-17As the inside of the turn is worse because there is only the low wing to get in the way and because the new planes are so slick and streamlined that it is more difficult to slow them down than to speed them up. The old planes slowed down like a Model T on a sandy road when you cut the throttle, but the modern ones sail right ahead for several seconds before you can even begin to drop back.

New speeds, new armament and more complicated equipment are making things happen faster and faster for the attack pilot. This is also true of the other branches, but the attack pilot had his hands full to begin with. It seems only yesterday that speeds were little more than half what they are today, and when you are flying near the ground that increase in speed means more than just the time it saves you in getting somewhere and the necessity for more frequent glances at the map. It means a proportionate increase in the speed of your glance, in your estimates of altitudes and distances, in your use of stick and rudder and throttle, and in the suddenness of your decisions. It is significant that the newest attack plane is controlled by a stick instead of a wheel, despite its two engines and the fact that it is as big as a light bomber. A wheel is easier to operate, especially on a big plane, but a stick can be brought into action more rapidly.

There are other aspects of low-altitude flying which we have scarcely touched upon here, such as low flight at night, tricks of low-altitude navigation, et cetera—each of which presents its own special problems and solutions. The problems and the solutions are all somewhat different from those of ordinary flying. And most attack pilots have learned to like low-altitude work best of all, despite its unique difficulties. Flying high may be somewhat swifter and more efficient, but almost everything connected with flying low is more interesting and more sudden. Attack aviation is interested principally in using this suddenness to military advantage, but in learning how to surprise an enemy on the ground the attack pilot is likely to get more than his share of surprises in the air.

OWN A ROYAL PORTABLE ON YOUR OWN TERMS

FREE HOME TRIAL

ONLY A FEW CENTS A DAY

ACT NOW!

You needn't risk a penny!

Royal's generous free HOME TRIAL will prove to your satisfaction that a genuine, latest model, factory-new Royal Portable is the typewriter for you . . . simple to use, convenient, built to give a long service. Includes such office typewriter features as a full-size keyboard, Royal's famous Touch Control, Finger Comfort Keys, and many others. Terms to suit your purse—cash or only a few cents a day. Mail the coupon today for full information about Royal's offer—prices, terms, FREE HOME TRIAL. No obligation.

ACT NOW! TODAY!

MAIL

ROYAL TYPEWRITER COMPANY, INC.
Dept. C-961, 2 Park Avenue
New York, N. Y.

Tell me how I can own—for only a few cents a day—a latest model Royal Portable—with Carrying Case and FREE Instant Typing Chart.

Name .....
Street .....
City ..... State.....

I already own a _____ Typewriter,
Serial No. _____ Tell me how much you will allow on it as CASH payment on a new Royal.

PHOTOGRAPHS

1938 National Air Race Entrants
Bendix Greve and Thompson Winners

Other Racing and Commercial Aircraft Past and Present
Contact and Enlarged Sizes - - - Send 10c for list.

Wm. Yeager's
AIRCRAFT PHOTO SERVICE
5116 Clark Avenue Dept. AT-11 Cleveland, Ohio

WANTED: TRAINED PILOTS and MECHANICS for BIG PAY JOBS IN AVIATION

Aviation Needs and Must Have Thousands of Newly Trained Men for new positions as Pilots, Airplane Mechanics and Aeronautical Engineers. Airlines adding millions of miles to their flight schedules. Factories working night and day building new airplanes.

This Lincoln Government Approved School trains you for good pay position as Pilot; as Government Licensed Airplane and Engine Mechanic or as Aeronautical Engineer. Good Salaries paid to properly trained men. Airline Pilots get up to $700 a month; Co-Pilots, $250. Licensed Mechanics get up to $200 a month; Aeronautical Engineers, $400. Make Aviation YOUR Career. Aviation offers you exceptional opportunities for big pay and promotion. Prepare yourself now at this Lincoln Government Approved School. Our Graduates regularly taking positions with leading Aviation companies and at Airports. You can do part-time work for your Board and Room while training. We assist Graduates in locating positions. Get the facts! WRITE TODAY for information.

LINCOLN AIRPLANE & FLYING SCHOOL, 156 Aircraft Bldg., Lincoln, Nebr.

MODEL MATTERS

(Continued from page 67)

who participated in the contest, gave a very creditable account of themselves.

NEW SOUTH CAROLINA CLUB. Last July the Torque Fliers Club of Greenville, S. C., set out for a contest in Florence, S. C. They had piled seven gas models in a trailer and were dusting along at about 60 m.p.h. when a tire blew out. The trailer was thrown loose from the car, and listed among the damage were the seven gas models, completely demolished. Naturally, the Torque Fliers didn't compete in the contest. But the humiliation of such a thorough washout spurred them into action.

They planned a contest for the following month—August 17th. The club members working as a unit built ten new gas models and took five out of eight prizes. There were forty entrants from South Carolina. Prizes were bought by selling advertising space on the wings of each plane. In this way they raised about a hundred dollars, which was used to buy prizes and defray the costs of the contest. The gas allotment was one sixteenth ounce of fuel per pound of weight.

Following are the winners: The entry of Frank and Neal Crawford was first with 7:53; Derrill Ivester was second; and Hugh Smith, Roy Taylor, J. C. Templeton, and T. I. Weston followed in this order. Following the contest the entrants banqueted and then met to form the South Carolina Model Airplane Association. Modelers throughout the State are invited to join. Jimmy Metchicas, secretary-treasurer of the Greenville Torque Fliers, 107 West Washington St., will welcome all inquiries.

CHICAGO RESULTS. Enthusiastic entrants and spectators, together with the splendid directing of old-timer Joe Lucas, made the recent Fernwood Park Model Airplane Meet one of the finest ever held in the Chicago area. Awards were made on the basis of the average for three official flights.

Senior—1. Irving Kovnat, 2:47.6; 2. Joseph Matulis, 2:40.9; 3. Robert Kaergard 1:44.9.
Junior—1. Robert Crowley, 1:36; 2. Robert De Batty, 1:09.3; 3. Jimmy Tangney, 1:06.3.

Joseph J. Lucas conducts the Fernwood Model Airplane Club and has done much to build up model enthusiasm in this neighborhood.

Chicago Aeronuts continue their contest triumphs. Dick O'Barski won the Midwestern States Gas Model Meet held in Chicago. And then Carl Goldberg took first in the duration event for gas models at the Mississippi Valley Meet. Other 'Nuts placed high in these two events.

August 14th the 'Nuts had a club contest. A thirty-m.p.h. wind caused a few headaches, but actually the only damage was a glider wing thrown off. Winners were:

1. Ed Lidgard, 2:40, Class C tube-stick model; 2. Joe Matulis, 1:53, Class C diamond fuselage; 3. Tie between Dick O'Barski, :48, Class C glider, and Marion Setzke, :48, Class C glider.

The event was free-for-all with high time winning. If anyone had wound up his model to capacity, the thirty-m.p.h. wind would have taken it out of sight after several minutes. Lidgard's stick model was lost, when it landed three miles away, but was returned to his home before he had returned from the contest.

A Midwestern States Gas Model Contest took place at Harlem Airport on August 7th, sponsored by the Gas Model Aeronauts in conjunction with the Chicago Park District. Final results were:

Special Awards—Best Flight by a Chicago Contestant: Richard O'Barski, Chicago, 6:55; Worst Crack-up: G. E. Sherahod, Chicago, (destroyed by fire); Best Flight under 4½" Span: Richard O'Barski, Chicago, 6:55; Best Flight over 4½" span: Robert Mazel, Chicago, 5:14.6; Best Flight Made by a Quaker Model: Francis Munson, Chicago, 2:06.8; Lightest Model Making Flight of over 1 Minute: Kenneth Willard, Chicago, 2:11.

Duration Winners (3-flight totals)—1. Richard O'Barski, Chicago, 8:43.7; 2. Walter Good, Kalamazoo, Mich. 8:26.5; 3. Ed Menthy, Maywood, Ill., 8:05.8.

B. G. M. C. OF BALTIMORE. The Baltimore Gas Model Club sponsored a contest during August for gas and rubber-powered models. Prizes were awarded on the basis of a three-flight average. Winners of the gas event were: Theodore Schindler, 1st; Carrol Carter, 2nd; and Myer Lahn, 3rd. Winners of the rubber event were Raymond Dietz, 1st; and Paul Mon, 2nd.

The contest was supervised by William W. Saunders, senior director of the club. He was assisted by Lahn and Coburn. Three brilliant crack-ups helped keep up the excitement among the one thousand spectators. Jim Long's entry spun in from considerable altitude; W. B. Kemp's job crashed into a telegraph pole; and a model from Washington dived in after failing to get altitude.

Prizes were presented by Captain Harry Rowland, test pilot for the Glenn L. Martin Company of Baltimore.

GULF STATES MEET. The Gulf States Model Airplane Meet was held August 28th at New Orleans, La. Entrants from six Southern States entered, and the meet was limited to gas models. N. A. A. rules were used and motor run limited to thirty seconds. Whalen Norman was contest director and Russell Jumonville served as manager for the contest, which was sponsored by the New Orleans Junior Chapter of the N. A. A. The contest will be repeated yearly. Winners were as follows:

Senior—1. Robert Basnett New Orleans, 1:56, awarded Wm. B. Helis Perpetual Trophy and $25; 2. Joe Berner, New Orleans; 3. W. Powell, New Orleans.
Open—1. Sylvester Thompson, New Orleans, 2:47, awarded Mod-Kraft Co. Perpetual Trophy and $25.

R. M. F. C. OF NEW YORK CITY. The Second Annual Gas Model Meet of the Richmond Flying Club was held at Miller Field, Staten Island, New York City, on August 14th.

One hundred and fifty entrants, two thousand spectators, and perfect flying weather made the contest a success. Soldiers from the First Tank Division of Miller Field acted as judges, timers, and field policemen. The meet was capably directed by William R. Mott, president of the R. M. F. C.

Four events were run off:

Event 1 (Endurance, with 20-second motor run)—1. Leon Shulman, N. Y. C., 7:45; 2. Magnus Anderson, N. Y. C., 3:57.
Event 2 (Payload, with 20-second motor run)—1. Arthur Keslow, Perth Amboy, N. J., 386 points, 9:00 time; 2. Anthony Bacchi, N. Y. C., 86.2 points. Formula for this event was wing loading x seconds in air.
Event 3 (Spectacular)—1. Richard Boegehold, Verona, N. J., model dropped parachute and confetti; 2. Joseph Raspante, N. Y. C., model carried a rubber-powered model and released it in flight.
Event 4 (Beauty)—1. Joseph Raspante, N. Y. C.

DESIGN TREND AT NATIONAL CONTEST. *—After talking with a particularly well-informed oracle we decided to repeat his impressions of the meet, together with a few of our own.*

The 11th Annual National Championship Model Airplane Meet is gone.

Now that the excitement has abated and the contestants have straggled back to their homes all over the United States and in Canada, the more serious model builders are beginning to realize that the Nationals this year was unique in that many indications were given of definite trends in the various phases of model activity.

Impartial observers had much praise for the fine performance of Jim Cahill in placing first in the Wakefield eliminations. More spectacular flights may have been made but none were made with a more deadly sureness. We of Air Trails found the performance particularly gratifying. What is significant about this particular model's championship performance is that its repetition in winning stamps it as a design influencing future construction in the same category.

It is to be remembered that this model was lost after its flight in the 1937 competitions. Exposure had sagged the sheet balsa of its monocoque fuselage, detracting considerably from the ideal streamline. Nevertheless, the 1937 Moffett victor again rolled back competi-

tion. The single-bladed, folding, feathering propeller, the monocoque deep-belly fuselage and stumpy single-wire landing gear, all proved themselves to still have championship qualities.

Much import is given to the prevalence of gas models built from kits that were in competition at Detroit. It can be safely said that the kit designs are quite capable of outperforming most original designs. The many Berkeley Cavaliers and the Comet Clippers attested to the fact that their outstanding characteristics of performance are being appreciated in contest circles. Both these designs, as well as many other kit-built ships, proved quite popular with the spectators.

From the standpoint of originality in gas-model design ,the gull-wing soarers proved outstanding. Of course, they have performed quite capably before and are no longer unusual. But it is evident that their design is contagious.

The outstanding characteristics of the gull-wing soarers were their tendency to point into the wind and their phenomenal gliding angle. In the high winds that marred the gas-model events the soarers escaped practically unscathed.

Structurally, the soarers featured a high-wing design with a large gull effect. The monocoque fuselages seemed to be hollowed from blocks with a streamlined single pant carved integral to mount a single air-wheel. Although one would say offhand that the single wheel mounted in such fashion would be inadequate, the contrary was true. The soarers landed just as beautifully as they performed in flight.

Probably the most unusual plane at the meet was an immense two-engined job brought to Detroit by Frank Broeg, who came with Roy Marquardt. The ship had full cantilevered wings, the outer sections being removable and the inner section gulled severely and built integral with two tail booms and a short fuselage nacelle. The engines were fitted one as a pusher, the other as a tractor.

Dispelling any fears and the malignant rumors about the interest in the rubber-powered field, the first two days of the contest produced possibly 500 top-notch ships. Interest was maintained through the various events for rubber just as it was for gas. Dozens of these ships were in the air nearly all day long.

The only general improvement in the rubber-powered field was the widely used folding propellers. We did see a fair number of rubber tensioners—devices that maintain a few turns in an extraordinarily long motor that otherwise would shift when unwound.

On the whole, one gets the feeling that rubber-powered interests have passed a low point and are on a furious upswing. Even after the rubber events were over much talk continued on things that might have happened, did happen, or on hopes for next year.

Flying scale flying was a distinct washout. We wonder when flying scale work at the Nationals will assume its proportion of acclaim. The few entrants in the flying scale events do not by any means represent the popularity of this category with the general model fan.

The Berryloid event for best finished models did not attract many entrants. The amount of work necessary on the part of the builder to make his gas model eligible for award in this event precluded his bothering with it. Harold Coovert of Dayton produced the outstanding Berryloid model, and his victory was more than well deserved.

In view of the perfection of finish on many ships and the appreciation of good finish because of its reduction of skin friction, it is certain that finish is going to play a prominent part in future practice.

The high winds that accounted for casualties in seven out of every ten gas models proved the fallacy of careless design and adjustments. Many of the crashes blamable to the wind could have been avoided had careful adjustments been made in the beginning.

Taken as a whole the gas-model field did show a growing attention to design refinements. Monocoque fuselages with beautifully rubbed finishes were not unusual. Many designers have placed their stabilizers high on the fin and rudder. Some have placed the stabilizer directly on top of the rudder. A few utilized twin rudders. Cantilever wings, monocoque fuselages, fine filleting were commonplace. The tendency to ultrastreamlining was marked.

Radio control seems to be as far away as ever. Very few entrants were present and these were deterred from extensive flying by the high wind. The immense amount of labor involved in building a radio-controlled model is sufficient reason for a builder to forgo the moment he has been pointing for all year should weather constitute more than a reasonable chance of damage. Radio equipment is an expensive thing.

Reviewing the events of the four days, a number of improvements incorporated in some ships give promise of stepping up performance when general use is made of them. For the rubber enthusiasts the folding propeller is fast becoming a necessity, and the very few one-bladed ones proved themselves by comparative performance with similarly designed and built ships to be inferior in propeller efficiency. Motor tubes to protect the fuselage from breaking rubber were evident on a very few ships. Their use might increase the entrant's chance of maintaining his ship in condition for its three flights. Rubber tensioners so increase the number of turns possible to be stored in the motor that it is likely tensioners will be a commonplace feature. From the sad results of the wind-blown gas events it seems likely that strict attention must be paid to attributes of design affecting flying characteristics in rough weather. It is also imperative that the builder know his gas job's peculiarities and capabilities like a book. Maxwell Bassett proved that long ago, but judging from performances displayed at the Detroit 1938 Nationals the lesson is only now being learned.

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, 1938.

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*, C. B. Colby, 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, 1938. De Witt C. Van Valkenburgh, Notary Public No. 24, New York County. (My commission expires March 30, 1940.)

AIR TRAVELERS AREN'T HEROES

(Continued from page 27)

ing current of cool air. These currents are rare or numerous, depending upon the weather, and at their worst are nothing of importance to the modern transport. When a ship enters such a current after flying through calm air, it naturally starts following it down and flies out on the other side. This may be two seconds later or a minute later, depending upon the area or width of the descending current. You do not feel any of this sinking except the first little dip when you enter, for you are going forward all the time.

Let's compare it to walking across the floor of a department store, representing the calm air, stepping onto a down escalator and continuing to walk, representing flying through the down-draft, and then stepping off at the lower floor and continuing in a straight line to the bargain corner. Nothing exciting about that, was there?

About as often as you fly through a down-draft you will fly through an updraft of rising warm air with the same process reversed, and with the same degree of "danger."

Another thing that first-time-uppers worry about is the small details of flight which sometimes give an erroneous idea as to their cause and purpose. For example, last winter, just before we slid in for a snowy landing at Chicago, I noticed the chap in the seat ahead glancing first at his watch and then the right wing tip with an expression of horror that was heart-rending to behold. For the life of me I couldn't figure out what was causing all the worry and watch watching. Finally I could stand it no longer and asked him what he was so interested in.

"Just look at the tip of that wing flap up and down when we hit a little bump," he replied with anxiety. "Do you think it will hold till we get down? We've got five minutes more to go!"

Now, I'm not an aeronautical engineer by a long shot, but I could explain flexibility to him. That's for safety. You can't break a buggy whip (ask dad, he knows) by waving it or snapping it, but you can break a brittle, rigid stick with a quick snap. The wings of a transport plane are made purposely flexible to a certain extent so that shocks will be absorbed with ease.

Just for fun, let's start at the beginning of your first flight and see what might worry you and see if I can set you right.

First of all, you're nervous—oh, yes, don't deny it. So is anyone doing something new the first time, whether it's getting married, making a public speech, trying a new salad, or flying.

You enter the plane and find to your horror that the ship is tilted up at a "frightful" angle, so that the front seats are apparently way above you. "Heavens, how will I ever get used to this angle?" You won't have to. As soon as the ship takes off, she will be level. While on the ground the ship is nose high only, and the latest ships are level on the ground.

You sink into a softly upholstered divanlike seat that quite upsets your idea of flying discomfort. The good-looking, efficient air hostess or stewardess comes along and hands you some gum and asks with a smile if you have fastened your safety belt. Horrors, a safety belt; that sounds bad! Don't worry, it's just a regulation, like axes on all-steel buses, and canvas water pails and crowbars on commuting trains. The experienced air traveler fastens the safety belt the minute he sits down in a transport as naturally as he takes hold of a strap when he boards a subway train, and for the same reason. You'll find one-half of the belt down on each side of the seat. It snaps across your middle, and is adjustable.

It is possible that the runway might be the least bit bumpy in spots and a belt across your lap will hold you steady. As I said, most runways are smooth and level; but, then, parts of a subway ride are smooth, but you still hang on to a strap in case you do hit a rough spot. Nothing particularly exciting about that. In rough air, and occasionally it does get bumpy, it is wise to take the hint and fasten the belt. Not that it is necessary, but after all, while riding in a car you can see a torn-up street ahead of you and brace your feet for the jouncing, whereas in the air even the best pilots can't see the bumps much before they fly into them.

It is the practice in modern air transports to notify passengers when they may smoke or remove the seat belts by extinguishing an illuminated sign in the front part of the cabin. This will undoubtedly be on when you take your seat and bears the legend: "Fasten seat belts! No smoking!" As soon as the ship is aloft, this sign will go out, and then, if you wish, you may unsnap the belt and reach for whatever kind of cigarette you prefer. If you are economizing on the trip, just relax and the hostess will bring you a smoke and even light it for you. No fooling!

Now that the take-off is over and you have lighted up, just relax and enjoy the trip. Get up and walk around if you like. You can't rock the boat in an airliner. I've seen the entire passenger list move to one side to look out at a particularly interesting sight without bothering the ship a particle. So don't sit as I saw one first-time-upper—afraid to cross her knees until the stewardess asked her to come over to the other side and look at the view.

You couldn't look out because it would make you dizzy? In fact you can't even climb a stepladder without being dizzy? Neither can I, but don't tell the neighbors. I'm so *affected* by height that I can't even look at my feet on a clear day. But I've *never* been dizzy in a transport plane. My doctor and hunting partner tells me the absence of perspective lines falling away from you "fools" the optic nerves. At any rate, there is no similarity between looking down from a height of a few feet, and from thousands. I'd no more think of looking over the edge of a cliff or a tall building than I would of jumping. But looking out of a plane is just like sitting in your own easy-chair and looking down upon a fascinating colored map slowly unrolling under you where the rug should be. If you plan to be dizzy, you'll be disappointed. At the height of transport air travel the ground apparently passes so slowly beneath you that even the sense of speed is missing.

When you're tired of the view you can press a button on the left arm of your sky-lounge chair and tilt back and sleep, or write letters to impress the poor earthbound relatives below you. Just in passing, don't, as I did, use your fountain pen if you are over a thousand feet or so, unless you have on either trout waders or a rubber apron. The lessened air pressure will let the ink run out so fast you'll have a flood. Use a pencil, or push that button just over your head and the hostess will bring you a complete stationery kit including one. This always makes a good thing to talk about in writing home, and it gives them the idea you're just about fifteen miles high, hanging on for dear life, and suffering untold agonies. Swell hero stuff!

Now then, I know you're wondering about the eats. Eating aboard a sky-liner is more than a meal; it's an epic! In the first place, if you have an idea of cheese sandwiches in wax paper and lukewarm coffee, you owe the air lines an apology. Meals aloft consist of such viands as hot—and I mean hot—soup, ice-cold salads, roast beef, hot turkey, crisp rolls and butter, cookies, hot coffee, tea, cold milk, or cocoa, or orange juice, pickles, olives, coleslaw, cake and ice cream. (Pardon me while I run out for a sandwich.) All served in their proper containers on little trays with napkins. How they ever get all the things they do on one of those little trays is beyond me. I understand some of the greatest aeronautical designers of the age gave up in disgust when they attempted to figure it out, and left it to air-hostess

genius to solve the wonder of flying food. Incidentally, they say it takes over a hundred miles to eat a meal, or something like five miles to chew a dash of chicken. That's better than I do driving to the station with the last of my toast.

There you sit, poor suffering air traveler, in your divan club chair, growling over a chicken leg while all the cares of the world pass endlessly beneath the silver wings of your plane.

I'll never forget the look on the face of a buzzard we passed over the dust plains of Texas during a lunch aloft. Of all the disgusted, envious, hopeless looks, his was the tops as he wheeled out of the way and glanced in through the window at the celery and olives.

From time to time, either the pilot of the skyliner or the co-pilot will come back into the flying living room with a report that you will read and pass along. This will tell you the altitude, speed, time of arrival at the next landing, and a few other things of interest. Take a look and pass it to the next chap so all can see what's what.

Don't forget to ask the hostess for luggage stickers, or look for them in the pocket in the back of the seat in front of you, along with maps of the country over which you are flying, and all sorts of postcards and interesting "junk" to carry away with you. More hero stuff to show the relatives.

Fortunate are you if you can spend a night aloft in a sky-sleeper. Oh, I know you'd never sleep, and you wouldn't enjoy it. Neither would I until that flight from Los Angeles, when Miss Forry, a most persuasive T. W. A. hostess, practically bullied me into going to bed in a berth I'd already paid for and was dodging like a time bomb. Finally, so sleepy I could hardly walk straight, I took the berth by the horns, so to speak, and went to bed. I must admit I was wrong, all wrong. I piled the small pillows (by the way, that's an idea the pullmans might copy: instead of one pillow or two, they have four or five small ones) just where they should do the most good—and lay back to worry. Something went wrong at this point, for I fell asleep.

Next morning I was called by the hostess right on the dot and dressed in plenty of time to have my orange juice and rolls before landing at Newark. One of the most amazing and satisfying nights I ever spent.

The beauties of flight would take another article, but there's one I will never forget, and I'm sure all who saw it never will. It was just outside of Kansas City, that same evening flying back from Los Angeles. It was just before Easter, and looking down into the blackness where twinkling towns passed slowly by, we were all suddenly startled to see a giant cross outlined in twinkling lights. As we passed slowly over we discovered it was made up of street lights from a right-angle intersection. The surrounding street lights had been shielded from above, leaving a giant twinkling cross, blocks long, visible from the sky. Someone had an idea that brought to me, at least, a feeling I will never forget.

On the other hand, I hope the New Jersey town whose giant name sign contains a letter facing the wrong way doesn't change it. It is just one more of the interesting sights from the air.

One more incident and I'll leave you to try for yourself the fun and adventures in modern air travel.

One night, taking off from a midwestern city, a young girl in her early teens and her mother took seats across from me in a sky-sleeper. They occupied the four-seat compartment, while I was alone in the compartment across the aisle. The mother obviously was an experienced air traveler, while just as obviously the daughter was making her first trip aloft. Panic in all its forms was shown as the ship prepared to leave. The young lady hoped it wouldn't go up. She hoped we wouldn't hit any air pockets. She wondered where the parachutes were, and she wondered if we'd be thrown out of our seats when we took off. All in all, she wished she'd never come.

Her mother and I both tried to calm her, and I even bet she wouldn't be able to tell when we left the ground. Oh, yes, she would (with gestures indicating a skyrocket taking off on a nonstop flight). When we did take off she wouldn't believe it until she looked out of the window with both feet braced. Then she exclaimed, loud enough for the pilot in the front office with the door shut to hear, "Why, mother, we *are* up!"

After she found she could move about at will, and even walk the length of the lounge and look out the windows at the full moon shining on the silver wings, she became much disgusted with the prosaic smoothness of the whole experience.

"Is this all there is to it?" she asked her mother, hands planted upon her hips in disgust.

At that moment the pilot came back with a report for the hostess to pass around.

The young lady looked at the bronzed young chap and said, "Who are you?" with all the interested curiosity of modern youth.

"Why, I'm the pilot," replied the captain with a cheery grin.

For an instant horror and bewilderment grasped the young passenger, and her mouth opened and closed in speechless amazement. Finally, grasping the side of the compartment, she managed, "Isn't—isn't *anyone* flying this thing?"

BERKELEY
GAS MODELS

Custom-built kits to construct the most famous gas models in the air. You want one of these ships for your own pleasure and thrills.

"BUCCANEER-48"

FOUR-FOOT WINGSPAN. Small-bore Champion, specially designed for the Ohlsson "23" Motor. The newest "Buccaneer" in this famous line of gas models..... $2.95 P.P.

OHLSSON "23" MOTOR

The motor that is alone in the 1/7 h.p. class. ⅝" Bore x ¾" Stroke. Starts as easily as any of the larger engines. .... $16.50 P.P.

$5.00 P.P.

"BUCCANEER-STANDARD"

5½-Foot WINGSPAN. FOR 1/5 h.p. motor.

Limited engine run champion and Senior N.A.A. Record Holder. Everything you desire in a gas model. Beautiful lines, snappy performance, and priced with the lowest mass production kits.

"SUPER-BUCCANEER"

7½-Foot Wingspan.

Winner of over 100 contest prizes. The favorite ship of some of the best model builders in America..... $8.50 P.P.

"CAVALIER-STANDARD"

6-Foot Wingspan

The latest full-size gas model kit on the market, designed to outclimb any other ship. You will like this clean little plane and its breath-taking flights..... $5.95 P.P.

"CUSTOM-CAVALIER"

9-Foot Wingspan. Monocoque Construction.

The aristocrat of model airplanes. Absolutely the most complete kit ever offered to model builders. Suitable for radio-control. $15.00

ALL KITS INCLUDE:

Full Size Plans
Wooden Parts Printed Out
Hardware and Ignition Equipment
Cement and Colored Dope
(Kits do not include wheels or power plant.)
All kits can be obtained thru your local dealer or mailed direct from us, Postfree in the U.S.A.

BROWN JR. MODEL "D" MOTOR

$10.00 P.P.

COMPLETE READY-TO-RUN

Full 1/5 h.p. with power to spare. The only unconditionally guaranteed motor in its price class.

SEND: For the big Berkeley Catalog with three-view drawings. Please include 10c to cover handling and postage.

BERKELEY MODEL SUPPLIES

"FIRST IN GAS MODELS"

230 Steuben St. Dept. T-4 Brooklyn, N. Y.

WINGS OVER BAJA

(Continued from page 22)

Hug moved into the hangar with Jeb behind him. It was dark and they had to feel their way. Presently they encountered another plane and Hug was able to swing one of the big doors back far enough so that a shaft of light fell through from the outside. Right in front of them was a trim little Stephens fighter. It, too, had been transformed with a coat of olive-drab paint, but there was no mistaking the squat bullet-shaped construction of the ship.

"That's her," said Hug. "The plane Lieutenant Taylor used to fly."

Jeb was trembling with excitement. He figured that the other two navy ships had already been delivered to the rebels in Mexico. For some reason the Stephens and the flying boat had not yet been sent across the Gulf.

"Hey, what's this?" Hug had moved on down the hangar and now stood before another plane. It was a monoplane, low-winged, black, sinister. On both sides of the engine the blunt muzzles of machine guns appeared. Over the rear cockpit there was a yoke to which was attached a third gun. Jeb couldn't tell at first glance the make or model of the plane, but he knew from the size of the motor, the broad blunt wings, the sturdy build of the plane, that it was capable of tremendous speed.

"Remember where it is," said Hug. "It might come in handy sometime."

"Quiet," warned Jeb.

"Maybe it's them—" began Hug, then stopped. There was a rush, the pound of feet. Hands reached out of the dark and tore at Jeb's face. Muscular arms went about his body. A hot breath, tainted with garlic, reeked in his face. He struggled and struck out. His fists smashed into soft flesh; the arms about him relaxed. He heard Hug grunt, then came the swift tattoo of blows. Jeb grinned to himself in the dark. He imagined the Irishman, his back to the wall, flailing out with those deadly fists of his.

"You there, O'Halloran?" he asked. His only answer was the tramp of feet and the grunts of struggling men. He felt his way along the wall, stumbled over a body, kicked it. Out came a long string of Spanish. That wouldn't be Hug. Then he heard O'Halloran's voice:

"It's thim spigs! Look out, lieutenant! One of 'em's got a knife! Swing the door open so I can see!"

Jeb threw his weight against the door. It swayed, caught, then swung slowly back. A wide shaft of light came pouring into the hangar. Hug was on the ground with two men bending over him. A knife flashed. O'Halloran rolled swiftly to one side, ducked, was on his feet. He hit out, smashing blows which landed solidly. The Mexican with the knife whimpered and went down. Hug stepped across the huddled body and planted a whizzing right on the jaw of the other.

Then he was through the door and seized Jeb by the arm. "Let's go," he barked.

They went down along the fringe of trees, turned to the right toward the street of the town. The riding lights of a plane appeared from the north. They winked on and off, signaling to the men below. Then the plane dropped down over the rim and the crater was filled with the roar of the motor. The ship circled the field once, landed. The pilot leaped out and started running along the fringe of trees in the direction of Marko's headquarters.

"Come on." Jeb started to run and Hug followed him.

They came into the big bar at the same time as the pilot. Marko was there, at a table. Opposite him were two men, hard-faced, leather-jacketed. Their helmets and goggles lay on the table before them.

The pilot from the recently landed plane dashed across the room. As he ran he called out excitedly: "Marko, them two ex-navy birds you brought down today is spies. I just got the word in Tiajuana. Grab 'em quick before they—"

An electric silence settled over the bar. Marko turned slightly in his chair and Walker saw that he had an automatic pistol in his hand. "The news," said Marko softly, "comes a little late. I guessed who you two punks were this afternoon. Stand easy, now, we got you covered from three sides."

Walker saw that a man lounged against the bar, a heavy black pistol drooping from his hand. Another leaned in the door, cuddling a sawed-off shotgun under his arm. Walker shrugged. "You got us wrong," he protested. "But I've got more sense than to argue with all this hardware. What are you going to do about it?"

Marko grinned and put his gun on the table. "You guys got sense," he approved. "We may be wrong but we ain't takin' no chances. We've got to lock you up until we investigate."

To the gunmen by the bar he said: "Upstairs with 'em, Jim. If they make any trouble, blast 'em."

Jeb and Hug preceded the black gun up the stairs. They were placed in a room at the far end of the building, and the door was bolted behind them.

"Now what?" asked Hug.

Through the thin walls of the room came a low moaning sound. Walker tensed. "Must be other prisoners next door."

"Might be Lieutenant Taylor," suggested Hug.

"Let's find out," Jeb's voice crackled through the darkness. "Feel your way around the wall. Must be a door here somewhere."

It was Hug who found the door, a broad door of heavy planking, *hinged* on the outside.

"Locked," whispered Jeb.

"Wait a minute," said Hug. "Just located the hinges. Maybe I can lift the pins."

"Easy," warned Jeb.

"Leave it to me," said Hug. "Lucky I got a little spanner in my pocket. Throw your weight against the door so it won't fall out while I work on them pins."

Metal scratched against metal. There was a grating noise. "That's one of 'em," said Hug.

Again the wrench grated against the hinge as the second pin pulled free. The heavy door sagged against Jeb. With Hug helping he swung it quietly around and leaned it against the wall. A square black hole yawned ahead. Jeb stepped through and tried to penetrate the inky darkness inside.

"*Hisst!*" he called. "Anybody here?"

"Water," said a hoarse voice. "For God's sake, water!"

"Quiet," warned Jeb. "We're friends. There'll be plenty of water after a while. How many of you here?"

"Walker! Jeb Walker, is that you?" came a strangled cry from the dark. Jeb recognized the voice of Danny Taylor.

"Thank God!" moaned Danny. "We'd just about given up hope. Stanley was shot through the shoulder. He's in bad shape. Been raving for the last day. We never expected to get out here alive."

Three of the prisoners crowded around Jeb and Hug. Stanley, who was wounded, lay on the floor and moaned softly.

"Take it easy," warned Jeb. "If Marko finds out we've located you fellows there'll be hell to pay. Danny, how did you get here? What happened?"

Danny gave a snort of disgust. "We were on patrol along the coast," he said. "A black plane dives on us and cuts loose with three machine guns. And there we were, weighted down with weapons and not a bullet in our belts. Well, there was only one thing to do—and we did it. The black plane herded us along, kept us flying south. If anybody tried to turn back a gust of slugs soon got that idea out of his head. The black ship brought us to this place, forced us to land in the crater. Stanley tried to make a break for it and got

drilled. We've been here three days with only one jug of water, which went dry yesterday. Give us a chance, that's all we ask. Just let us find that big red-faced man who ordered us locked up. We'll settle with him if it's the last thing we do."

Hug had been prowling around the two rooms and now came back to report. "There is a window in the other room. It's boarded up but I think we can pry it loose. I've been working on it with the spanner."

"Stick with it," ordered Jeb grimly. To Danny Taylor he said: "Forget about getting even with Marko. We'll take care of that later. Right now we've got to think about how we're going to escape. This town is filled with thugs, gunmen who'll blast at the first sign of trouble. Hug knows where the planes are. If we can make the hangar we've got a chance."

O'Halloran came back, chuckling in the dark. "Easy," he said. "We've ripped loose two boards. It's a short drop to the ground."

"A couple of you men carry Stanley," Jeb ordered. "Quiet now. At the first sound, these crooks will be swarming about our ears."

They all moved into the next room. Taylor dropped through the opening Hug had made in the window and the wounded man was lowered down to him. O'Halloran followed and Jeb was about to drop to the ground below when feet pounded in the hall and somebody banged on the door.

"Walker?" a hoarse voice came through the wood. "Marko wants to see you down below. Come out with your hands lifted."

"Go ahead," Jeb hissed at Danny Taylor. "Hug will show you where the planes are. Get in the air as fast as you can."

"How about you?" growled Taylor. "If you think we're going off and leave you—"

"Follow orders," rasped Jeb. "I'll try and join you as soon as I hear the engines start. Get going."

Jeb went across to the door and found that it was unlocked. He stepped out into the brightly lighted hallway and felt a gun jammed into his ribs. "Downstairs," said a voice behind him.

Marko was waiting in the bar below—alone. "Come in, lieutenant," he sneered. "I want to talk to you." To the gunman he said: "Go to bed, Jim. I can take care of this lug myself."

Jeb crossed the room and stood before Marko's table. He saw that the man's automatic lay close to his right hand. "Sit down," ordered Marko. "Have a drink. You and me is going to talk. I can use you, so don't be afraid of accidents." He nodded toward the gun. "You're too valuable to get hurt."

Jeb slumped into a chair, reached for the bottle. His ears were strained for sounds from the direction of the hangar. Had Hug and Danny made it? It seemed a long time since they had started for the planes.

"We're going to use you as a decoy," Marko went on. "You'll send word to the navy that you're a prisoner. They'll start rescue ships out to look for you and we'll bring down the rescue ships. Navy planes are popular in Mexico. We want as many of them as we can get."

"The navy doesn't give a damn what's happened to me," Jeb evaded. "You know I've been court-martialed, thrown out."

"Don't kid me, sailor," sneered Marko. "That fake court-martial didn't fool nobody."

The night was shattered by the roar of a motor. Two more engines burst into life. Marko and Jeb faced each other in frozen silence. Jeb was leaning slightly forward, the palms of his hands resting on the table. Marko lay back in his chair, the gun in his right hand, the muzzle pointed at the pit of Jeb's stomach. A hideous smile appeared on his face, his finger began to press the trigger.

"So that's it," he said softly. "You found my four prisoners. Thought you'd steal a plane and get away. No man leaves *El Nido del Gavilan* without my permission."

Marko opened his mouth to yell. One cry from him would have brought the sleeping pilots down from the rooms above. Jeb saw what was coming, lunged swiftly forward across the table.

The gun blazed in his face. A streak of flame seared his cheek. He felt a red-hot stabbing pain along the side of his jaw. The force of his lunge carried him on top of Marko. Jeb fought blindly for possession of the gun. He gripped Marko's wrist and felt the wiry strength of the man forcing the gun around to shoot again. Hot blood poured into Jeb's face, got into his eyes. He wiped them clear with his right hand, then twisted with all his strength to knock the black automatic out of Marko's fist. A chair crashed to the floor. Jeb felt himself thrown forward. He came down on top of Marko, striking his head on the overturned table. The gun barked again, close beside his head. He lashed out with his free hand, trying to find Marko's face. The room swam dizzily about him. He had to get that gun!

As from a far distance Jeb heard the roar of the motors. Danny Taylor was at the throttle. He was warming his engines ready for flight. He had told Danny to go on without him.

Marko's body twisted violently to one side and Jeb was thrown clear. He staggered forward on his knees, groping for the gun. His right hand clasped itself around the hot muzzle. He twisted it up, away from his face. Then he struck out, smashing blow after blow into Marko's face. The gun kicked and he knew it had fired again. His hand around the muzzle was twisted free. He could feel the blood dripping from his fingers and knew that they had been torn by the jacket as it recoiled.

Jeb gathered himself for a final effort. He was almost done. His arms felt limp, his hands heavy. He twisted to one side, struck out. His left fist crunched against something solid. Marko's body slumped limply to the floor.

Jeb wiped the blood out of his eyes, twisted the gun from Marko's fingers and started for the door. Feet pounded overhead. As he went through the door a voice cried out from above. Someone coming down the stairway fired. A spurt of flame stabbed through the darkness. Jeb lifted the automatic with his left hand and pulled the trigger

ATTENTION, LIGHT PLANE ENTHUSIASTS!

In response to many requests, and in keeping with our aim to further the sport of light plane flying and the forming of light plane clubs, we offer the following service to our readers.

Upon receipt of 10c in coin or stamps to cover printing and mailing costs we will send a simplified plan for the formation of a light plane flying club, a tested constitution and bylaws from which a workable governing and operating plan can be formulated. These have been arranged with the collaboration of the editors and heads of successful light plane flying clubs now in operation, with slight modifications due to regional and other circumstances.

Please be sure to note the make and type of any light plane you now own, or plan to purchase in the future either for club flying or individual member use.

This will enable us to gauge more accurately the flying club situation as it now stands.

If you're contemplating the formation of a club or are interested in getting the most from your present club, send for these valuable plans at once. Address your request to Light Plane Club Plan, AIR TRAILS, 79 Seventh Avenue, New York City. Be sure to inclose 10c in coin or stamps.

three times. He could feel the gun buck at each shot and heard the slam of bullets boring into wood. Then he was out of the door and running toward the hangar. He went down the street in the fringe of the trees. As he did so a great black shape rolled swiftly past him. His ears were deafened with the thunder of motors. The gray cabin plane swept smoothly down the salt beach, lifted itself into the air, roared up over the crater rim and disappeared from sight.

Danny Taylor had obeyed orders. He had taken off. Jeb threw himself down in the deep shadow of the pepper trees and lay, panting for breath, listening to the swelling uproar from the headquarters building behind him.

A babble of voices. Men running. Excited cries. Lights springing up in the buildings of the strange little town. Jeb lay quietly, listening, taking it all in, wondering what was going to happen to him, and at the same time feeling a great sense of satisfaction that Hug and Danny Taylor and the rest had got away. They would be safe now. In an hour they would be back at North Island, back to warm quarters, plenty of food and water. The wounded man, Stanley, would be in the hands of a doctor. Jeb didn't care now what happened. He had accomplished his mission. The Flying Admiral would know.

Then two voices cut out of the babble. Marko was talking to one of his pilots. The gang leader had evidently been revived. He was in a furious temper.

"The fools!" Marko sneered. "They think they can get away! Go after them in the Hawk. No mercy. Shoot their ship down. Get the pilot if you can."

A cold chill ran through Jeb's nerves. He had forgotten the Hawk, that big-motored, well-armed fighting ship which waited in the hangar. The cabin plane would be an easy prey for the Hawk. And the black monoplane would be able to overtake it in twenty minutes. The result was inevitable. The dawn would find a smoking wreck somewhere in the dry hills of lower Mexico. The plane and the charred bodies of the passengers would never be found.

Men hurried past him in the dark and Jeb gritted his teeth to keep from crying out. He had the automatic gripped tightly in his left hand, but he knew that only one or two shots remained. He thought for a moment that he might spring from his hiding place, rush madly into the middle of the gang and shoot Marko down. Then he realized the folly of such a gesture. It was like committing suicide. He wouldn't have a chance against the guns of Marko's henchmen.

With tense muscles he lay against the base of the tree and listened to the first roar of the Hawk's motor. The black plane had been rolled out of the hangar. Even now it rested at the lower end of the salt beach, ready to take off as soon as the engines fired smoothly.

The motor coughed, spluttered, then burst into a steady throb of life. The pilot revved it, called out for the chocks to be pulled away. Jeb from his hiding place watched the plane swoop down the beach and soar into the air. He heard Marko's laugh as it flashed up over the rim of the crater and thundered north after the transport ship.

"It won't take the Hawk long to bring down the buzzard," Marko said with a laugh. "We might as well have a drink and wait until she comes in."

Jeb swung the muzzle of the automatic around until it pointed in the direction of Marko's voice. His finger pressed the trigger. Then he hesitated. His finger relaxed; the muzzle of the gun dropped. An idea had come to him in a flash. Wasn't there another armed plane in the hangar? The Stephens fighter, that swift little navy hornet, stood waiting and ready.

The big doors were open; the hangar yawned dark and empty where the cabin plane had been. Jeb tried to remember just where the Stephens was kept. His mind was a little foggy; he couldn't figure it out. He decided the best thing to do was to go through the hangar, feeling his way along until he located the ship. With the automatic thrust well in advance he stepped through the open doorway and peered intently into the darkness.

A shadow moved against the opposite wall. Jeb squeezed the trigger and waited. He could feel his heart pounding rapidly. The shadow moved again. Jeb took a deep breath and fired. By the flash from the muzzle he could see a figure moving swiftly along the wall. He raised the gun to shoot again. Then stopped. There was something vaguely familiar about that squat silhouette.

"Who's there?" Jeb called softly.

"Is that you, lieutenant?" came back Hug's husky voice. "You damn near plugged me that time. I thought you was Marko."

"Where is that Stephens fighter?" asked Jeb. "Marko has sent the Hawk after the cabin plane. We've got to find the fighter and go after them."

"This way," said Hug, leading Jeb through the dark hangar. "I loaded the ammo belts when we first come in. She's all ready to fly."

"Watch out for the ground crew," Jeb warned. "They're around here somewhere. "We don't want them to jump us in the dark."

Hug laughed softly. "They won't bother us none," he said. "I took care of them greasers when we first got here. They're all asleep and they won't wake up till morning."

Hug swung open the doors and revealed the Stephens fighter crouched in the long shed, as if eager to be off. "I've already checked the gas and oil," he announced. "She's ready to take the air."

Jeb pulled himself up with his left hand, with Hug shoving from behind. In the cockpit he fumbled with the belts and found that there were perhaps a hundred rounds for each gun. "Not much to fight with," said Jeb. "Roll her out on the beach."

Hug spun the inertia starter. Jeb threw in the gear. The motor kicked, coughed and went dead. Again Hug spun the flywheel. The motor spluttered, roared into life.

Hug cried out something and Jeb saw figures appear through the darkness. The automatic spat yellow flame. Hug bent over and pulled the chocks free. He leaped for the rear cockpit, caught the rim and clung. Jeb opened the throttle. The Stephens struck the salt beach and skidded wildly. Fingers of fire stabbed out in the darkness behind. Hug pulled himself up, tumbled headfirst into the cockpit. Jeb ruddered the Stephens around, headed up the beach, felt the wash from the propeller bite into his face. He pulled back on the stick, flipped the Stephens into the air, pulled it up in a tight zoom and went out of the crater with the right wing tip brushing the rim.

He began to climb. He would have to have altitude in order to put up any kind of a fight with the Hawk. The Stephens thundered up in a long slanting climb over the uneven hills of Lower California. Then, far ahead, he saw the lights of a plane. From the wing spread he judged it to be the cabin ship. The big bus roared along as if it were flying some well-regulated passenger lane.

Jeb looked, could see no sign of the Hawk. With his superior speed he crept up rapidly on the three-motored ship. He was puzzled that the Hawk had not appeared. Then he saw the black monoplane. It was flying without lights, silhouetted against the sky, five thousand feet above the transport plane. Jeb understood what was about to happen. The Hawk had located its prey. It had climbed above it and would come screaming down for an overhead attack. From that position it would be easy to shoot into the cabin ship. The pilot wouldn't have a chance.

Jeb tripped his guns and let them pound out ten shots to give warning. The fingers of his right hand were stiff and gummy, but he forced them to do

their work. Then he pulled the nose of the Stephens up and started to climb for altitude.

The first warning Jeb had that he was near the Hawk was a stream of tracer bullets flickering past the nose of the Stephens. He slid off on the right wing. The Hawk had located him, was coming back. Jeb heard the roar of the motors on the cabin plane and knew that Danny Taylor had realized his danger now and had opened the throttle wide.

The Hawk banked and came down. Jeb caught a flash from the black wings as it went overhead. He pulled the nose of the Stephens up and fired a swift burst into the belly of the plane as it went over him. But the Hawk's pilot was an experienced man, a renegade war flyer who had been in many dog fights. He pulled his plane into a loop, roared up under the Stephens. Jeb watched a line of tiny punctures appear in the metal dash before him and felt the jar of bullets going through the fuselage. He put the nose down for a dive. The Stephens took on speed, the wings vibrated violently, the engine bucked. Jeb wondered how much the Stephens could stand, held her to her course. He wanted to be traveling at top speed when he came out of the dive. He sensed rather than saw the Hawk roaring down behind him. Once he noted the white line of tracers streaming past his head and knew that the guns of the Hawk were on him.

The cabin plane was winging its way over Tiajuana. It would soon be across the border now, safe. Jeb knew that he had accomplished his purpose, even if he was shot down himself. He would save the other ship. If it hadn't been for Hug in the rear cockpit he wouldn't have cared what happened. As a man in a dream he pulled the stick back, felt the Stephens shudder in every wing and wire as the wind tore at the fabric.

Up he came and, before he could check the plane, he had shot over in a tight loop. The Hawk was below him now; he could see the black wings and the two hooded figures crouched in the cockpits. He reached forward, tripped his guns and watched the line of tracers going into the plane below. The figure in the rear cockpit slumped forward. The gun on its yoke fell to one side. The Hawk started up in a loop and Jeb fired again, held the gun trips down until the last bullet had pounded out of the belts. Then he leveled off, headed for the lights along the border. He didn't know what had happened. Didn't care.

He felt Hug pounding him on the back. The mechanic was half out of his cockpit, excited about something. Jeb looked down. Far below him he saw the Hawk spinning slowly down in a sickening spiral. It slid off on one wing, whipped up into a stall.

Jeb never knew how he got back to Rockwell Field at North Island. Instinctively he must have followed the Silver Strand to Coronado. But there was the field beneath him, with floodlights cutting a wide white path across the brown tarmac. With his right hand hanging limply at his side he eased the Stephens down, cut the throttle, felt it hit, bounce, roll to a standstill. Then he was lifted out of the plane. Danny Taylor was there; people were talking, shouting. Vaguely he could hear the voice of Hug explaining how it had happened.

After that he remembered that he was put into an automobile and rushed across the field, carried into a lighted room. He felt the sting of antiseptics on his hand and cheek. "Here, drink this." Jeb drank, knew that he was being lifted into a warm, dry bed. He dropped off into a blissful sleep.

Someone was pounding at the door. He awoke into a world bright with sunshine. Hug came in, a broad grin on his Irish face. "How do you feel this mornin'?" he asked cheerfully. Jeb noted that Hug was in uniform, that he had another hash mark on his sleeve.

"Shipped over already?" Jeb asked him.

"Yep," said Hug. "Can't keep me out of the service. You get more action here than any place I know."

Danny Taylor arrived, fresh and clean, his old smiling self again. There were hollows in his cheeks and dark circles under his eyes, but a bath and a shave and a hot meal had done wonders for Danny.

Jeb propped himself up in bed, felt much better. "What's the news?" he asked.

"Wait," said Danny.

Then the admiral arrived. He beamed at Jeb as a father might beam at his firstborn son. "Thought you could do it," he barked. "That's why I gave you the job. You were reinstated this morning—special order from the secretary of the navy. Can't give you a decoration. You get no reward. But I want to thank you personally."

"Thank O'Halloran, too," said Jeb. "If it hadn't been for him I wouldn't be here now."

"Going to make a flyer out of O'Halloran," said the admiral. "We got the location of the Hawk's Nest from him."

"What are you doing about it, sir?" asked Jeb.

"It's already been done," said the admiral. "We wirelessed the Federal government at Mexico City. They sent a bombing squadron and laid a few eggs in the Hawk's Nest. The place doesn't exist any more—wiped out."

IMPERIAL LEADS
24-HOUR SERVICE

Gas Model Supplies at CUT PRICES

18" BALSA
1/16x1/16, 100, 5c
1/16x1/4 35 for 5c
1/16x3/16 18, 5c
1/16x1/4 15 for 5c
1/16x1/2 5 for 5c
3/32x3/32 30, 5c
1/8x3/4 30 for 5c
1/8x3/16 12 for 5c
1/8x1/4 10 for 5c
3/16x3/16 8, 5c
1/4x1/4 6 for 5c
1/4x1/2 3 for 5c
1/2x1/2 2 for 5c
1/64x2 4 for 10c
1/32x2 8 for 10c
1/16x2 8 for 10c
3/32x2 7 for 10c
1/8x2 6 for 10c
3/16x2 3 for 9c
1/4x2 3 for 10c
1/2x2 1 for 2c
3" sheets or 36" lengths, double above prices; add 10c for pkg. chge. for 36" lengths.

18" PLANKS
1x1 5c; 1/2x2 6c
1x1 1/2 9c; 1x2 10c
1x3 15c; 2x2 18c
2x3 23c; 2x6 39c
3x3 40c; 3x6 75c

SHEETS 12"x2"
1/16 or 1/32 10 for 10c
1/8 8 for 10c
1/4 3 for 7c
3/32 8 for 10c
3/16 3 for 7c

BAMBOO
1/16 sq. x12, 36, 5c
1/16x1/4x15, dz. 10c

CLEAR DOPE OR THINNER
5c per oz.; large bottle, 8c; 1/2 pt. 30c; 1 pt. 45c

COLORED DOPE
6c per oz.; large bottle, 10c.

CLEARCEMENT
5c per oz.; large bottle, 8c; 1/2 pt. 35c; 1 pt. 55c

PROPELLERS

	Balsa Mach. Cut	Paul-O-Wing
5"	4c	10c
6"	5c	15c
7"	6c	20c
8"	7c	25c
9"	8c	30c
10"	8c	35c
12"	10c	45c
14"	14c	
15"	15c	60c

RUBBER
.045 ... 25 ft. 5c
1/16 sq., 15 ft. 5c
1/4 flat ... 15 ft. 5c
Skein 50c
3/16 ... 10 ft. 5c

RUBBER LUBRICANT
Large bottle.. 10c

BAMBOO PAP'R
White.. 2 for 15c
Red or Yellow 15c each

BROWN, JR. MOTOR "D" NOW $10

5-FOOT BALSA
1/8x1/8 30 for 20c
1/8x3/16 12 for 20c
1/8x1/4 10 for 20c
3/16x3/16 8 for 20c
1/4x1/4 6 for 20c
1/4x1/2 3 for 20c
1/2x3/8 1 for 8c
1/2x1/2 2 for 20c
For 5' Lengths add 25c pckge. charge. Specify whether you wish balsa for rubber-powered or gas models.
Double Balsa prices for Spruce, Basswood, or Pine.

PNEUMATIC AIR WHEELS
3 1/2" ... pair 1.50

SPRING STEEL WIRE
1/16 dia. 5 ft. 12
3/32 dia. 5 ft. 15
1/8 dia. 5 ft. 25

DURALANGLES
1/2x1/2 per ft. 15
3/4x3/4 per ft. 22

BRASSANGLES
1/4x1/4 ft. 25

STREAMLINED ALUM. TUBING
1/4x1/2 ft. 15c
5/16x5/32 ft. 16c
3/8x3/16 ft. 18c

SPARKCOIL 1.50
GAS FUNNEL with strainer .30
FLIGHT TIMER 50 Sec. ..... .50
0 Sec. to 1 M. 2.00
DURAL TUBING
1/4 dia. ft. 14
5/16 dia. ft. 20

Your choice of one of these FREE OFFERS with all orders for $1.00 or over.
FREE
1. Large bottle clear cement and 60 1/16x1/16x18 balsa
2. 2 pr. 1 7/8" Birch Wheels
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

WOND. WATER SPRAYER 15c

WHEELS per pr.

	Birch	Balsa	Celu
1/2	.01	.03	
3/4	.02	.04	.05
1	.03	.05	.07
1 1/4	.04	.08	.10
1 1/2	.07	.10	.16
2	.15	.15	.30

SHEET ALUM. .0004x5x11 1/2
2 sheets 3c
.005 in. 6x6 5c
.010 in. 6x6 6c

THRUST BEARINGS, dz. Sm. 10c; lge. 15c

PROP BLOCKS
1/2x 3/4x 5 6—5c
3/4x 3/4x 6 6—5c
3/4x1 x 7 4—5c
3/4x1 x 8 3—5c
3/4x1 1/4x10 3c ea.
3/4x1 1/4x12 3c ea.
1 x1 1/2x12 4c ea.
1 x1 1/2x15 7c ea.

SANDPAPER Doz. sheets .. 5c

BUSHINGS 1/16 .... 4 for 1c

FREE POSTAGE on all orders in U. S. Add 10c packing charge on all orders (large or small) in U. S.; Canada, U. S. possessions, and foreign, over $1.00 add 15%. Foreign, under $1.00, add 15c. No C. O. D. No stamps.

NOSE BLOCKS
1x2x1 ..... 1c
2x2x1 ..... 2c
2x2 1/2x1 ..... 3c

TISSUE, AA
All col., doz. 10c
Silver ...ea. 5c
Superfine, wh. 5c

ALUM. TUBING
1/16, 3/32, 1/8 ft. 7c
3/16, 1/4 ft. 10c

WIRE
6-8-10-12-14
2 ft. 1c

20 IN. FLYING PLANS 10c—3 for 25c
Sparrow Hawk, Boeing Trans. 247, Spad Chass., Vought Corsair, Curtiss Swift L. W., Waco Cabin Biplane, Douglas Dolphin, Boeing P12F, 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

Dealers: Send for Wholesale Price List
Send 10c for Complete 16-page Illustrated Catalog
Price list of model airplane and boat supplies, 3c postage

IMPERIAL MODEL AERO SUPPLY
416 E McDonald Avenue, Brooklyn, N.Y.

AVIATION

AIR-MINDED Young Men interested in technical training for entering Aviation as
APPRENTICES
MECHANIC PILOT METEOROLOGIST
Write, immediately, enclosing stamp, to—
Mechanix Universal Aviation Service Co.
Wayne County Airport, Box 857, Dept. T, Detroit, Mich.

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
Saturn Cal. 32 automatic pistol kit ..... .75
LUGER 9 M/M auto. pistol kit w/4" barrel..... 1.75
LUGER 9 M/M auto. pistol kit w/6" barrel..... 1.90
All kits make beautiful full scale models. Postpaid in U. S. A.
GUN MODEL CO., Dept. W-52, 2908 N. Nordica Ave., Chicago, Ill.

FOCKE-WULF STÖSSER

(Continued from page 68)

well. The fuselage covering may be applied now, in small strips. Do not forget to add piece "A" to the tops of formers 6 and 7, as it supports the stabilizer. The fillet block in front of former 6 should be carved now and cemented in place, and the whole unit doped, since this will be harder when all the struts and details have been added. The fuselage is doped silver with two or three coats of dope, and set aside. After it has dried well, lettering and exhaust stacks may be added.

TAIL SURFACES

The tail surfaces are made in a way that provides extreme flexibility and consequently easier adjustments. The rudder and stabilizer are both cut from $^1/_{16}$x3" sheet, and care is taken to have the grain running the right way, as shown on the plans. After the stabilizer has been covered, the small fins shown in the side view should be cemented on. The rudder should also be covered, and both the parts doped silver. The easiest way of duplicating the insignia shown on the rudder is as follows: Dope a red band around the rudder and set aside. While the red dope is drying, cut a small circle from white bond paper. On this paper draw the swastika and fill in with black india ink. Cement the paper circle on the middle of the red band—and there you are, a very neat job done with a minimum of effort and time.

WING

Cut the ribs out of $^1/_{16}$" sheet, making two of each, except #3, of which fourteen should be cut out. The $^1/_{16}$" thick wing spar should be cut to the depths shown by the rib notches. Assemble the wing on a flat surface, such as a drawing board, and cement the parts together. Break the leading and trailing edges at the proper points, set at the right angle to secure 1¼" dihedral, and cement. The whole wing can be covered now and doped silver. Do not forget to draw the letters on the wing at this point, as it will be very hard to do the lettering if the struts are in place.

ASSEMBLING

The easiest way to get the wing at the right incidence and position is to cut a small piece of scrap sheet to the outline formed by the bottom of the wing and the top of the fuselage. Pin this jig on the fuselage and then pin the wing to the top of it. Fit the struts by the "cut and try" method, and after they have been cut to the right size and sanded to a streamlined shape, cement them in place. After you have fitted all the struts, take the pins out of the jig and remove it. Add slight amounts of cement to the joints between the struts and the wing until a small fillet forms. This will not only enhance the appearance, but will duplicate the streamlined fairings on the original ship.

Cement the stabilizer onto part "A," and fit the rudder so that it will turn the model to the right when gliding. Cut the propeller from a medium block of the size shown on the plan, and carve so that it has about $^3/_{32}$" or ⅛" undercamber. Add the two half cones to the side of the prop and then the top cone. The freewheeling shown may be used, but this is entirely up to the model builder. Add the small details, such as the step on the left side of the ship and the "N" strut between the main struts and the bottom of the wing. The aileron and rudder outlines can be simulated with a narrow strip of black tissue cemented or doped over the finished wing.

Since the entire model will weigh between .7 and .9 ounce (depending on the materials used, of course), four strands of ⅛" flat rubber will do for normal flight. When lubricated, with an inch of slack, the rubber can be wound up to 750 turns without fear of breakage. If you are in doubt as to the freshness of the rubber, however, do not use more than 600 turns. Testing can best be accomplished on a grass-covered field or lawn, but if you are a "city slicker" you'll have to R.O.G. your model with successively larger amounts of turns in it for adjustments.

THE CABINEER

(Continued from page 60)

Blanks No. 2 are cemented together by the same method as No. 1, and placed promptly on the already-finished boatlike creation. Each side is fitted and pinned carefully. In all operations avoid using an excessive amount of cement or smearing the cement on the wood, as it will hurt the appearance of the finished product. Next the two half formers F C are added. Blanks No. 3 are fitted and cemented separately. First the bottom and rear part is fastened, then the front part is bent over the top of former F A.

The roof of the cabin is supported by bamboo struts. Use thick celluloid for windows.

Get the cowling started by cutting out the two formers F E and F D and cement the four ⅛" square pieces into their respective places. Cover all around with $^1/_{16}$" sheet balsa if no paint or dope is intended for it, otherwise a little thicker stock, like $^3/_{32}$".

Before the cowl is attached to the body, the holes can be cut into all formers. Save the square piece cut out of F E. Use it as a pattern for the back of the nose plug.

Small bushings and large copper washers make a good bearing in both the prop and nose plug. Any proven freewheeling device on the prop is well worth the trouble. The landing gear is bent out of .040 wire and cemented right behind the cowl. Next the streamlined struts and the pants with the balsa wheels in them are added. The wire-to-wood contacts should be glued several times into a firm joint.

WINGS AND TAIL

The outline of the tail surfaces is cut out of ⅛" sheet balsa, except for the rudder tab, which is of $^1/_{16}$". Instead of ribs, just glue in ¼" high pieces and sand the whole unit into a streamlined section. When covering, even the rudder tab should be covered over with tissue and doped, to prevent it from cracking during adjustments. Cement the four separate surfaces right on the seams of the body.

The wing is built in two halves and coupled together by the center section, while the tips are raised 2" high. The small end ribs are cut down to shape after the spar has been set in to meet the bamboo tip.

To improve its appearance, the model can be decorated with strips of tissue, but avoid covering or painting the whole body.

Twelve strands of ⅛" rubber are used for power. The correct full length is tied into one loop and folded into six smaller loops. With the aid of a weighted string (use a small nut or bolt), it is pulled over the closed rear hook.

FLYING

The wing is held on the cabin roof by rubber bands. The rubber can either encircle the whole body or just go over the top of the wing and be held by wire hooks.

Adjust for a good glide by raising either the leading or the trailing edge of the wing slightly. For the first powered flight—fifty winds—set the rudder to the right ⅛". Gradually increase to capacity, which is two hundred and fifty by hand and four hundred and fifty with a winder.

Fully wound, it is easy to reach a hundred and fifty feet altitude, and in case the rubber breaks, you can still laugh at those who *would* laugh at you.

Air Adventurers

(Continued from page 37)

We have a swell letter from Bill Mabbott of Brantford, Ontario, who sends us a neat air picture of his home town. Bill has taken instruction on the D. H. Moth, Avro-Avian, Cub, Aeronca and the Fleet. So far he has more than four hundred flights listed in his log book. Grand stuff, Bill. We like your aerial view, too.

We have an interesting discussion on a recent issue of Air Trails from Elmer Passmore of Georgetown, Ontario. Elmer is a real Pangborn fan and claims he gets more aerial information out of the "What's Your Question?" feature than any other department in the magazine. He also likes articles on light plane motors and suggests that we add a special feature on stories of World War air aces and a picture now and then of a World War plane. This suggestion may sound well, and we can understand it coming from a Canadian, but many of us feel that the World War ace story has been done to death, and there is no longer any widespread interest in the subject. We may be wrong, of course, and we can only know by getting fair responses from our readers.

Thomas Clohosey of East Orange, N. J., has qualified for his Craftsman's award with a swell model of the Curtiss Goshawk, of which he sends us a photograph. Tommy is nuts about our big-size reproductions of plane photographs, which he claims show more actual detail than all the articles that could be written about them.

We've nailed a Diesel engineer, too, this month. He's Lee Sayer of Summitville, O., who in addition to his interest in the big compression-ignition engines has long been a great follower of the light plane and model game. He has built rubber-powered and gas-powered models and we hope he gives us a kind word on our recent Diesel engine articles.

Ross Smyth of 31 Wilfrid Avenue, Toronto, has a grand idea. First off, he has been a member of Air Adventurers for more than two years and he's a rabid air fan. Here's Ross' plan. At his house they have a large recreation room and Ross thinks it would be a swell idea if all Air Adventurers or would-be Air Adventurers were to get in touch with him and form a special Toronto chapter of the club and meet regularly at his home.

Personally we think this is one of the finest gestures offered by a club member in months, and we wish we had some business in Toronto for a few weeks to see how this plan works out. We might also suggest that if any other members have such quarters available, that they drop a line to this department, put up their proposition and give us the correct address.

NEW OPPORTUNITIES FOR YOU

When five men fly around the world in 91 hours; when a young man flies from America to Ireland in 28 hours; when two men fly from Ireland to America in 25 hours; when two other men fly from the Azores to America in less than 18 hours; when these flights follow in quick succession and each is made with unerring accuracy, you have absolute proof of the success of aviation, and of the safety of airplanes when built, and serviced, and flown BY MEN WHO KNOW THEIR BUSINESS.

FLIGHTS SUCH AS THESE CREATE NEW OPPORTUNITIES FOR TRAINED MEN TO BUILD AIRPLANES, TO SERVICE AIRPLANES, AND TO FLY AIRPLANES

Where will the industry get these men?

ROOSEVELT AVIATION SCHOOL

— the oldest Government approved school in the East—*knows the demands of the industry and trains its students accordingly.* More than ten years of experience and an enviable record of success in training hundreds of students, makes it possible for us to say:

IF YOU ARE INTERESTED IN A CAREER IN AVIATION, WE CAN HELP YOU

Write today to Dep't A. T.
Give your age, full name and address

ROOSEVELT AVIATION SCHOOL
AT ROOSEVELT FIELD, MINEOLA, L. I., N. Y.

One of our most energetic members is Miss Doris Pearce of East Helena, Montana. Doris says she is only a little girl, but she writes a mighty big letter, explaining how she goes around boosting aviation and attempting to prove to others that aviation is safe and that it has a great future. We also see a great future for Doris if she can contact one of the big air lines and take over the public relations office to "sell" flying to the masses.

Another little girl member who simply beams with enthusiasm is Dorothy Blackler of Corner Brook, Newfoundland. Dorothy is out to become an airline stewardess and tells us she hopes to see the next landing of the Short-Mayo component *Mercury*, and if so will try to get us some interesting photographs of the famous ship.

Matthew Cutler of Benton Harbor, Mich., is on his way to becoming a great artist. He has sent us a neat drawing of his conception of Sandy's new Eaglet, which not only indicates special knowledge of aircraft design, but shows fine skill and patience in execution. He says he has collected three scrap books of aviation news, pictures and plans from Air Trails magazine.

Tom Higgins of Sarnia, Ontario, also sends in a drawing. He has done the Mainliner and asks for our opinion on it. Well, Tom, you have a good eye for line but you are careless in presenting the detail. You should use cleaner pens and brushes and always try to make such drawings on illustration or Bristol board.

Harry Silhan of New York City has gone in for his Airplane Mechanic's award and sends us a photograph of a wartime Bristol Fighter complete with pilot and observer. You made one mistake in your explanation, Harry. The observer on the Bristol Fighter did not fire a Vickers gun. He was equipped with one or two Lewis guns. The rest of your detail is very good, however.

After gaining his Photographer, Airplane Mechanic and Engine Mechanic awards, Warren Vreeland of Pittsfield, Mass., is applying for his Flight Lieutenant's ticket this month and sends in a neat word discussion on a recent issue of Air Trails. He is also experimenting with a new idea in photographing model planes and he promises to let us all in on the secret if it works out.

Jack Maloney of St. Thomas, Ontario, is another smart observer. He recently visited the St. Thomas airport and wrote in a lengthy description of his day, which included an unexpected flight in a biplane which, incidentally, he failed to name. Still, his description was very interesting and indicates he had a particularly full day.

Bob Weaver of Greenville, O., has completed a Lockheed Orion with pontoons, and in a series of test flights has averaged 41 seconds per hop. He says that building pontoons for model planes is very exacting and very interesting work. He adds a suggestion that we arrange for Air Adventurers to get together by the exchange of actual addresses. Well, Ross Smyth of Toronto has given us a good idea on how it could be done, Bob.

That's all for this month, but remember, we can still use plenty of interesting letters, pictures and drawings, so keep pitching, you Air Adventurers, and let's have it in the next mail.

AIR PROGRESS

(Continued from page 10)

est land-plane transports in the world. It is understood that she will be put into service at once. All who have seen this ship remark on the comparative slowness of her landings and the absence of run afterward.

* * *

Pan American Air Lines has announced a slight modification in its trans-Pacific schedule since the loss of the Hawaiian Clipper on July 29. Departures will be maintained on Wednesdays as in the past. But every third Wednesday, under the present plans, there will be no flight.

* * *

The new airport built at St. Moritz, in Switzerland, is believed to be the highest in the world. It is situated at an altitude of 5,643 feet and special snow plows have to be kept in readiness at all times to keep the airport open for the use of incoming sports enthusiasts.

AIR FORCES

The Army Air Corps continues its search for the ideal in flotation gear, now required on all land planes operating over any stretch of water. This, of course, refers mainly to planes used abroad or on foreign service. According to the "Army Air Corps News Letter," the old flotation bag and carbon-dioxide tank system is fast being replaced with watertight compartments, which are built directly into certain portions of the plane itself. The system has been tried out in cooperation with the Martin Co. on B-10 and B-12 bombers at an added weight of approximately 50 pounds. The former flotation gear usually weighed 105 pounds.

Speaking of the Martin B-10 bomber, it has been announced that the last service job of this type has been given up at Hamilton Field and is being replaced by the new Douglas B-18.

* * *

In the recent Royal Air Force war games more than 900 first-line service planes were engaged in the attack and defense of the east coast. These planes make up only the home defense squadrons, which gives an indication of the actual strength of the combined overseas and home establishment squadrons. In addition to the aircraft involved, there were 15,000 aircraftsmen, 17,000 anti-aircraft troops and 4,000 observers. The attacking force "from the east" was composed of no less than thirty-six bomber squadrons which were met by twenty-three fighter squadrons. The official referees were carried in planes of fourteen other squadrons.

* * *

John H. Russel, Major-General, U. S. Marine Corps, Retired, in a copyrighted article carried in the New York *Times* recently, asserts that mass parachute jumping by trained and strongly armed troops would be mass suicide if attempted against modern army and air strength. He agrees that under conditions such as have been experienced in Ethiopia the plan might have some value, but not against closely massed forces where the delivery ships would be immediately detected and quickly dispatched by interceptor planes. He is of the opinion that it would be an unnecessary sacrifice of trained troops.

* * *

China ordered 100 Curtiss Hawk 75 fighters, but has stipulated that the wings be made of wood rather than metal, because wood wings are easier to repair on active service than metal airfoils. This brings up the old argument about wood *versus* metal planes for war purposes. Years ago, many followers of the wood school declared that metal planes would be of no use in action, because of the trouble in making necessary repairs under active service conditions.

* * *

It is believed that more than 100 Seversky P-35 fighters have been exported abroad by the Aircraft Trading Corporation of New York. This is more than the Army Air Corps has on order. The Curtiss company is also making and assembling military planes in China.

* * *

A new $7,000,000 air depot now under construction at Sacramento, Calif., will be ready for occupancy by March, 1939. It is believed that it will be the most complete shop in the country for keeping military craft in fighting shape. It will service all fighting planes on the Pacific coast and until the smaller depot is completed at Hickam Field in Hawaii, the Sacramento air base will service all military craft in the whole Pacific area.

* * *

Many American airplane and engine manufacturers are said to be negotiating for licensing arrangements whereby they can build American, British and possibly French types in Canada. Since the British Air Ministry has discovered that no Canadian factory can turn out a military plane until 1940, there is a great possibility that American manufacturers, who can provide technical help, will be welcomed into the broad Empire scheme.

* * *

In a flight lacking publicity or ballyhoo, an American Army Air Corps pursuit ship of the Seversky type recently set up a new military transcontinental mark from San Francisco to New York. The actual flying time was 9 hours, 55 minutes with two stops, one at Salt Lake City and the other at Cleveland. The original feature of the flight was to check up on performance data, cruising speed and fuel consumption under long-range operating conditions.

* * *

An interesting argument has come up in Britain. Anti-navy men, who lean toward the airplane as the first line of defense, are complaining that the Queen Bees, so easily shot down by navy anti-aircraft gunners in practice, are not actually scoring hits. They claim that after a short burst is fired and no direct hit is scored, the navy man in charge of the radio-control pillar makes the plane assume a "winged" form of flight, and then makes it simulate an actual crash like that of a plane struck in a vital part. It is the old argument of can airplanes sink battleships, with a little reversed English. A Queen Bee is an Airspeed plane flown under radio control from a battleship for anti-aircraft target purposes. About 150 have been built—and shot down.

* * *

The Army Air Corps plans to enlist the aid of civilians in the air-raid program planned on a large scale in North Carolina in October. The civilian aid will take the form of a widespread anti-aircraft "warning net" encircling Fort Bragg and extending to the North Carolina coast. The plans include arrangements whereby civilians can warn the headquarters staff of the approach of "hostile" forces.

MISCELLANEOUS

A new problem is noted in the Pacific where the Japanese government plans an air line from Tokyo to the Japanese-mandated islands in the South Pacific by way of the American-owned island of Guam. Establishment of such a service would form a connecting link with Pan-American Clipper service, but might provide some unpleasant situations should diplomatic conditions in the Pacific become more strained.

* * *

The island of Anticosti, near Montreal, which German capitalists recently tried to acquire as a basis of a pulp and paper industry, is to become a Canadian Royal Air Force base instead. The government auxiliary schooner *Halifax* recently started to survey Anticosti and the Magdalen Islands in the lower St. Lawrence.

* * *

The robot navigator used by Howard Hughes on his round-the-world flight was the first installation ever allowed aboard a civilian plane. The instrument belongs to the Army Air Corps and was perfected by Lieutenant Thomas Thurlow of Wright Field. The robot computes longitude and latitude automatically without the aid of books, tables or star positions.

N.A.A. NEWS

(Continued from page 33)

of the Federal government with respect to civil aeronautics. The N. A. A. had advocated the measure since it was first proposed and was one of its prominent sponsors.

Most significantly, the Civil Aeronautics Authority is frankly a new experiment in American government. It serves two masters—the executive and the legislative. The new law establishes a five-member agency which is charged with regulatory duties and acts as the representative of Congress; and the office of Administrator, who is charged with executive and administrative duties and is directly responsible to the President.

The members of the Authority are Edward J. Noble, chairman; Harllee Branch, vice-chairman; Robert Henry Hinckly, George Grant Mason, Jr., and Oswald Ryan. Clinton M. Hester is the Civil Aeronautics Administrator.

In the Authority is vested all the regulatory powers exercised by the Federal government over aeronautics and, in addition, certain new regulatory powers over the economic phases of transportation. The basic means of regulation is similar to that provided by the Interstate Commerce Commission with respect to regulation of railroads and motor vehicles.

The Authority has the power to decide what air transport companies may engage in air transportation and where they may operate; it fixes rates for the carriage of passengers, property and mail; it promulgates all air traffic regulations; issues certificates of competency to pilots and other air and ground personnel; and examines and certifies the airworthiness of aircraft, engines and other equipment.

Under the Act, the jurisdiction of the Federal government has been extended to include airports, and Congress has recognized in some measure the responsibility of the government toward airport development by providing for a special study to be completed by February 1, 1939, to determine whether, and how, the Federal government shall participate in the construction, improvement, development, operation, or maintenance of a national system of airports.

Under the new law, any doubts regarding the extent to which the Federal government may enforce traffic rules have been eliminated. The commerce regulated by the Act is defined as all aircraft operations, both commercial and non-commercial, between the States and between this country and abroad, and all aircraft operations within the limits of any civil airway. Thus every aircraft must be registered, regardless of the purpose for which it may be used and where it may be operated.

Congress provided in specific terms that the Authority, in administering the Act, should give full consideration to the needs of the private flyer, and directed the Authority to give preference to neither air carriers nor private flyers.

Aircraft manufacturers will also be affected to some extent by the new law. In the opinion of some experts, the wording of the Act indicates there will develop an increasing degree of government inspection at the manufacturing stage.

Provisions of the new law affecting consolidations, mergers and interlocking relations between aircraft manufacturers and air carriers are far more flexible than the rigid restrictions which applied under the Air Mail Act. Whereas the old law contemplated an absolute divorce between manufacturing interests and air mail contractors, the Authority, under the new law, may authorize such interrelations where it is found to be in the public interest. In other words, although the new law does not invite manufacturers to acquire interests in air carriers, or vice versa, it does recognize that in some circumstances such interrelations may be of public benefit.

By the enactment of the Civil Aeronautics Act of 1938, Congress has at last solidified the shifting sands of years gone by into a bedrock air policy on which aviation can build a firm foundation for future growth.

COORDINATION OF AVIATION CONFERENCES

Arthur Dudley, Chairman of last year's Western Aviation Conference at Sacramento, and member of the Executive Committe of N. A. A., has advanced a forward-looking plan for regional and national aviation conferences. This plan has been endorsed by the Executive Committee of N. A. A. and by the Executive Committee of the newly formed National Aeronautic Conference.

The plan is concerned with a closer coordination and scheduling of regional conferences and a more direct tie-in of these conferences with an annual conference. Recognition of not more than seven official regional conferences is proposed, based, insofar as practical, on the State groupings represented by the divisional organization of the National Association of State Aviation Officials.

Also, insofar as practical, the plan proposes that regional conferences be held consecutively at a time when Congress is not in session, possibly in the fall of the year. This would enable speakers to go from one conference to another without sacrificing undue time from their regular duties.

Under the plan, the organizing and program committee of a second National

FREE AIR WHEELS (valveless)
With every $4.00 order or over, we will give absolutely free 1 pair 3½" valveless pneumatic wheels. These wheels are listed at $1.50.
FOR LIMITED TIME ONLY!

GAS POWERED SPECIALS

Wood can be had in Spruce, Bass or Balsa at the same price as those listed below.
BALSA 5 ft. lengths
¼x¼ ..4 for .10
⅛x½ ..3 for .14
⅛x1 ...2 for .15
3/16x3/16 8 for .25
3/16x½ 2 for .10
3/16x1 . 2 for .19
¼x¼ . 6 for .25
¼x½ . 4 for .25
¼x1 ..3 for .25
⅜x⅜ . 3 for .25
½x½ . 3 for .27
½x1 .. 1 for .18
1x1 ... 1 for .25
SHEET BALSA 36" Lengths
1/16x2 ..... .04
3/32x2 ..... .05
⅛x2 .... .05
¼x2 .... .09
for 3" stock, double 2" Price.
BAMBOO PAPER
24"x36", 1 sheet.... .05
SPECIAL JAP SILK
A strong, light silk imported specially for gas models.
Grade A, 1 yd. .40

CEMENT
1 oz......... .18
8 oz......... .35
1 pt......... .60
Dope, Paper Adhesive, Colored Dope same prices as cement.
HARDWOOD PROPS FOR GAS MODELS
12" or 14" ea. .90
15" or 16" ea. 1.15
SPRING STEEL WIRE
1/16 dia. 5 ft. .12
3/32 dia. 5 ft. .15
⅛ dia. 5 ft. .25
DURALANGLES
½x½ per ft. .15
¾x¾ per ft. .22
SPARK PLUGS
Brown Jr. Plugs
A needle point plug for engines. Recommended for balky motors especially.
Each......... .05
CHAMPION PLUGS
Each......... .05
REGULAR PLUGS and JACKS
Extra small—wt. 1/3 oz.
Per set of 4 .25
BRASS ANGLES
¼x¼ ft. .25

CONDENSERS
Special gas model condensers.
1½" long, 1 for .25
1¼" long, 1 for .25
STREAMLINED ALUM. TUBING
¼x⅛ ft. .15
5/16x5/32 ft. .16
⅜x3/16 ft. .18
SPARK COIL 1.50
GAS FUNNEL with strainer .30
FLIGHT TIMER
50 sec .50
0 sec to 1 min. 2.00
DURAL TUBING
¼ dia.....ft. .14
5/16 dia...ft. .20
OHLSSON AIR WHEELS
3½"....pr. $1.50
4½"....pr. 1.75
M & M AIR WHEELS
3¼"....pr. 1.50
3½"....pr. 2.50
4½"....pr. 2.75
MODEL AERONAUTICS YEAR BOOK
This book contains more than 80 detail plans of both gas and rubber powered models
Price ..$1.00 p.p.

RUBBER POWERED SPECIALS

18" BALSA
1/16x1/16. 100—5c
1/16x⅛ 35—5c
1/16x3/16. 18—5c
3/32x3/32. 30—5c
⅛x⅛ 30—5c
⅛x¼ 10—5c
3/16x3/16 8—5c
¼x¼ 6—5c
¼x½ 3—5c
18" SHEETS
1/64x2 4—10c
1/32x2 8—10c
1/16x2 8—10c
3/32x2 7—10c
⅛x2 6—10c
3/16x2 3— 9c
¼x2 3—10c
PROP BLOCKS
½x¾x6 6—5c
⅝x1x8 3—5c
¾x1¼x10 3c ea.
¾x1¼x12 3c ea.
BAMBOO
1/16 sq.x11 35 for 5c
1/16x¼x11 1 doz. for 8c
18" PLANKS
1x1 5c: ½x2 6c
1x1¼ 9c: 1x2 10
1x3 15c: 2x2 18c
2x3 23c: 2x6 39c
3x3 40c: 3x6 75c

3" sheets or 36" lengths, double above prices; add 10c for pkge. charge for 36" lengths.
COLORLESS CEMENT
1 oz. 5c: 2 oz. 9c
4 oz. 16: 1 pt. 50
Clear dope, banana oil, thinner, same price as cement.
COLOR'D DOPE
White, yellow, orange, blue, red, green, olive drab, black, silver, gold or gray.
1 oz. 6: 2 oz. 10
4 oz. 19: 1 pt. 65
HIGH GLOSS
1 oz. 9c: 2 oz. 16c
4 oz. for 28c
MICRO-FILM
1 oz. 15 2 oz. 25
4 oz. 40c
WOOD FILLER
Same price as Micro-Film.
TISSUE, AA
All col., doz. 19c
Superfine, white, 1 doz. 15c
BUSHINGS
1/16 — 1 for 1c

WHEELS per pr.
Brch Blsa Celu
½" .01 .03
¾" .02 .04 .05
1" .03 .05 .07
1¼" .04 .08 .10
1½" .07 .10 .16
3" .15 .15 .30
ALUM. TUBING
1/16, 3/32, ⅛, 1 ft.. 7c
3/16, ¼, 1 ft.. 10c
PROPELLERS
Balsa Mach Cut / Paulowina
5"— 4c 10c
6"— 5c 15c
7"— 6c 20c
8"— 7c 25c
9"— 8c 30c
10"— 8c 35c
12"—10c 45c
14"—14c
15"—15c 60c
RUBBER
.045, 25 ft.. 5c
1/16 sq. 15 ft. 5c
⅛ flat 15 ft. 5c
Skein for 50c
3/16, 10 ft.. 5c
WASHERS
1 doz. ⅛ or ¼ 1c
THRUST BEARINGS
Small, 1 doz. 10c
Large, 1 doz. 15c

MOTOR TRADE-IN OFFER—Send your motor or a description of your motor for best appraisal offer.
HOW TO ORDER—No orders under 50c. Add 15c to orders under $1.50. 10% to orders over $1.50. Add 20c for 5 ft. lengths.
HEATHE MODEL AIRPLANE CO.
260 (B-11) Troy Ave., Brooklyn, N. Y.

Fall Specials at Wholesale

FREE $1.00 worth of supplies (your choice) with every order for $5 or over. 35c worth of supplies (your choice) with every order for $2.50 or over.
For 36" Lengths in all wood just double 18" length Price

18" Balsa per 200
1/32x1/16 .. 9c
1/16x1/16 .. 9c
1/16x⅛ 16c
1/16x3/16 .. 22c
1/16x¼ 26c
3/32x3/32 .. 22c
⅛x⅛ 25c
⅛x3/16 .... 48c
⅛x¼ 50c
¼x¼ 80c
1x1 ....2 for 6c
2x2 ....2 for 23c
1x2 ....2 for 13c
2x3 ....2 for 32c
1/32x2 20 for 14c
1/16x2 20 for 17c
3/32x2 20 for 20c
⅛x2 ..20 for 22c
¼x2 ..20 for 40c
COL'RED DOPE All Colors
1 oz. bot. dz. 50c
2 oz. bot. dz. 75c
WASHERS
⅛ or ¼, 100 5c

Quill Brushes
doz. 7c gr... .70
Shafts or Rear Hooks....doz. 6c
SHEET CELL.
6 x 8 doz.... .65
LG. INSIGNIA SHEETS
doz. 36, 100 $1.65
CLEAR DOPE
1 oz.....doz. 38c
2 oz.....doz. 60c
1 pt. 35c; 1 qt. 65c
1 gal. each $1.48
BUSHINGS
1/16 I.D., 100 13c
CLEARCEMENT
1 oz. bot. dz. 40c
2 oz. bot. dz. 65c
1 pt. 40c 1 qt. 60c
1 gal........1.75
5 gal........6.50
Jap Tissue
White, doz.. 12c
Colored, doz. 14c
Silver, doz.. 21c

BEST BAMBOO
1/16x¼x15 dz. 8c
1/16sq.x12 gr. 10c
MACHINE CUT PROPS, per doz.
5"...20c 6"...21c
[illegible]...30c 8"...35c
10"..45c 12"..60c
WHEELS, doz.
Birch Bal Cel
½" .05 .09 ..
¾" .06 .11 .24
1" .08 .14 .25
1½" .10 .19 .35
THR BEARINGS
sm., dz. 6c, gr. .55
lg., dz. 7c, gr. .65
PARA RUBBER 225 ft. skeins.
.045 sq..... 30c
1/16 sq..... 33c
⅛ flat...... 40c
½" NOSE PLUGS
1 doz. 5c 100 33c

Orders Shipped Express Charges Collect. On C.O.D. orders, send 25[illegible] with order, balance on delivery. Save C.O.D. charges, send payment with order.
DIAMOND MODEL AIRPLANE CO.
260 Troy Ave. Dept. B-11 Brooklyn, N. Y.

Aeronautic Conference would be made up of the chairman of each of the seven regional conferences. Delegates to the national conference would be selected by each regional conference with a maximum of ten each, named to represent the special phases of regional aviation (non-scheduled operators, private flyers, airport managers, etc.) at the national conference. The national conference would be held at Washington after Congress convenes in early February. The date would be separate from that of the meeting of any single organization to eliminate any implied connection with any one organization. It would be sponsored by the National Aeronautic Council, the recently formed permanent coordination agency made up of the National organizations participating in the first National Aeronautic Conference held in Cleveland last January. To stamp it as the one official national conference, sanction as such would be requested from the National Aeronautic Association.

Under the plan, the presidents of the national associations represented on the National Aeronautic Council would serve as an advisory committee to the organizing and program committee of the conference.

The plan as proposed obviously offers a more orderly procedure for the organization and coordination of regional discussion conferences than heretofore. Moreover, it is pointed to the desirable end that these will not conflict and will always serve aviation. Through consecutive scheduling, the problem of attendance on the part of national leaders at these conferences is simplified and increased participation by such leaders thus made possible.

The plan has the advantage of decentralizing the organization of the national conference, and by the tie-in of each regional meeting insures that the national conference will be thoroughly representative of all sections. By having the chairman of regional conferences serve as an organizing committee for the national conference, these men are given the responsibility and the opportunity to see that the action taken at their several regional meetings is properly recognized and considered nationally.

Proper education and guidance of the many varying interests concerned with aviation's growth along lines indicated by field experience and dictated by field needs is highly important. The plan provides an efficient way for aviation people and the public generally to voice their opinions on both regional and national policies.

MEMBERS OF N.A.A. EXECUTIVE COMMITTEE

Albert I. Lodwick. Lodwick is the capable Executive Vice-President of the Aviation Manufacturing Corporation, which company's activities include the Vultee Aircraft Division, the Stinson Aircraft Corporation, and the Lycoming Aircraft Engine Division.

For nine years before taking over his new post, he was associated with the Curtiss-Wright aviation interests, having been employed by the Wright Aeronautical Corporation, engine manufacturers, and later by the parent organization as assistant to the president of Curtiss-Wright Corporation. He was also director of public relations and probably no man enjoys a finer reputation in the field of aviation publicity than he does.

He resigned from Curtiss-Wright on February 1 of this year to accept the position with Aviation Manufacturing Corporation.

Lodwick was born at Mystic, Iowa, where he attended high school, and later was graduated from Iowa Wesleyan College. The following year he entered Harvard University in the Graduate School of Business Administration, where he spent two years and received the Master of Business Administration degree. He is married and lives in New York City.

As personal representative of Howard Hughes, he figured prominently in Hughes' recent globe-girdling flight.

Colonel John H. Jouett. Few men have had as varied and as enviable a background in aeronautics as Colonel Jouett.

West Point graduated him in 1914, and when the United States entered the World War he was sent overseas for duty with the balloon section of the A. E. F. Later he organized training activities for the United States at Langley Field, Va. In 1930, after a long and distinguished military record both in lighter- and heavier-than-air craft work, he resigned from the Army to organize the Chinese Air Force. He had the rare honor of being decorated with the coveted Order of the Jade by the Chinese Government.

Albert H. Near. Near is the dynamic superintendent of Bowman Field, at Louisville, Kentucky. He served in the Motor Transport Corps during the World War and shortly after the conflict was over entered the Air Corps Reserve. He now holds the rank of first lieutenant and has been an active pilot with the 325th Observation Squadron since 1924. He is president of the Aero Club of Kentucky.

QUESTIONS

(Continued from page 29)

Question: I am a high school graduate and my studies include the required English, history, physics, chemistry, algebra, and plane and solid trigonometry. Would these subjects cover the mental test required for flight cadet appointment, and if not what other subjects do you suggest I study? S. C. C.

Answer: The written test required for flight cadet appointment is equal to two years of college education. For detailed information write to the Adjutant General of the Army, Washington, D. C.

Question: Do you think that it would be possible for me as a foreigner to get into Randolph Field? If not, what should I do in order to acquire American citizenship? What are the mental and physical conditions I would have to fulfill in order to get into R. F.? J. B., Jerusalem, Palestine.

Answer: You have to be an American citizen to get into Randolph Field. To become one you have to be a resident of U. S. for at least five years, and your entry into this country is regulated according to the quota granted the country whose citizen you are now. You must be in perfect physical condition to enter Randolph Field, and have at least two years of college education in an American school.

Question: If I were to enlist in the Army Aircraft Technical School and specialize in aircraft and engine mechanics, would it be possible for me to secure a government license upon expiration of the enlistment term and get a job as an air line mechanic with one of the major air lines? J. O. C., Jr., Newsom, N. C.

Answer: The Aircraft Technical School gives the most thorough training of any school and your chances will be excellent to get a job with some air line.

Question: I would like to go to West Point after completing two years in college. Will you please tell me what subjects I should take to prepare me for entrance? P. H., Elizabethton, Tenn.

Answer: You can take just the general academic course. No special training is required to enter West Point beyond being a high school graduate.

Question: I would like to know what planes are stationed at the Pensacola air base and also what are the color schemes of the Boeing P-26A and the F-4B4? H. G., Vallejo, Cal.

Answer: I could not list all the ships stationed at Pensacola. They change all the time. There are training ships, observation, attack, torpedo plane, utility, etc. The color scheme of the P-26A is blue fuselage with yellow wing and tail surfaces; the F-4B4 has a silver fuselage,

silver flippers, the rudder may be either red, green or blue, depending on the squadron, and wings yellow.

Question: What are the requirements to join the British air force, and is the physical test as severe as that for the U. S. Army Air Corps? What air forces take cadets who are not citizens of their country? W. S., Portsmouth, N. H.

Answer: To enlist in the British air force you have to be a citizen of Great Britain. I think that their physical test is just as strict as the U. S. one. Write to the Secretary, Air Ministry, London, for more detailed information. No matter what air force you enlist in you must be a citizen of that country.

Question: For the last few issues of Air Trails I have been watching for an advertisement concerning the sale of shop blueprints for a two-seater airplane for home building. Could you please give me the name and address of a company selling such blueprints? J. A. D., Bogota, N. J.

Answer: Try the Payne Aircraft Co., Joliet, Ill.

Question: I am interested in getting into aviation as a master or flight mechanic. I have a high school education and a limited mechanical training; am mechanically inclined. As I am financially embarrassed I cannot attend any aircraft school. Are there any aircraft manufacturers who give apprenticeships, or air lines which give scholarships? What would you suggest? J. H. A., Franklin, N. H.

Answer: The only manufacturer I know of with an apprenticeship is the Luscombe Aircraft Co., Trenton, N. J. The air lines have no scholarships, as they don't have the time to train novices. Their job is to fly passengers and mail. If you are a high school graduate you can enter the Air Corps Aircraft Technical School at Rantoul, Ill., where you get trained in any branch of aviation outside of flying. This training is free. Write to the Commandant, Aircraft Technical School, Rantoul, Ill.

Question: I am not counting on entering any college but I do want to become a pilot in either the U. S. Army or Navy. I want all the data on qualifications in both branches. C. S., Cincinnati, O.

Answer: Write to the Adjutant General of the Army or U. S. Navy Bureau of Navigation, Washington, D. C.

Question: Are there any foreign aviation magazines and if so how could I get them? How could I get aviation magazines from England, France and Germany? Where can I get Jane's "All the World's Aircraft"? How much does it cost? What is the latest copy? What is the most formidable fighter in the world? Bomber? L. P., Fairfield, Conn.

Answer: You can get foreign aviation publications through the Foreign News Depot, Times Bldg., N. Y. C. You can get there Jane's "All the World's Aircraft" as well. The price of this book is approximately $15, and the latest copy is for the year 1937. I suppose the most formidable fighter at present is the British Hawker Hurricane, and the bomber our own Boeing YB-15.

Question: Are there any letters in front of the license number on a racing plane and if so what are they? What do the letters NR on Frank Hawks' "Time Flies" stand for? J. A. M., Frankfort, Ind.

Answer. All racing planes must have either the letters NR or NX in front of numbers. The letter N means that the ship is of U. S. registry; the letter R means its purpose is restricted and commercial operations cannot be conducted with it. The letter X means that the plane is an experimental model. This answers also your question about the "Time Flies."

Question: Could you give me the performance figures of the Curtiss low-wing Swift pursuit? Was it accepted by the Army? What are the performance figures of the Navy Northrop single-seat pursuit and the Vought V-100 Corsair? C. R., Mansfield, O.

Answer: I cannot give you performance figures on these ships as most of them were never accepted by the Army or Navy. The Vought V-100 trainer is supposed to have a top speed of 150 m.p.h.

Question: If I have a high school education and have gone to an aviation school, can I get into the Army Air Corps? M. B., Los Angeles, Cal.

Answer: You have to have at least two years of college education to get into the Air Corps for flight training and any previous aviation experience does not count.

Question: Is the Boeing XB-15 the same as the YB-15 Bomber? Do college students with two years' attendance have to take an examination before entering the U. S. Air Corps? A. O., Sumpter, S. C.

Answer: The Boeing XB-15 is the same ship as the YB-15. If you had two years of college you will not have to take the written test to enter the Air Corps.

Question: What are airfoils and what types are there? In your April issue of Air Trails you said that the N.A.C.A. symmetrically shaped airfoil used in the Taylorcraft had been replaced by the

(Turn to page 98)

SKYWAY BALSA CAN'T BE BEAT!

FREE with all purchases over $1.00 your choice of: (1) Model Water Sprayer. (2) Model Builder's Knife. (3) Choice of 2-20" Model Plans—Curtis, Heath, Boeing, Driggs, Bellanca.

18" Balsa Planks	**PROPELLERS**	Gas Model Silk
½x½ ..2 for 5c	Balsa Paul-O-	super quality
1x1 ....1 for 5c	Mach. Cut Wins	per yard 40c
1x2 ....1 for 9c	5" 4c 7c	**BROWN RUB.**
2x2 ....1 for 16c	6" 5c 11c	1/16 sq. 15 ft. 5c
2x3 ....1 for 22c	7" 6c 16c	¼ flat ..15 ft. 5c
3x6 ....1 for 38c	8" 7c 20c	3/16 flat 12 ft. 5c
3x6 ....1 for 72c	9" 8c 24c	Skein 225 ft. 70c
NOSE BLOCKS	10" 8c 27c	**5 FOOT BALSA**
1x2x1 .....1c	12" 10c 35c	⅛x⅛ 30 10c
2x2x1 .....2c	14" 14c	⅛x3/16 ..12 10c
2x2¾x1 .....3c	15" 18c	¼x¼ 10 10c
3x3x1 .....4c	16" 16c 72c	3/16x3/16 8 10c
3x3x2 .....7c	**ALUM. WHEELS**	¼x¼ 6 10c
3x3x3 .....9c	1" pr. 6c	¼x½ 3 10c
5x5x2 .....21c	1½" pr. 11c	⅜x⅜ 1 7c
18" BALSA	1⅞" pr. 14c	½x½ 1 9c
1/16x1/16 100, 5c	Sheet Aluminum	Specify whether hard or soft. Add 25c pack. charge on 5 ft. lengths.
1/16x⅛ 35 for 5c	.003 ..sq. ft. 10c	**DUMMY RAD. ENGINE (Celu.)**
1/16x3/16 18, 5c	**ALUM. LEAF**	1½" dia. ... 8c
1/16x¼ 15 for 5c	2 Sheets for 1c	2" dia. 12c
3/32x3/32 30, 5c	**TISSUE, AA**	2½" dia. ...11c
⅛x¼ 30 for 5c	All col., doz. 10c	3" dia. 17c
⅛x3/16 12 for 5c	Silver ...ea. 5c	**THRUST BEARINGS**
¼x¼ 10 for 5c	Superfine, wh. 5c	½ Doz. Small 4c
3/16x3/16 8, 5c	**CAMEL'S HAIR BRUSHES**	Large 6c
¼x¼ 6 for 5c	Small 3c; med. 5c	**INSIGNIAS—**
¼x½ 3 for 5c	Large 8c	French, American, English, German
18" Balsa Sheets	**BAMBOO PAPER** 2 for 15c	1¼" ....4 for 3c
1/64x2 6 for 10c	**Wood Veneer**	2" .....each 1c
1/32x2 9 for 10c	20x30" ..1 for 9c	24 and stripes 5c
1/16x2 8 for 10c	2 for 17c	**DOWELS**
3/32x2 7 for 10c	11 in. **BAMBOO**	1/16x6 ..doz. 5c
⅛x2 ... 6 for 10c	1/16x¼ 0 for 5c	⅛x18 ...2 for 3c
3/16x2 3 for 8c	Shredded .40—5c	3/16x18 ..2 for 5c
¼x2 ...3 for 9c	**REED**	**WIRE**
½x2 ....2 for 11c	1/32 or 1/16"	.014 6 ft..2c
3" sheets or 36" lengths, double above prices; add 10c packing charge for 36" lengths.	3 ft. 1c	.020 .028 6 ft..3c
	⅛ in. ..3 ft. 2c	.031 .040 6 ft..6c
	CEMENT	1/16" 3 ft..5c
PROP. BLOCKS	**CLEAR DOPE**	**NOSE PLUGS.**
½x ¾x 5 7—5c	**THINNER**	½" ...1 doz. 5c
½x ⅞x 6 6—5c	1 oz. 5c, ½ pt. 30c	¾" ...1 doz. 10c
⅞x1 x 8 3—5c	2 oz. 8c, pint 45c	**MODEL PINS**
¾x1¼x10 2—5c	**Colored Dope**	Pkg. 5c
¾x 1½12 3c ea.	1 oz. 5c, ½ pt. 35c	**PROP. SHAFTS**
1 x1½x12 5c ea.	2 oz. 9c	2 for 1c
1 x1½x15 6c ea.	**MICROFILM**	**BOMBS**
1 x2 x18 9c ea.	One oz. bottle 10c	¾"..3c 1¾"..7c
WHEELS per pr.	**Sheet Celluloid**	2¾"..11c
Brch Blsa Celu	2x6—2c 6x8—3c	**GUNS WITH RING MOUNT**
½ .01 .03	12x16 .....15c	1¼" 10c 1¾" 15c
¾ .02 .04 .05	**RUBBER LUBRICANT**	**MODEL BUILDER'S KNIFE**
1 .03 .05 .07	Large bottle 10c	Surgical steel blade 10c
1¾ .04 .07 .10	**WING AND TAIL LIGHTS**	
1⅞ .06 .09 .16	5/16" 10c	
3 .14 .30	9/16" 15c	
Alum. Tubing	**SANDPAPER**	
1/16", 3/16", ¼" ...10c ft.	Doz. sheets ...5c	

DEALERS: Send for wholesale price list.

FREE postage on all orders in U.S.A. Add 10c for packing cost on all orders. For U.S. possessions, Canada or foreign countries add 15% on orders over $1.00; under $1.00 add 15c.

SKYWAY MODEL AIRCRAFT SUPPLY CO.

383 Seventh Ave., Dept. A, Brooklyn, N. Y.

ELECTRIC UNLOADING

Thrill of Thrills in new 1938

LIONEL TRAINS

Touch a button and by remote control the body of this electric dump car tilts until its load of coal is deposited alongside track, right where you want it. Read all about electric unloading, uncoupling and whistling. Catalog contains full details and color pictures of the greatest fleet of model trains in all train history. Get your copy at once. Clip coupon below.

The Lionel Corporation Dept. M
15 East 26th Street, New York, N. Y.
Enclosed is 10 cents for a copy of the new 1938 52-page, full color Lionel Catalog. Send it to:

Name_____

Address_____

City_____ State_____

GLIDING

(Continued from page 35)

in Jay Buxton's two-place transporter sailplane, the ship being flown by Jay's attractive daughter Lucretia. Rumor has it that Gable was highly enthusiastic over the flight and Lucretia's ability to pilot. The Transporter was scheduled to be used in the film "Too Hot to Handle," starring Mr. Gable and Myrna Loy.

Hannah Reitsch, Silver "C" pilot and the only woman holding the rank of flight captain in Germany, arrived in New York with her Habicht special stunt sailplane. This ship has been dived by Miss Reitsch to a speed of 250 m.p.h. She is going to demonstrate her acrobatic skill in this country.

Lewin Barringer, President of the Wings Soaring Club of Philadelphia, tried out the club's new field at Willow Grove, Pa., by making a soaring flight of 35 minutes' duration, and reaching an altitude of 4,700 feet. Another member, Sam Freeman, using Wistar Brown's Goeppingen Wolf, reached 3,800 feet and by doing so gained one leg on his Silver "C." All flights were made from winch tow.

Members of the Carnegie Tech Glider Club, Pittsburgh, Pa., are building a Haller Hawk, Jr., from a kit.

Art Schultz of Detroit soared recently for four hours in his A.B.C. sailplane, taking off from the Triangle Gliderport and attaining 5,180 feet.

The Southern California Soaring Association members tried out a new soaring site located in the San José hills, twenty-five miles from Los Angeles. Six ships participated in the event—the Heidelman utility, a Briegleb utility, Jensen's Soloflugen, Stan Hall's Cherokee and the Aero I.T.I. two-place primary.

WAKEFIELD

(Continued from page 53)

within seventy-five feet of the ground when it drifted over another field, caught another current and went up again.

The fields adjoining the airport were alternately green and dirt surfaced. The model would catch thermals over the green fields and start to glide down over the dirt ones. After about twenty minutes, Guillemard, a French modeler, joined me in the chase. Using his motorcycle we followed it for about an hour more. Finally it went out of sight straight above us. It was a safe bet that it would keep going for quite a while. We returned to the airport about 1:30. With considerable relief, I learned that my flight of 30:05 was still the high time of the day.

About 4:30 a telephone call to the airport told us that Clodhopper II had just landed about thirteen miles away. We recovered the model. The elevator and rudder were cracked, but I thought I'd make temporary repairs and take my remaining two flights. On the second flight I was disqualified for pushing the model. (Which didn't upset me because the model stalled and the flight was short). Obviously, it was still badly out of adjustment from the rough handling at the end of its first flight. And since the contest closed at 6:30, there was no time for test flights. On the third flight the model dived in after thirty-seven seconds.

But Clodhopper II had earned a rest. Its three-flight average of 654 seconds put it well out in front.

The only refreshments served on the airport were beer and wine. The Americans noticed that they had ice to keep it cold and started drinking ice water. Finally, to reduce requests for ice, they charged fifty centimes (about two cents) for a glass of ice.

However, not everyone had the good sense we exhibited. The hot sun plus ample liquid refreshment made some of the timers rather unsteady. Van Wymersch of Belgium made an eight-minute flight and was credited with four minutes. His timer clicked the watch and declared the model out of sight while it was still circling in plain sight directly overhead.

Contest proceedings were painfully slow. About the middle of the afternoon the judges and officials went into a huddle to figure out a way of speeding up the procedure. They were barely successful in getting all the flights run off before 6:30 p. m.

That same night we had the banquet at the Palais d'Orsay, one of the finest hotels in Paris. Of course the menus were written in French and we weren't quite sure what we were eating. Celebrities were on hand to give the banquet official flavor. Practically everyone made a speech which was subsequently translated into French, English, and German. The Wakefield Trophy was presented by Madame Wibault, wife of the famous French airplane designer. Then followed toasts and cheers for each of the fourteen countries. At last it was over.

MODEL DESIGNS AT THE CONTEST

The majority of models were powered with American brown rubber. The British used a new black rubber which they claim has more sustained power than our brown. It is interesting to note that few motors were broken despite the hot weather. Most motors were direct-drive, which seems to hold an advantage over geared motors. The only new gadget that caught our attention was the automatic thrust adjuster used by Van Wymersch of Belgium. The change of thrust was intended to keep his model climbing throughout the power run. There were folding propellers from Czechoslovakia, South Africa, and the United States.

The British models were smooth flyers which still use their typically long motor runs. Several of them had round, paper-covered fuselages with shoulder-high wings. Their motor run averaged about one and one half minutes. None of them was geared.

French designs practically all followed the diamond-shaped fuselage design. Their models had faster climbs than the British jobs. Practically all the foreign models had a longer motor run than ours.

The Swedish team used round, rectangular, and diamond fuselages. The wings were long and straight with dihedral at the very tips. All had twin rudders. All of the Swedish team were from the same club in Stockholm and were the best-outfitted team at the contest. We liked them better than any other modelers—their tastes were more American both in model design and other matters.

Only one German model was made of balsa (Schmidtberg's entry). The other five were hardwood. This is an outgrowth of the ruling that balsa, bamboo, or Japanese tissue are forbidden in state-sponsored model contests. One of the entrants told us that they have built and flown indoor models out of hardwood covered with microfilm. In fact, they have flown a metal model, covered with microfilm, for better than three minutes indoors.

AMERICAN DESIGNS

Stiglmeier's model was a Korda type with the wing parasoled and rudder changed, along with other minor differences. It flew nicely on about three-quarter winds when testing, but on full winds it did tight right circles without gaining altitude at the beginning of the flight. Ted Just tried adjusting it for the second official flight, but had little success. On the third official flight it did a swell loop and turned in a splendid flight.

My entry, Clodhopper II, had a few minor changes from last year. It was the same model that won the Moffett trophy in 1937 and first place on the

Wakefield elimination at Detroit earlier in the year. (This model was presented in detail in the November, 1937, issue of Air Trails).

Bohash's entry was a conventional type, rectangular fuselage job. Unfortunately it wasn't adjusted as well as it might have been.

Pfeil's model had a long, swept-back wing with non-lifting tail. Wing and tail were attached with dress snaps. The model proved very eccentric on the take-off.

DeLaMater's design was conventional, resembling closely the cabin designs which have proved favorite in this country for the past five years.

Wisniewski finished his entry on the boat. He used an old wing and propeller. The fuselage was a square tube of $\frac{1}{16}$" balsa veneer to carry the motor. The front of the fuselage bulged into a podlike shape to get the necessary cross-section area.

WAKEFIELD CONTEST RESULTS

Following are the flights turned in by the American team, arranged according to the order in which members flew.

	1st	*2nd*	*3rd*	*Aver.*
1. Stiglmeier (Ted Just, proxy)	94	81	115	96 sec.
2. Cahill	1925	0	37	654 "
3. Bohash	123	79	106	102 "
4. Pfeil	165	78	55	99 "
5. DeLaMater	63	187	5.6	83 "
6. Wisniewski	98	76	0	58 "

Following is the listing of the high time of the 1st man from each country. It is *not* a listing of the individual high-place winners.

1. United States	10:54	Cahill
2. France	6:58	Bonjuret
3. Germany	6:15	Klose
4. Sweden	6:07	Magnusson
5. England	5:57	Almond
6. Canada	4:56	Milligan (by proxy)
7. South Africa	4:45	Beatty
8. Australia	4:27	Fullerton (by proxy)
9. Poland	3:27	Degler
10. Belgium	2:54	Van Wymersch
11. Holland	1:37	Bezemer
12. Czechoslovakia	1:33	Vys-Roul
13. Norway	1:17	Olsen

WINNERS OF THE WAKEFIELD TROPHY

1928	England, Newell	52.8 sec.
1929	England, Bullock	70.4 "
1930	U. S., Ehrhardt	155.0 "
1931	U. S., Ehrhardt	234.0 "
*1932	U. S., Light	477.4 "
1933	England, Kenworthy	321.0 "
**1934	England, Allman	111.8 "
1935	U. S., Light	146.6 "
1936	England, Judge	249.0 "
1937	France, Fillon	253.2 "
1938	U. S., Cahill	654.0 "

**Contest not recognized by the Society of Model Aeronautical Engineers and the trophy automatically returned to England.*
***In 1934 the three-flight average was begun instead of the longest of three official flights.*

WE WIN THE THOMPSON!

(Continued from page 19)

Major Seversky in delivering it to Jacky had broken my east-to-west record which I had held since '33. So it was with a great deal of pleasure I watched her ship roll across the Cleveland finishing line Saturday afternoon. I was on the field and spoke to her a few minutes before she took off for Bendix Field, New Jersey, to complete her transcontinental dash.

Don't get the idea I wasn't pretty busy all this time with my own preparations. In qualifying on Wednesday there had been one or two minor adjustments to be made on my engine, so that Friday at 5 a. m., before any of the other pilots were on the field and before the sun had yet risen, I was taking the ship around the course for a last-minute check-up. On landing I was satisfied Don had brought the engine up to its highest peak of efficiency. However, in order to be absolutely sure that I knew every inch of the ten-mile rectangular course, I had made additional plans.

For three days preceding the race, at the conclusion of the day's program when the crowd had departed, I flew with my friend Bill Smart of Detroit in his Waco cabin plane. We spent about an hour each evening between seven and eight cruising leisurely around and around the ten-mile course, fixing in my mind every landmark which would readily enable me to pick up the pylons. You know, when you are tearing around a ten-mile course which includes four right-angle turns in a few seconds over two minutes, you haven't much time for casual observation. I firmly believe that this preliminary work was of great help in enabling me to come through this year.

So many friends have asked me how I keep track of the laps when traveling at such speed. This year I had two systems: one in the cockpit of my plane and one in an obscure corner of the Cleveland Airport. On the cockpit of my plane I had thirty little strips of adhesive tape, representing the number of laps, and I reached out and yanked one off every time I passed the grandstand. In the corner of the field I had large lettered signs with two attendants to give me my lap position and place in the race. I might say that after the first six or seven laps, when I was fighting it out all the way with Ortman, it was most satisfying to see that Number One on the ground.

I took my ship off the ground this year with fifty-five more gallons of gasoline on board than I had ever had in it before on a take-off, making 220 gallons in all. This gave me a few anxious moments before the start, but the ship handled the job perfectly and took the increased load in its stride. During

(Turn to page 97)

Earn Wood-working $$ IN YOUR SPARE TIME!

Learn how you can build up a profitable spare or full-time business in your own home. This new book "How to Make Money in Woodworking" is crammed with practical tested ideas, plans, and suggestions. Tells you exactly what to make, how to make it and how to sell it. Describes plans that have worked for others. Woodworking, the new way, is light, pleasant and profitable. Send only 10c and complete book will be mailed postpaid. Satisfaction guaranteed or money refunded. Write to Dept. 1108.

Delta Mfg Co. 600 E. VIENNA AVE. MILWAUKEE, WIS.

NOW ONLY $5.00

REAL ENGINE VALUE

Over 7,000 GHQ Gas Engine Kits have been sold at $8.50. Now is your chance to buy the *New Improved* kit for $5.00 absolutely complete with coil, plug, etc. Send only $1.—Shipped Exp. Coll. for balance same day. Catalog 3c.

A screwdriver is the only tool you need. Average assembly time 30 minutes.

GHQ MOTORS, 854T East 149 St., New York, N.Y.

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

FREE AEROPLANE with motor purchase. Easy terms, only $12.50 down. 200 pounds useful load. Welded steel construction. Propellers—all types—98c up. Sensational values. Illustrated information 25c. Universal Aircraft, Fort Worth, Texas.

DEALERS, Jobbers! Real profits on model supplies. Stamp brings new wholesale list. Modelers write for free retail list. Waterbury Model Builders Supply, 131 Cherry Street, Waterbury, Conn.

$5.00 A YEAR RAISING CANARIES. A pleasant and profitable hobby. Write for Free circular. J. Carozza, 1310 Baltimore, Middletown, Ohio.

GMS SUPER CATALOGUE—lists everything for gas powered models. Get your Free copy To-day. GMS, 311 A Second North, Syracuse, N. Y.

CORRIGAN PHOTO BUTTON. Get this great hero button for only 10c. Also Howard Hughes. Both for 15c. Stephen's Novelty, 252 Market St., Newark, N. J.

PILOTS—QUIZ SYSTEM text book revised June 1938 contains Navigation, Meteorology, Aircraft, Engines and new Civil Air Regulations with the questions and answers. Why fail on your examination? Only $2.00 postpaid, or C.O.D. Dept. B, Quiz System, 1435 Flower St., Glendale, Calif.

14" FINISHED M.R.L. GAS PROPS!!
LATEST DESIGN, MOST EFFICIENT PROPS EVER MADE, AND LOOK AT THE PRICE!!! **2 for only $1.00**

M.R.L. SPECIAL BROWN RUBBER
The Champion Model Airplane Rubber!!

1/32"—35 ft. 5c—225 ft. 25c	1/8" —10 ft. 5c—225 ft. 70c
3/64"—25 ft. 5c—225 ft. 30c	9/64"—10 ft. 5c—225 ft. 75c
1/16"—20 ft. 5c—225 ft. 35c	5/32"—15 ft. 10c—225 ft. 85c
5/64"—20 ft. 5c—225 ft. 40c	11/64"—15 ft. 10c—225 ft. 90c
3/32"—15 ft. 5c—225 ft. 50c	3/16"—15 ft. 10c—225 ft. 95c
7/64"—15 ft. 5c—225 ft. 60c	1/4"—10 ft. 10c—225 ft. $1.20

M. R. L. Rubber Lubricant—Tube 10c; 3 oz. 30c
M. R. L. Microfilm Solution—3 oz. 30c; ½ pt. 65c
M. R. L. Contest Cement—Large tube 10c; 3 oz. tube 30c
Berryloid Clear Dope—½ pt. 30c; pint 50c; quart 90c
New Lightweight Airwheels—3" diam. $1.25 pr.; 3½" $1.50 pr.
Champion Spark Plug—⅞x24 Standard 65c each

No Orders Under 50c Accepted

MODEL RESEARCH LABORATORY
3531-T North Western Ave. Chicago, Illinois

A MAN'S GAME

(Continued from page 50)

"Tell Morton it was Mattell who did the kidnaping," he said to Red. "He is on his way to Chicago now in that Stebling, repainted green. There are two of his men dead in his lodge on Mullet Lake. I shot down Angel-face Holliday. He doesn't have to look for him. How soon does that game begin?"

"Leatherneck says in one hour," Red answered. "You have Wren?"

"I have him," Bill said. "He has been doped but he'll be all right by the time we get there. He'll miss the first half. Tell Sandy he has to do the work of two men until we get there. I'm signing off."

VII—BARFORD'S BAD BREAK

JUST as the rest of the team came into the Barford dressing room at the end of the first half, Leatherneck Coe's sedan screamed to a stop outside. Bill Barnes was at the wheel, and in the back seat sat Red Gleason and a revived Pete Wren.

They rushed him into the dressing room where two doctors, trainers and Leatherneck Coe examined him. After a few minutes the doctors told Leatherneck that Wren was in fit shape to play. Five men helped him into his clothes while the coach tried to tell him what to expect from Dartmore.

"They're going to make their big bid in the third quarter, Wren," Leatherneck said. "Sanders is almost gone. He played for both of you through the first half. You've got to stop them in the third and then go into the air in the fourth to pull this game out of the fire. Everything depends on you!"

"I'll stop 'em," Wren said. "I'm all right. I'll stop 'em!"

The Barford line-up was intact except for the substitution of Wren for Alcock. For the first ten minutes of that quarter they fought like madmen to stem the Dartmore wave of strength, displaying all the tricks in their bag. Back and forth the two teams hammered and clawed, until it seemed inevitable that one of them must crack. After the first three plays Pete Wren appeared to be his old self again, and Sandy began to take heart. The boy was blocking and tackling with deadly accuracy.

And then Barford got her second bad break of the game.

Taking a Dartmore punt over his shoulder, Pete Wren eluded the first three men who dove at him and went scampering across the field with Sandy by his side. The Barford stands rose as they crossed the midfield mark. Sandy threw his body across a Dartmore back and went down. But Wren kept on, straight-arming, side-stepping, giving them a foot and taking it away.

On the Dartmore twenty-yard line two men caught up to him, coming from different sides. They both hit him at once. Three others piled into the play, and when the referee untangled them Wren lay stretched out on the ground, one leg sprawled grotesquely.

A trainer and then a doctor ran out from the side lines. A few minutes later they carried Wren from the field, still unconscious. A groan of anguish went up from the Barford stands.

For one sickening moment Sandy gave the game to Dartmore. Then he saw the uncertainty and despair written on the faces of his teammates. And they were looking at him. He called them back into a huddle.

A smile of confidence fastened itself on his freckled face and spread to the rest of them. Someone made a wisecrack and they all laughed, dangerously.

"Watch that left tackle," Sandy went on. "When the play is coming through him he stands with both feet parallel. If it's going to the right his right foot is back. If it's going to the left his left foot is back. If it's a pass or kick he plays high so that he can get through to protect the receiver or make the tackle. Keep your eye on him. And now, you swabs, let's take 'em!"

Three bucks at the line lost Barford five yards. On fourth down the ball was grounded on a pass and went to Dartmore on their own twenty-five-yard line. Captain Roberts dropped back as though to kick on first down. The ball snapped back to Wood as he circled. Roberts took the ball from Wood as he spun half around. He dropped back as his ends and Wood raced down the field. Wood, who had cut out far to the right, suddenly turned as Roberts whipped the ball at him. He took it out of the air and when he came down he was running. Not a man laid a hand on him before he crossed the goal line.

Sandy knifed through the Dartmore line and blocked the kick as the whistle ended the quarter.

The Barford stands were so strangely still as the fourth quarter began that the man at the radio mike could be heard halfway down the field.

"Folks, *I wish* you could see this boy Sanders now. He has gone wild again. Where he gets the strength I don't know. He ran back the kickoff twenty-five yards. Then Alcock, who took Wren's place, fumbled. All the breaks are against Barford, but they are in there fighting. Barford held Dartmore for three downs and now they are kicking again. Roberts gets off a high punt intended for Beasley. But Sanders cut across the field and took it.

"There he goes! Five—ten—fifteen—twenty—he's running like a deer. He's over in Dartmore territory and they can't bring him down. Every man on the team has had a shot at him. He gives 'em his feet and he gives them his hips and then he takes 'em away again. He just straight-armed a man so hard the man lit on his back five feet away.

"He's *over!* Over for a touchdown and the score is tied again! *What a* football game! What a game and what a man. The crowd has gone mad.

"They're lining up for the kick. Sanders is going to try to convert. Oh, oh. It was too low. The score is still tied. Unless something startling happens it is going to be a tie game."

When Sandy trotted back to his position for the next kickoff he was half-delirious with pain. He motioned to Colbert and told him to play it safe. His back ached unmercifully. It throbbed and stabbed as a result of an iron knee brace being ground into it.

He cursed and cajoled and pleaded with the team in the huddle.

"Listen," Sandy said to Captain Barron, "if we're going to pull it out we've got to get into the air. Their left half has been playing in closer to the line all the time. If you can block out their left end and Colbert can lay the ball in my arms I can outrun them. Let's give it a try."

"O. K.," Barron said. "I'll take the ball from center, spin and toss it to Colbert while you get out there."

"Let's go!" Sandy said.

As the ball sped back to Barron and he spun around with it, Sandy began his sneak out to the right. Colbert took it and faked a pass to the left end. His arm came around and he flipped it straight into Sandy's outstretched hands. He raced wide as Barron took out the end. Side-stepping, dodging, whirling, he got into the clear. The left half was sucked in too far to catch him. He outran him and stumbled over the goal line with his breath coming in sobbing gasps, then dropped unconscious.

Colbert kicked the goal and the score was 20—13 with Barford on the long end. The game ended as Barford kicked to Dartmore.

Bill Barnes and his men and Leatherneck Coe were crowded around young Sandy when he opened his eyes. He tried to sit up but Leatherneck and the doctor pushed him back.

"Let me go in again, Leatherneck," he said.

"It's all over, old son," Leatherneck said, and his eyes were misty. "Twenty to thirteen. You won the game, kid."

"And you won a hundred and sixty bucks that Red and I bet for you," Shorty Hassfurther said in his ear.

"Gimme my pants," Sandy said. "I know a place to spend it!"

(Continued from page 95)

my duel with Ortman around the first few laps neither one of us opened his motor to its fullest extent. We were still carrying a full load of gasoline, and when you are whirling a ship around the pylons at 300 miles an hour a heavily loaded ship is a great disadvantage.

This year for the first time the planes and pilots paraded in front of the grandstand before going down to the end of the field for the take-off. The post parade was similar to that at any race meeting, and although we pilots felt a bit conspicuous plodding along behind our ships, it met with great approval from the crowd, and did give the public a chance to observe the racing planes before they took to the air.

We had a few very exciting moments just before the start. My other plane, flown by Lieutenant Mackey, was third from my ship, and we were all on the line about twenty-five minutes before the start. Some of the lads had gassed in the pits, but I didn't want the strain on my ship, so it was pulled the mile and a quarter to the starting line with empty tanks, and there I gassed both ships. I did not want to start my engine until ten minutes before the race, so I sent my mechanic to complete gassing the Wedell-Williams and start the engine. When the bombs signaled ten minutes before the start of the race my mechanic was still attempting to turn over the engine in my Wedell-Williams.

As my own motor was a particularly heavy one to start, you can imagine my feelings watching my mechanic down the line struggling frantically to finish that job and get back to the Pesco. Once we were on the starting line, no mechanical failure was allowed to delay the scheduled start. I knew Don could not immediately leave Joe's ship, and since I wanted to be sure of having my motor warmed up for at least ten minutes, I told my mechanic's assistant and my manager, Eddie Robbins, who were with me, to jump up on the wing of my ship and to start winding. They wound it up with a whirl and fortunately the engine turned over at the first try. I settled back knowing I would have at least one airplane in the race. Then came the bombs indicating five minutes to go. I could still see Lieutenant Mackey working feverishly in his cockpit to start that balky engine. Not till two minutes later did he succeed. After the race Joe said he would never want to go through another seven minutes like that.

At the five-minute mark announced by the bombs, the starter and his assistant each raised a red flag above his head. As each minute ticked past they gave us the signal by four, three, two and one downward movements of the left hand. At the one-minute mark they raised the white flag, and when they dropped this we gave her the gun and were on our own.

The start was straight down the field past the grandstands, and a mad race for all airplanes to get off the ground and safely around the first pylon. I managed to lift my ship off a moment behind Ortman in his Marcoux-Bromberg. Earl had a lighter load to lift than I did, and beat me into the first turn by a short distance.

I imagine the lead changed a dozen times during the first part of the race. However, after rounding the sixth lap and going into the back stretch, I pulled my choke to get a little leaner mixture into the carburetor. It was a successful move, as I immediately picked up about ten miles per hour and with that I had the necessary speed to pass Ortman, not meeting up again with him until the twenty-ninth lap. In talking with Earl after the race he said that at approximately the same time I had changed my gasoline mixture he had endeavored to do the same. He did not get the same break, and thought his ship lost a few miles per hour as a result of his attempt. However, such is racing luck.

On the twenty-ninth lap, coming into the stretch in front of the grandstand, I finally succeeded in lapping Ortman. I knew this assured me of a ten-mile lead, and if I avoided cutting my pylons and the old motor continued to tick as sweetly as she had been doing during the past hour, I was in. When I got the checkered flag as I completed the thirtieth lap I went around the course again just for luck and the sheer joy of it.

Now that I had accomplished what I had planned for so long, the next thing to do was to get the old bus safely down on the ground. Tony le Vier had hit some bad ground in landing the previous day, and my ship lands at much greater speed than his. However, I took it up to about 3500 feet, made a wide circle and brought it in on a long, straight glide. She hit the ground O. K., then started to bump as I hit some rough spots while rolling at about 95 miles per hour, and hopped off the ground several times, but I finally managed to hold her and level her off. In taxiing up to the winner's inclosure I was a greatly thrilled and happy person indeed.

Jacky Cochrane and Mr. Crawford, president of the Thompson company, grasped my hand. The next minutes were too crowded to attempt a description, but you can understand how I felt after having set a new world's record at 283.149 m.p.h., beating the previous record of 264.261 made by Michael Detroyat of France at Los Angeles in 1936, and being the only one to have won this classic for the second time.

EMBARRASSED BY HORRID PIMPLES?

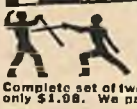
Help protect your skin against intestinal waste poisons

Ridiculed and shunned because of ugly, pimple-blemished skin? Get right at a common cause of the trouble—guard against intestinal waste poisons.

Between 13 and 25, the skin is apt to be oversensitive. At the same time, poor digestion and elimination often throw waste poisons into the blood stream . . . that may be carried to the skin and cause repulsive, ugly pimples to break out.

Many young people help solve this problem—simply by eating Fleischmann's Yeast. Each cake of this famous fresh food helps eliminate intestinal waste poisons from your body *before* they can get into the blood stream . . . and so gives your pimples a chance to clear up. Don't run the risk of permanent scars from neglected pimples. Start eating Fleischmann's Yeast now—3 cakes daily—one cake ½ hour before each meal. Begin now!

FREE Sensational OFFER
2 FENCING SWORDS FREE
FENCING
WORLD'S FINEST SPORT
HARMLESS-EXCITING FUN



Develops strong body and alert mind. HARMLESS. The spring-steel 3-foot-long foils (swords) are equipped with rubber buttons. Aluminum cup-shaped hand guards. Our DeLuxe foils are built for hard usage. Complete set of two foils (swords) and free instruction booklet, only $1.98. We pay postage. Two additional fencing swords FREE for limited time. (Regular price of these two sets of foils $3.96.) ORDER NOW.

ALL-AMERICAN FENCERS GUILD, Dept. 11AT, 48 W. 48th St., New York

DODGING CLOUDS IN MEXICO

by

BERNARD A. LAW

is the story of establishing the C A T L lines in Mexico, of flying everything from snakes to silver, peons to Presedentes. It is crowded with laughable, adventurous and serious anecdotes about Amelia Earhart, Will Rogers and others whose names you know.

You'll enjoy reading it in the

DECEMBER NUMBER
of
AIR TRAILS

Sky Kitten 1-place Biplane

Lightest of modern high performance airplane with 40 to 50 h.p. engine. Gross weight 650 lbs., wing area is 70 sq. ft. Top speed with 40 h.p.=120 m.p.h.

Knight Twister, 75 h.p., wing area 55 sq. ft. Gross weight=750 lbs., top speed=160 m.p.h.

Knight Twister Sr., wing area=79 sq. ft. Gross weight=950 lbs., 95 h.p. "Monsoon" engine. Top speed—180 m.p.h. with 120 baggage.

New Low Wing Pusher two-place side-by-side with tapered wings, and new tri-cycle landing gear, 50 h.p. engine—96 m.p.h.—wing area=152 sq. ft. Gross weight=1100 lbs.
3-view drawing of any design—each 60c.
Shop drawings of Sky Kitten or Knight Twister; each set $5.24.

Payne Aircraft Corporation
R. R. 1— Joliet, Ill.

It was a proud moment for me and I know I shared it with my mechanic, Don Young. He did a great job.

After Jacky Cochrane grasped my hand, among the many people who pressed forward to greet me the one I remember most was Mrs. Rudy Kling, whose husband won the Thompson Trophy last year and was killed a few months later in a crack-up in Miami.

I will be back next year with a new racer that will be faster than my Pesco special, for already we have plans for a ship that I am sure will see the record go over three hundred miles per hour next year.

WINNERS

1st—Roscoe Turner, Chicago, Turner-Laird Pesco special plane, Pratt-Whitney Twin Wasp, Sr., engine; time, 63 minutes, 30.61 seconds; speed, 283.419 miles per hour; won, $18,000. 2nd—Earl H. Ortman, San Diego, Cal., Marcoux-Bromberg special, P-W Twin Wasp, Jr.; time, 66:44.18; speed, 269.718 m.p.h.; won $9,000. 3rd—S. J. Wittman, Oshkosh, Wis., Wittman racer, Curtiss D-12; time, 69:26.87; speed, 259.187 m.p.h., won $4,500. 4th—Leigh Wade, Buenos Aires, Military Aircraft Corp. One, P-W Twin Wasp, Sr.; time, 72:02.74; speed, 249.842 m.p.h.; won $2,500. 5th—Joseph Mackey, Columbus, O., Wedell-Williams, P-W Hornet; time, 72:06.44; speed, 249.628 m.p.h., won $1,800. 6th—Joseph P. Jacobson, Kansas City, Keith Rider, Menasco C6S-4; won the sum of $1,400.

Jacobson was flagged down after twenty-seven laps and credited with sixth place. Arthur C. Chester of Los Angeles completed twenty laps. Harry H. Crosby of Los Angeles completed ten laps.

The Special Ludlum award of $4,000 for a new Thompson record was won by Roscoe Turner.

LIGHT PLANES

(Continued from page 76)

Beverly Aero Club, Beverly Airport, Beverly, Mass.
Blakeslee Flying Club, Preserve, Pa.
Burlington Flying Club, Burlington, Wis.
Canajoharie Aero Club, 101 Reed Street, Canajoharie, N. Y.
Chattanooga Flying Club, Lovell Field, Chattanooga, Tenn.
Chesapeake Flying Club, Curtiss-Wright Airport, Baltimore, Md.
Chester Aero Club, Chester, Pa.
Cub Aero Club, Candler Field, Atlanta, Ga.
Darius-Girenas Aero Club, 262-A Humboldt St., Brooklyn, N. Y.
Detroit Sky Club, Detroit City Airport, Detroit, Mich.
Dixie Flying Club, P. O. Box 150, Chattanooga, Tenn.
Dixon Flying Club, Dixon, Ill.
Eaglet Aero Club, Room 420, Y. M. C. A., Janesville, Wis.
Elm Aviation Club, Buffalo Airport, Buffalo, N. Y.
Elmira Gliding Club, c/o S. J. Iszard, N. Main St., Elmira, N. Y.
Elmira Flying Club, 800 Copley St., Elmira, N. Y.
Falcon Aero Club, R. C. A. Victor Co. Bldg., 6-2, Camden, N. J.
Flying Six Club, 4152 Locust St., Riverside, Cal.
Four Aces Flying Club, 48 Mechanic St., Bradford, Pa.
Four Plus Four Flying Club, 831 Wesley Ave., Oak Park, Ill.
Frederick Flying Club, Frederick, Md.
Fresh Air Flying Club of America, Hicksville, N. Y.
Garfield Park Flying Club, 100 N. Central Park Ave., Chicago, Ill.
Harford Flying Club, Belair, Md.
Harper Flying Club, Harper and Seven Mile Road, Detroit, Mich.
Harlequin Flying Club, San Francisco Bay Aerodrome, Alameda, Cal.
Hill Flying Club, 634 East Stephenson St., Freeport, Ill.
Huntington Flying Club, Fifth Ave. Arcade Bldg., Huntington, W. Va.
Intercourse Glider Club, Intercourse, Pa.
Ithaca Flying Club, Willard Straight Hall, Ithaca, N. Y.
Johnson City Flying Club, Johnson City, Tenn.
K-12 Aero Club, Municipal Airport, Springfield, Mo.
Kewanee Flying Club, Kewanee, Ill.
Lake Charles Flying Club, Lake Charles, La.
Lansing Aviation Club, 615 N. Capitol Ave., Lansing, Mich.
Lock Haven Flying Club, Lock Haven Airport, Lock Haven, Pa.
Lockport Eaglerock Flying Club, Lockport, N. Y.
Louisville Flyers, Inc., 624 E. Chestnut St., Jeffersonville, Ind.
Mankato Flying Club, Mankato Airport, Mankato, Minn.
Marion Aviation Club, Marion, Ind.
Marion Flying Club, Marion, Ind.
Marywood Flying Club, 5525 Cornell Ave., Chicago, Ill.
Md. Flying Club, 5525 Cornell Ave., Chicago, Ill.
Michigan Aero Club, 12642 Manor Road and Detroit City Airport, Detroit, Mich.
Michigan Skyways Club, 3456 Penobscot Bldg., Detroit, Mich.
Modesto Glider Club, Municipal Airport, Modesto, Cal.
Negaunee Aviation Club, 308 Cyr St., Negaunee, Mich.
Newark Aero Club, Newark Airport, Newark, N. J.
New Castle Aero Club, 152 E. Second St., New Castle, Del.
Niagara Frontier Flying Club, 933 Starin Ave., Kenmore, N. Y.
99-Club of New York, Gotham Hotel, N. Y. C.
Northfield Flying Club, Northfield, Minn.
Oil City Aero Club, c/o Bundred Oil Corp., National Transit Bldg., Oil City, Pa.
Orion Flying Club, 393 Main St., Hackensack, N. J.
Ox Flying Club, 6529 Kedvale Ave., Chicago, Ill.
Pegasus Flying Club, Hangar 3, Floyd Bennett Field, Brooklyn, N. Y.
Pittsburg Flying Club, 501 N. Catalpa St., Pittsburg, Kan.
Presque Isle Flying Club, Kearsarge, Pa.
Private Flying Club, c/o Walter Sundstrom, Route 7, Yakima, Wash.
Prop and Wing Club, Colonial Hangar, Buffalo Airport, Buffalo, N. Y.
Providence Flying Club, Providence Airport, Seekonk, Mass.
Reading Aero Club, c/o Bernharts, P. O., Madlera Airport, Reading, Pa.
Revere Flying Club, Muller Field, Revere, Mass.
Rising Sun Aero Club, 938 Carver St., Philadelphia, Pa.
Riverside Aero Club, 4629 Penrose St., Riverside, Cal.
Romney Aviation Club, Romney, W. Va.
Royal Flyers, Detroit City Airport, Detroit, Mich.
St. Joseph Valley Aero Club, Municipal Airport, South Bend, Mich.
Salines Flying Club, Ave. A and Lincoln, Salines, Cal.
San Francisco Flying Club, San Francisco Airport, San Francisco, Cal.
San José Aero Club, 545 Alviso St., Santa Clara, Cal.
Shreveport Aero Club, Municipal Airport, Shreveport, La.
Soaring and Gliding Club of Chicago, 4845 Waveland Ave., Chicago, Ill.
Sonoma County Flying Club, 722 First St., Santa Rosa, Cal.
South Bend Glider Club, 3002 Hendricks St., South Bend, Ind.
South Bend Aero Club, 8300 Cicero Ave., Chicago, Ill.
Southern Aeronautical Club, 3722 Fulton Ave., Hapeville, Ga.
Southwest Flying Club, 5439 South Sawyer Ave., Chicago, Ill.
Sportsman's Glider Club, 2325 Congo Ave., Akron, O.
Sportsman Pilot Club, 2309 E. 10th St., Indianapolis, Ind.
Strenberg Motors Flying Club, 6035 Cottage Grove Ave., Chicago, Ill.
Towanda Flying Club, Towanda, Pa.
Tri-County Aeronautical Club, 510 W. 3rd St., Plainfield, N. J.
Trott Aviation Club, 254 72nd St., Niagara Falls, N. Y.
Twenty-one Club, 320 S. 21st St., St. José, Cal.
Twin Peaks Flying Club, National Parks Hangar, Salt Lake City, U.
University of Akron Glider Club, c/o Dean Triplett, U. of Akron, Akron, O.
University of Detroit Flying Club, McNicols at Livernois Rds., Detroit, Mich.
University of Minnesota Flying Club, U. of Minnesota, Minneapolis, Minn.
Vero Beach Glider Club, Vero Beach, Fla.
Waukegan Flying Club, Waukegan, Ill.
Weonit Flying Club, Bayside Airport, Hingham, Mass.
Whirlwind Flying Club, Essex Airport, Caldwell, N. J.
Youngstown Aviation Club, 1315 Quinn St., Youngstown, O.

QUESTIONS

(Continued from page 93)

Clark "Y", which I know nothing about. I would like to know what Eiffel 431 means. O. R., Delan, Cal.

Answer: By airfoil is meant the cross-section or rib profile of a wing designed in such a way as to sustain the weight of the plane in the air. Clark "Y", N.A.C.A. or Eiffel 431 are types of airfoils. There are thousands of such types and there would not be space enough in one issue to describe them. Write to the National Advisory Committee for Aeronautics, Washington D. C., for their booklet on airfoils.

Question: Is a German Heinkel pursuit the same as the Hawker Hurricane? W. N., Aspen Tunnel, Wyo.

Answer: No. The Heinkel pursuit is an entirely different ship from the Hawker Hurricane. The Hurricane is a British ship powered by a Rolls-Royce Kestrel while the Heinkel is German and powered with either the Benz-Mercedes gasoline motor or a Junkers Jumo Diesel.

Question: Could you please tell me just what is required to join the Naval Air Corps? If a college education is required, which college is advisable? W. H., Keansburg, N. J.

Answer: To enter the Naval air force you must have at least two years of college education or pass a written examination which is its equivalent. Any college is acceptable.

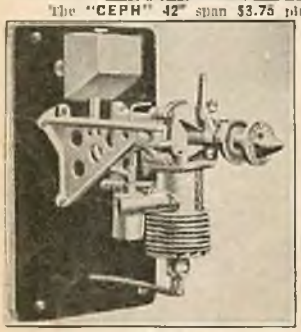
Question: I just finished school and would like to get into aviation. My eyes aren't very good so I would like to know if I could get an airplane mechanic's course either in the Army or the Navy. I had three years of machinist trade in school. E. D. H., Ambridge, Pa.

Answer: Write to the Commandant, Aircraft Technical School, Rantoul, Ill. This school trains men for all ground aviation trades.

YOUR HOBBY IS YOUR BEST PAL

The "CEPH" 42" span $3.75 plus 25c P.P. use ½ to 1/10 H.P. motor.

"REARWIN SPEEDSTER" 39" span $3.95 plus 25c P.P. use ⅛ to 1/10 motor.



"HUSKY MOTOR" ⅛ H.P. Price $12.50 P.P.

"TAYLOR CUB" 72" span price $5.50 plus 50c P.P. use 1/5 to 1/2 H.P. motor.

AIRCRAFT GAS MODELS

EACH KIT CONTAINS

Red and Yellow American Bamboo paper and Cement, completely formed shock absorbing Landing gear struts, formed Motor mount to fit any engine desired, Rubber wheels, detachable wings for convenient carrying, finished cut to shape Celluloid windshields, Aluminum for cowling and the finest grade of Balsa wood obtainable. Clear Dope is furnished extra, 50c per Pint or 30c ½ Pint. BUILT RIGHT FOR BETTER FLIGHT.

Authentic One-Quarter Inch to the Foot Solid Scale Models

AIRCRAFT

AIRCRAFT

"BELL FIGHTER AIRACUDA"

A perfect ¼" scale model of America's latest and most popular fighter. THE EAGLE OF THE SKY. Complete in every detail, body, wings, nacelles, and tail surfaces cut to outline shape. Color: Army yellow and blue. Wing span: 17". Price: $1.00 plus 20c for packing and postage.

MARTIN

BOMBER

The U. S. Army's modern giant, ¼" scale. Wing span: 17". Color: Army blue and yellow. All difficult parts cut to shape. Price: $1.00 plus 20c for packing and mailing.

BOEING F4B4, Colored white and yellow $ .35

NEW MONOCOUPE Colored all yellow, red trim $ .25

EACH AIRCRAFT KIT CONTAINS

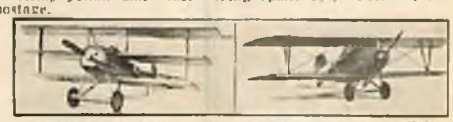
Liberal portions of colored lacquers and cement, finished pine wheels, colored insignias, rigging wires, most difficult parts cut to outline shape, detailed drawings, die cast Propellers and Pilots and many other fine features too numerous to mention. All Wartime kits contain super detailed Machine guns. The following Kits contain detailed Radial Engines and spun metal Cowlings, Boeing P 26 A, Boeing F 4B1, Boeing F 4B2, 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.

25 Cents Each	35 Cents Each
Spad 13	Boeing F4B3
Fokker D 7	Boeing F4B1
Fokker D 8	Boeing P26A
Fokker Tripe	Curtiss Goshawk
S. E. 5. Pursuit	Curtiss BF2C1
Waco Custom	Boeing P12E
Nieuport 17 C1	Boeing P12F
Sopwith Camel	Northrup XFT1
New Monocoupe	Grumman F2F-1
Albatross D5	Consolidated P30
Curtiss Hawk PGE	
Howard Mulligan	

DE HAVILAND 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.



FOKKER TRIPE. All red black detail.

ALBATROSS D5. Colored red and blue.

FOKKER D7. Colored red wings blue fuselage.

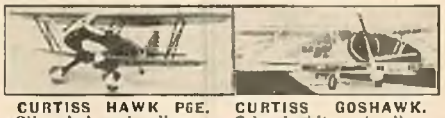
FOKKER D8. Colored red and blue.

SPAD 13. All yellow black detail.

S.E.5. All yellow, black detail.

SOPWITH CAMEL. Colored Blue and Olive.

NIEUPORT 17. Colored yellow and blue.



CURTISS HAWK PGE. Olive drab and yellow.

CURTISS GOSHAWK. Colored white and yellow.

AUTHORIZED DEALERS

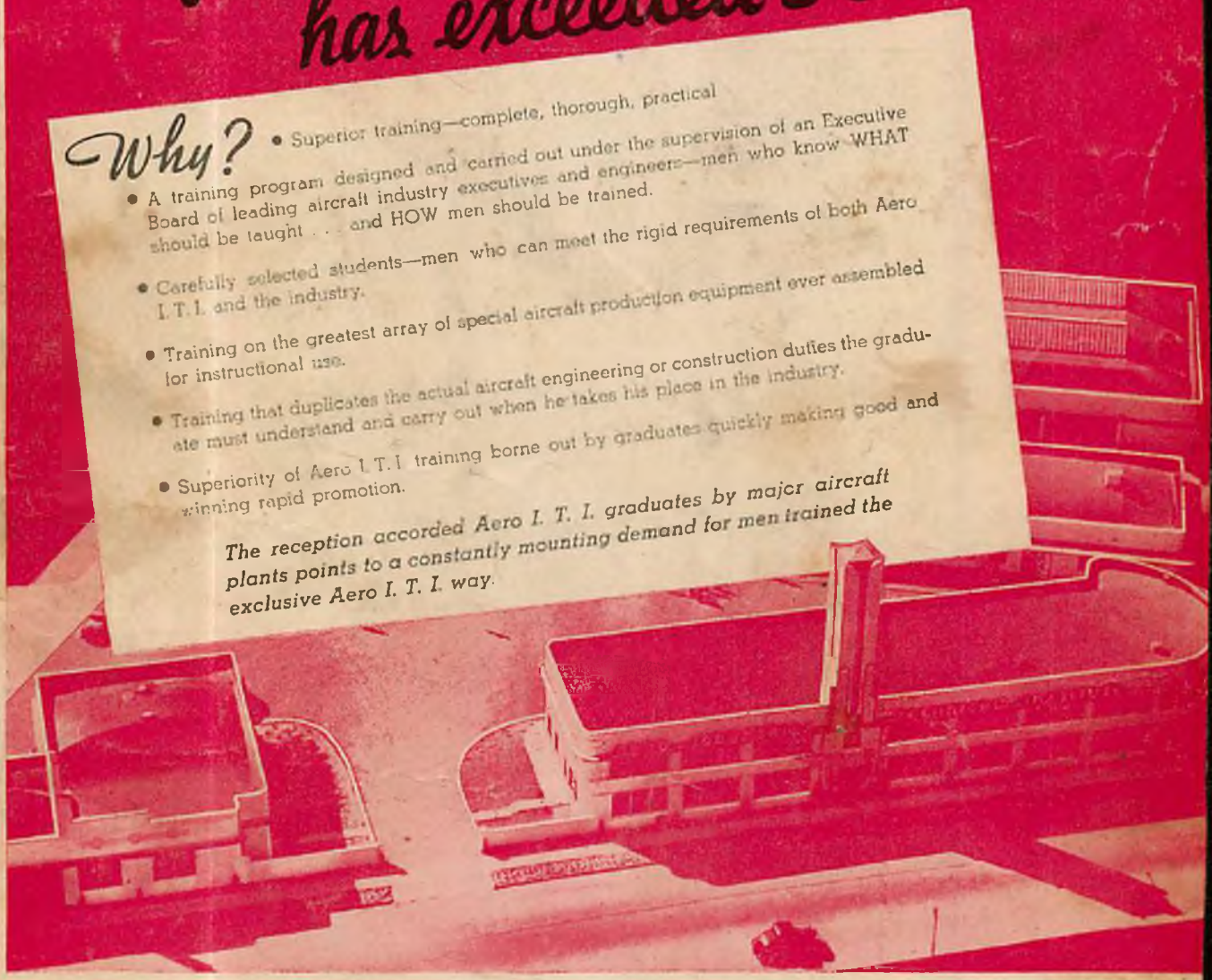
The unusually high percentage of repeat orders for our product definitely proves the superiority of AIRCRAFT kits. **Write Today.**

NOTE. All pictures on this page are photographs of actual models.

For foreign shipments add 25%

AIRCRAFT, 4346-48 NORTH PULASKI RD., DEPT. B. 11., CHICAGO

DEMAND for Aero I.T.I. graduates has exceeded SUPPLY!



Why?

- Superior training—complete, thorough, practical
- A training program designed and carried out under the supervision of an Executive Board of leading aircraft industry executives and engineers—men who know WHAT should be taught . . . and HOW men should be trained.
- Carefully selected students—men who can meet the rigid requirements of both Aero I. T. I. and the industry.
- Training on the greatest array of special aircraft production equipment ever assembled for instructional use.
- Training that duplicates the actual aircraft engineering or construction duties the graduate must understand and carry out when he takes his place in the industry.
- Superiority of Aero I. T. I. training borne out by graduates quickly making good and winning rapid promotion.

The reception accorded Aero I. T. I. graduates by major aircraft plants points to a constantly mounting demand for men trained the exclusive Aero I. T. I. way.

AERO I. T. I. COURSES

AERO I. T. I. Supervised Courses are confined to the designing and building of modern airplanes (no flying involved). They include: Master Aircraft Mechanics; Aeronautical Engineering, Design and Drafting; and Combination Aircraft Mechanics, which may be started at home no matter where the student lives, with later practical training in the extensive Aero I. T. I. Shop.

All training at Aero I. T. I. is under the supervision of a world-known group of aircraft executives and engineers w comprise the Executive Board. Their copyrighted course one of the many exclusive features of Aero I. T. I. traini

EXECUTIVE BOARD

C. A. VAN DUSEN
Vice-Pres., Consolidated Aircraft Corporation

JOHN K. NORTHROP
formerly Pres., The Northrop Corp., and Vice-Pres., Douglas Aircraft Company, Inc.

ROBERT E. GRO
President, Lockhe Aircraft Corporati

AERO I.T.I.

Aero INDUSTRIES TECHNICAL INSTITUTE

5257 WEST SAN FERNANDO ROAD • LOS ANGELES, CALIFORNIA

AERO INDUSTRIES TECHNICAL INSTITUTE
5257 West San Fernando Road, Los Angeles, Cali

Please send immediately complete details on your trainin program, and free copy of your new booklet, describing to day's opportunities in the aircraft industry. I am 18 years o age or over and can furnish character references.

NAME_____ AGE____

STREET_____

CITY_____ STATE_____ 5-12