AIR TRAILS Pictorial

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A STREET & SMITH PUBLICATION

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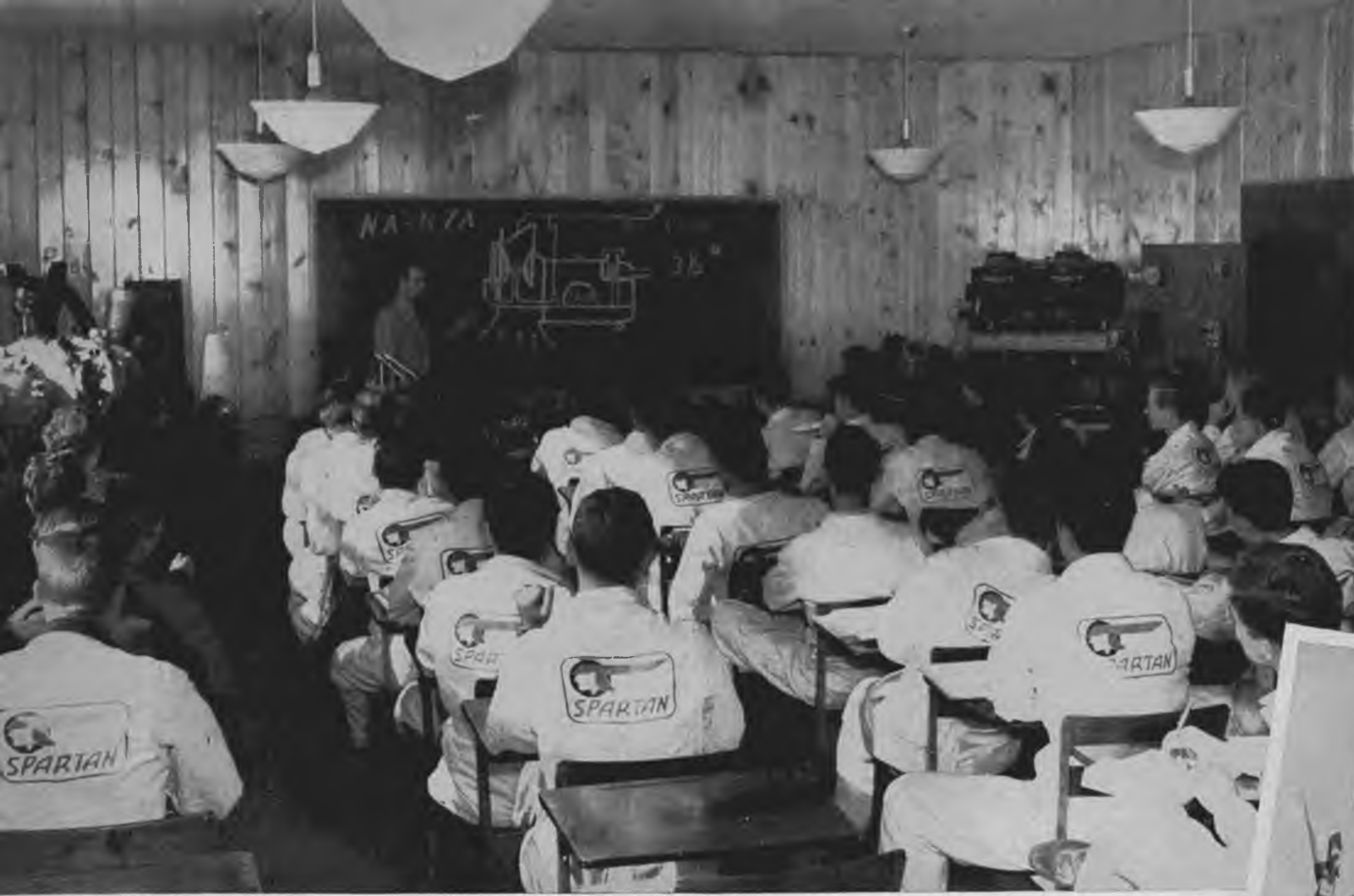
TRANSPARENT FIGHTERS

★ FULL COLOR SPREAD OF LIBERATOR ★

★ FLYING WING MODEL DESIGNING ★

GRUMMAN SHIPBOARD FIGHTER



A STREET & SMITH PUBLICATION

AIR TRAILS *Pictorial*

APRIL, 1943—VOLUME XX NO. 1

CONTENTS

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Gen. Lahm, whose career dates back to the Wright Brothers and ballooning, studies a miniature of Randolph Field, culmination of his training ideas.

AERIAL ARGONAUT

By Capt. James Farber, AAF

PIONEER, EXPERIMENTER, FATHER OF CENTRALIZED PILOT TRAINING, GENERAL FRANK LAHM IS ONE OF AVIATION'S HEROES.

MAJOR GENERAL FRANK PURDY LAHM sees nothing glamorous about his career. Most of his countless friends and acquaintances, who range from youthful model builders to occupants of the White House, have their own opinions and estimates of this venerable argonaut of the airways. Some associate him exclusively with aviation education. Others assert that he is primarily a great experimenter and pioneer. Still others believe that he personifies the spirit of aviation's venturesome youth, and to some he represents solid, plodding scientific achievement.

He is all of these and more. One of his brother officers who has known him a long time put it into hangar lingo once: "He's a paradox, that fellow Lahm." He's a paradox because the average man can't quite connect the long string of accomplishments linked to his name with a person of his quiet personality.

General Frank Lahm is the father of centralized pilot training in the United States. To him can be credited the idea and materialization of Randolph Field, the West Point of the Air. This army show place, home of the Gulf Coast Air Corps Training Center, is the culmination of his theories on aviation training and one of the high points of a career that started when he lived as a boy in Paris and helped his father conduct experiments with gas balloons.

The "firsts" after his name are truly a catalog. He was the army's first airplane pilot as well as its first airship pilot. The army reports that he was the first military cross-country observer and the first United States military passenger, a fine distinction, perhaps, but a valid one. The army has good cause for its pride in General Lahm

Frank Lahm has much in common with his long-time friend and early tutor, Orville Wright. Both were born in Ohio, Lahm on November 17, 1877. Both pioneered in aeronautics during the first five years of the twentieth century. The boy Lahm and his father, Mansfield businessman Frank S. Lahm, were experimenting with balloons in the vicinity of Paris at about the same time that the Wright brothers were rigging their first airplane at Dayton, Ohio. The elder Lahm took young Frank along on his balloon expeditions; it was this experience that enabled the young man to win the great Gordon Bennett International Balloon Race from Paris to Yorkshire, England—402 miles—in (Turn to page 48)

HERE WE GO AGAIN!

"Abel Grasshopper . . . calling Battery B . . . direct hit on target—square Six!" . . . "Battery B to Abel Grasshopper—thanks, nice spotting!"

In World War One, hard-bitten boys in the Field Artillery were, strictly speaking, very much on their own . . . but the glorious job they did is a matter of current history. ☆ ☆ ☆ In today's mechanized warfare of swift move and counter-move, the rolling caissons play an ever-increasing part of vital importance . . . and that's where we came in . . . for the new Aeronca Grasshoppers, tested in that grueling school of Army maneuvers, are now used by flying personnel as an ideal small ship for teaching the successful technique of fire control and target spotting, so necessary to effective Field Artillery operation. ☆ ☆ ☆ Officially designated as the Army's L-3-B, these "First and Finest" Grasshoppers give evidence to the job that Aeronca is doing, of making planes to the exacting requirements of our armed forces. ☆ ☆ ☆ This accomplishment in itself is significant proof of Aeronca's position of leadership in the lightplane field, and indicates what may be expected from Aeronca in the post-war era . . . after the Peace is won, you'll fly a Grasshopper! ☆ ☆ ☆ ☆ ☆

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A full-color book to delight the young in heart . . . Walt Disney's "Mr. Grasshopper Wins His Wings". Send 10¢ in stamps to Dept. T, Aeronca Aircraft Corp., Middletown, Ohio.

AERONCA

FIRST *Grasshopper* FINEST

—but no circus!

Small high-precision parts are an Ohlsson & Rice specialty. Our experience with close-tolerance parts—such as this miniature 8-ball thrust bearing—goes back even prior to the introduction of the precision-built Ohlsson miniature gas engine.

Today, scores of leading companies have found that they could double and treble production and still maintain quality standards. These companies found they could do it because they had to do it. The war effort demanded it.

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Our experience covers numerous small parts that have been adopted by manufacturers for their own products. Your inquiry will be given prompt attention.

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MANUFACTURING COMPANY
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RIGHT OR Not at all!

KNOW 'EM BY NAME

By Peter M. Bowers and Cristopher Wilfried

WEIRD DESIGNATIONS GIVE WAY TO POPULAR NAMES IN U. S. CAMPAIGN TO HELP SPOTTERS LEARN TYPES.

THE planes of American manufacture listed below are ships that are actively engaged in war duty, either in our own army or navy air forces or in the Royal Air Force. The British policy has been to give each plane some distinctive name rather than the unwieldy system of letters and numbers with which the American air forces technically designate their aircraft. In the American system of nomenclature, letters stood for the military purpose of the plane; the army and navy each had different letters, sometimes for the same airplane. Numbers referred to the model of a plane and, in some cases, to the particular modification of a certain model. In the navy system, too, some letters meant the manufacturer of the plane. Thus the army A-24 is the same as the navy SBD. In the army system, A stood for *attack;* 24 meant that it was the twenty-fourth kind of attack plane the army had used. In the navy system, SB stood for *scout bomber,* D for Douglas, its manufacturer. Such a system was obviously too complicated. With the co-operation of the Aeronautical Chamber of Commerce, all the American planes have been given the names which everyone is beginning to know. In many cases, the British name has been adopted.

FIGHTERS

ARMY	NAVY	MFCTR.	U. S. NAME	BRIT. NAME
P-38		Lockheed	Lightning	Lightning
P-39		Bell	Airacobra	Airacobra
P-40E		Curtiss		Kittyhawk
P-40F		Curtiss	Warhawk	Kittyhawk II
P-43		Republic	Lancer	
P-47		Republic	Thunderbolt	
P-51		North American	Mustang	Mustang
	F2A	Brewster	Buffalo	Buffalo
	F4F	Grumman	Wildcat	Martlet
	F4U	Vought-Sikorsky	Corsair	

SCOUT OBSERVATION *(seaplanes)*

ARMY	NAVY	MFCTR.	U. S. NAME	BRIT. NAME
	SO3C	Curtiss	Seagull	
	OS2U	Vought-Sikorsky	Kingfisher	Kingfisher

TRANSPORTS

ARMY	NAVY	MFCTR.	U. S. NAME	BRIT. NAME
C-43	GB	Beech	Traveler	
C-45A	JRB	Beech	Voyager	
C-46	R5C	Curtiss	Commando	St. Louis
C-47	R4D1	Douglas	Skytrain	Dakota I
C-53	R4D3	Douglas	Skytrooper	Dakota II
C-54	R5D	Douglas	Skymaster	
C-56	R5O	Lockheed	Lodestar	Lodestar
C-61	GK	Fairchild	Forwarder	Argus
C-69		Lockheed	Constellation	
C-76		Curtiss	Caravan	
C-87		Consolidated	Liberator Express	
	JR2S	Vought-Sikorsky	Excalibur	

HEAVY BOMBERS

ARMY	NAVY	MFCTR.	U. S. NAME	BRIT. NAME
B-17		Boeing	Flying Fortress	Flying Fortress
B-24	PB4Y	Consolidated	Liberator	Liberator

MEDIUM BOMBERS

ARMY	NAVY	MFCTR.	U. S. NAME	BRIT. NAME
B-18		Douglas	Bolo	Digby
B-23		Douglas	Dragon	
B-25	PBJ	North American	Mitchell	Mitchell
B-26		Martin	Marauder	Marauder
B-34	PV	Lockheed	Ventura	Ventura

LIGHT BOMBERS

ARMY	NAVY	MFCTR.	U. S. NAME	BRIT. NAME
A-20	BD	Douglas	Havoc (attack)	Havoc, Boston
A-24	SBD	Douglas	Dauntless (dive)	Dauntless
A-25	SB2C	Curtiss	Helldiver (dive)	
A-29	PBO	Lockheed	Hudson (patrol)	Hudson
A-30		Martin		Baltimore
A-31	TBV	Vultee	Vengeance (torpedo)	Vengeance I
A-34	SB2A	Brewster	Buccaneer (dive)	Bermuda
A-35		Vultee	Vengeance (dive)	Vengeance
	SB2U	Vought-Sikorsky	Vindicator (dive)	Chesapeake
	TBD	Douglas	Devastator (torpedo)	
	TBF	Grumman	Avenger (torpedo)	

PATROL BOMBERS *(flying boats)*

ARMY	NAVY	MFCTR.	U. S. NAME	BRIT. NAME
OA-10	PBY	Consolidated	Catalina	Catalina
	PB2Y	Consolidated	Coronado	
	PBM	Martin	Mariner	

TRAINERS

ARMY	NAVY	MFCTR.	U. S. NAME	BRIT. NAME
PT-13, -17	N2S1, N2S3	Boeing	Caydet	
PT-19, -23		Fairchild	Cornell	Cornell
PT-22	NR	Ryan	Recruit	
BT-13, -15	SNV	Vultee	Valiant	
BT-14		North American		Yale
AT-6	SNJ	North American	Texan	Harvard
AT-7	SNB-2	Beech	Navigator	
AT-8, -17		Cessna	Bobcat	Crane
AT-10		Beech	Wichita	
AT-11	SNB-1	Beech	Kansas	
AT-13, -14		Fairchild	Yankee Doodle	
AT-15		Boeing	Crewmaker	
AT-19		Vultee	Reliant	
	SNC	Curtiss	Falcon	

LIAISON

ARMY	NAVY	MFCTR.	U. S. NAME	BRIT. NAME
L-1		Vultee	Vigilant	Vigilant
L-2		Taylorcraft	Grasshopper	
L-3		Aeronca	Grasshopper	
L-4	NE—navy trainer	Piper	Grasshopper	

Bruiser

This is the Vega Ventura, a tough looking, tough acting new bomber with some definite family characteristics.

It *looks* like the Hudson only bigger. It's sleek and powerful, with stamina in every spar. It acts like the speedy, record-breaking airline Lodestar only faster and more maneuverable. In action it's a *bruiser*, the biggest, hardest-hitting bomber yet designed and produced by Vega. It carries a bellyful of destruction in its whopping bomb bay and throws 50 caliber death from five gun positions.

U. S. and R. A. F. pilots can tell more about this deadly bomber in the days to come, and they *will* in stories of blasted Axis supply lines, smashed Axis tanks and silenced Axis guns.

A subsidiary of Lockheed

Vega

Aircraft Corporation

WEEMS SYSTEM OF NAVIGATION

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Today with uncanny accuracy American planes are being ferried to all fronts, bombers with their deadly loads are reaching their objectives and transports bring men and supplies unerringly to the far flung corners of the world. The men who guide these planes with such precision to their destinations are the navigators.

It is these men who, when the war is won, will guide our giant commercial airliners over the world wide air lanes we are now establishing.

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C26S—Shielded

CHAMPION SPARK PLUGS which fire at high altitudes and under extremely high pressures in our "hottest" bombers and pursuit ships have exceptional quality of materials, design and workmanship which accounts for their extreme dependability. These very same qualities are inherent in all Champion Spark Plugs.

C26—Unshielded

It takes 112 Champion Spark Plugs to "plug up" a Flying Fortress. And each and every one of them has a real job to do. They fire at a faster rate than the machine guns with which it bristles, and for hours on end, instead of mere minutes. They must fire at pressures and temperatures not encountered in normal engine practice, and they must be so dependable that pilot and crew don't have to give them a thought.

Champion Spark Plugs are filling that rather large order with characteristic distinction. They are being widely used in aircraft engines of every size and type in use by our air forces, and they are piling up records for long life and dependability, hitherto unequalled.

Characteristic Advantages of Champion All Ceramic Insulated Spark Plugs Are:

1. Immunity from heat and chemical reactions.
2. Freedom from fuel, oil, or moisture absorption which causes "shorts."
3. Inherently high heat conductivity with consequent wider range between pre-ignition and fouling.
4. Absolute uniformity of material.
5. Homogeneous structure eliminates air spaces which cause current leakage.
6. Easily cleaned and serviced—no specialized equipment or factory returns necessary.
7. Scientifically controlled manufacture.

Model Builders *Attention!*

Actual Size V-Plug

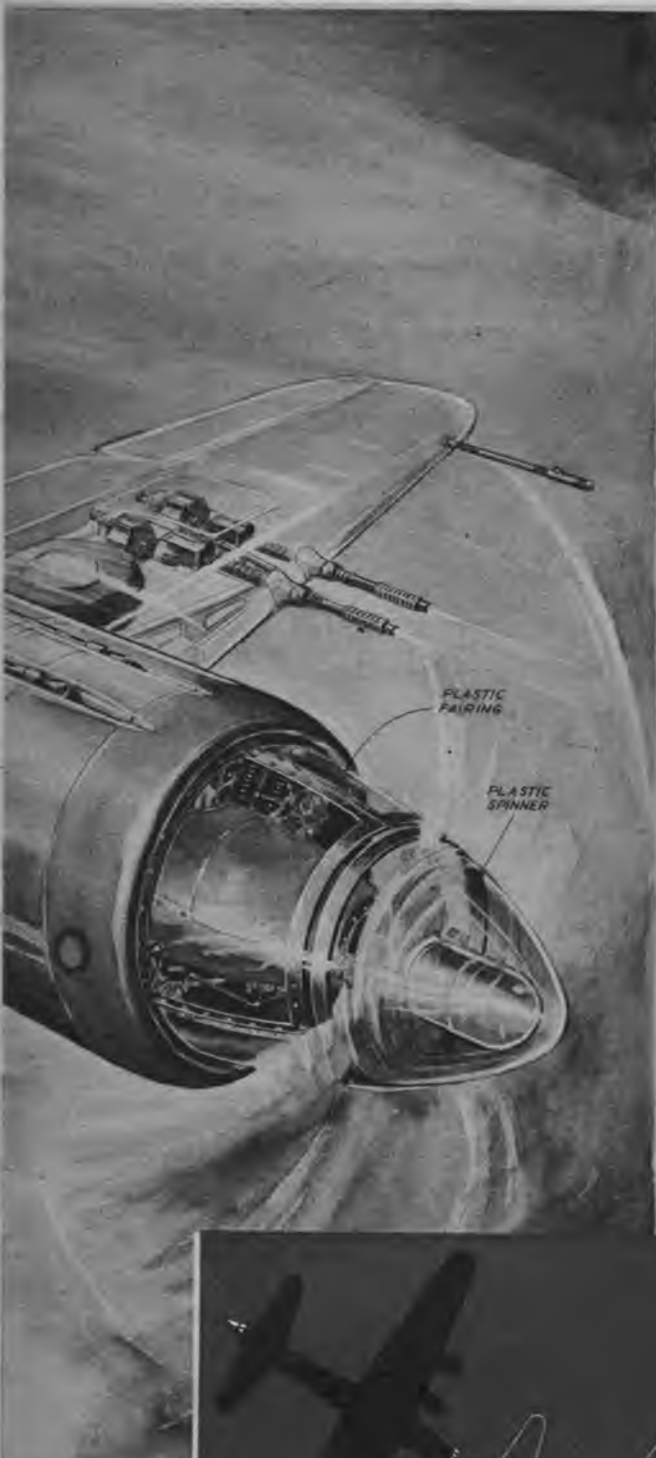
	V	V-2	V-3
Hex	1/2"	3/8"	5/16"
Thread	3/8"-24	1/4"-32	1/4"-32
Thread Length	7/32	7/32	5/32
Weight, Grams	8	3½	2½

Champion spark plugs for model gas engines give the same dependable performance as regular Champions. Sillment sealed. Sillimanite insulator. Alloy needlepoint electrodes for easy starting. One-piece construction.

CHAMPION
SPARK PLUG COMPANY • TOLEDO, OHIO

Something to consider. This bomber nose made by Du Pont is entirely of Lucite, including ribs.

TRANSPARENT FIGHTER



THE popularity of the transparent airplane as a subject for both mild and wild speculation is phenomenal. Almost since the Wright brothers first jolted off the ground at Kitty Hawk, discussion has been rife about transparent bombers which could slip unseen by enemy fighters—or almost unseen; for the pilot, to say nothing of the engine, will be bowling merrily along as though the law of gravity had gone crazy. From time to time stories burble up—always stories which someone has heard from someone—about thin, transparent steels. And if you had a penny for every piece of pseudo-scientific fiction which projects wild yarns of transparent aircraft onto thousands of pages of pulp, you would have a tidy sum.

But now the rapid development of plastics may begin to tinge all these fantastic tales with reality. Aviation Artist Doug Rolfe, giving thought to this intriguing subject, has produced the Focke-Wulfish wrapped-in-cellophane package of dynamite on these two pages. Whether we shall ever see a fighter like this is something for each reader to decide for himself.

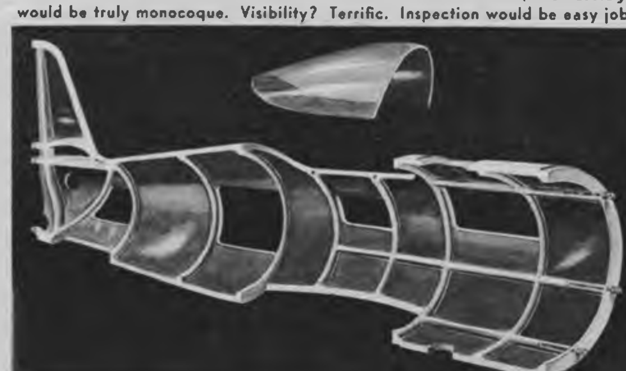
Applications of plastics in airplane manufacturing are mounting in number. One big bomber has over 400 plastic parts, in one form or another. Plastics are used in three forms: pure—as in knobs, instrument panels; reinforced—as in gears and pulleys; and laminated—as in fuselages, wing tips. The third form is that being currently used for primary structures, but the first one would have to be the basis of the transparent airplane. And there's the rub. Pure plastics, by themselves, are not strong enough. Harried engineers point out that a wing cast solidly from pure, clear plastic would be much too weak to support the loads to which a maneuvering airplane would subject it. How much such a wing would weigh we cannot even guess.

Somewhat sturdier but still not strong enough are reinforced plastics. Scraps of cloth, paper or some other materials are stirred into the liquid plastic before pouring. One automobile manufacturer was experimenting with this method of making bodies when the war broke. Laminated wood plastics are very strong; they can be and are being used for making entire airplanes such as the Fairchild AT-14, the Timm trainer and the Langley. All these planes are made by "cooking" layers of plastic-coated wood under heat and pressure into infusible shells

Manufacturing a transparent plane should be an interesting job. Aside from having stacks of parts that wouldn't be visible and jobs on the assembly line that might have to be sprayed with washable paint, it couldn't be made by any existing processes of airplane building. Even the "cooking" method now used for "plastic planes" is out of the question. The whole job would possibly have to be done by injection molding.

Still, Mr. Rolfe presents an interesting thought. And his fighter is a beauty. Transparent or not, it would be a comfortable thing to have around when the air is full of enemy planes.

Left—The transparent bomber might look like this. In top view only engines, tanks and armor are visible. Below—Made in two half shells, the fuselage would be truly monocoque. Visibility? Terrific. Inspection would be easy job.



THE CONSTELLATION

By Hall L. Hibbard VICE PRESIDENT AND CHIEF ENGINEER, LOCKHEED AIRCRAFT CORP.

SAID TO BE 100 MILES AN HOUR FASTER THAN PRESENT-DAY AIRLINERS, THE LOCKHEED CONSTELLATION CAN TRANSPORT 62 PERSONS.

From left to right are Lt. Col. Bernard B. Morley, AAF Lockheed plant representative; Hall L. Hibbard, vice pres. and chief engineer; and R. A. von Hecke, vice pres. in charge of manufacturing. Ship's success is due to them.

(The Constellation, fastest four-engined land-based cargo- and passenger-carrying plane ever developed, was designed by a great engineering team. Headed by the author, the staff included C. L. Johnson, chief research engineer for Lockheed and one of the nation's leading aerodynamics experts, and F. R. Shanley, chief structures engineer. Lockheed's sky giant points the way to great developments in aerial transportation for both war and peace.—Ed.)

ALTHOUGH performance and specifications details cannot be disclosed at this time for reasons of security, I should like to point out in the beginning these salient facts about the Constellation:

When she reaches the stage of mass production, this swift ship, powered with four Cyclone 18s, will give the U. S. Army Air Forces greater troop- and supply-carrying potentialities than can be matched by any other nation in the world.

Here, too, we have a large but graceful four-engined ship that is faster than the Japanese Zero. She is faster than any four-engined bomber now in service anywhere in the world. Cruising 100 miles an hour faster than transports now operated by domestic air lines, she can cross the continent from Los Angeles to New York nonstop in less than nine hours, carrying fifty-five passengers and a crew of nine; or, if you prefer to stop at intervals, as is practiced by the air lines today, she can carry sixty-nine persons, including crew, at fares comparable to those charged by the railroads.

The Constellation is a luxury ship gone to war. Back of her design and construction, which commenced two years ago, was the request of Howard Hughes and Jack Frye, both of Transcontinental and Western Air, Inc., that we turn out a liner capable of carrying passengers nonstop, coast to coast in the finest possible luxury, in record time at lower costs than prevail today. Meanwhile war came. The air line deferred its ambitious plans to make way for army requirements. The first Constellation has been delivered to the army for war duty. Luxury must wait.

You would detect certain differences in this plane merely by walking around her as she sits gracefully on an airfield. Others are less obvious. Suppose we examine the craft critically, exposing such of her "secrets" as the military authorities will permit.

You may not recognize that the fuselage exterior has been seventy-five percent spot welded; hot wing de-icing has been provided; a radically new electrical system carries the power, and the nacelles and cowling are made of stainless steel in which fire may burn for thirty minutes without interfering during flight with the plane's operation. The fuselage, you may note, represents a perfect circle which aids rather than retards the wing's high lift, and the nacelles are of such a design that they offer no more drag than the Lockheed Model 14 transport had with one tenth the horsepower pouring from the Constellation's four engines.

The wing is perhaps the most important feature of any airplane, for the efficiency of this member determines to a great extent the economy and efficiency of her operation. If you have seen a photograph of the famous Lockheed Lightning P-38, now winning battles and acclaim on the Allies' several fronts, you have seen the wing from which the Constellation wing grew. We knew the P-38 wing to be a fine compromise between low drag and high lift. Like the P-38, the Constellation wing also has excellent stall characteristics, which is an important factor in high-flying, long-ranging transport and cargo planes.

To the engineer, the wing is known as an N. A. C. A. section having no aerodynamic twist. To arrive at our final choice, several comparative types were tested in the Lockheed wind tunnel, including the so-called laminar flow sections. While these exhibited good drag characteristics, they did not prove well-suited to a transport airplane because of their sensitivity to roughness that might be caused by ice formations, mechanical abrasion due to walking on the wings, and to the roughness of de-icer boots.

Some other types of wings are undoubtedly superior in respect to drag to that selected for the Constellation—superior, that is, when considered by themselves. But we must evaluate a transport wing in conjunction with its operation when using Fowler flaps. This brings under study its action at the landing speed, which means that the effect of high-lift devices on the wing section is of paramount importance.

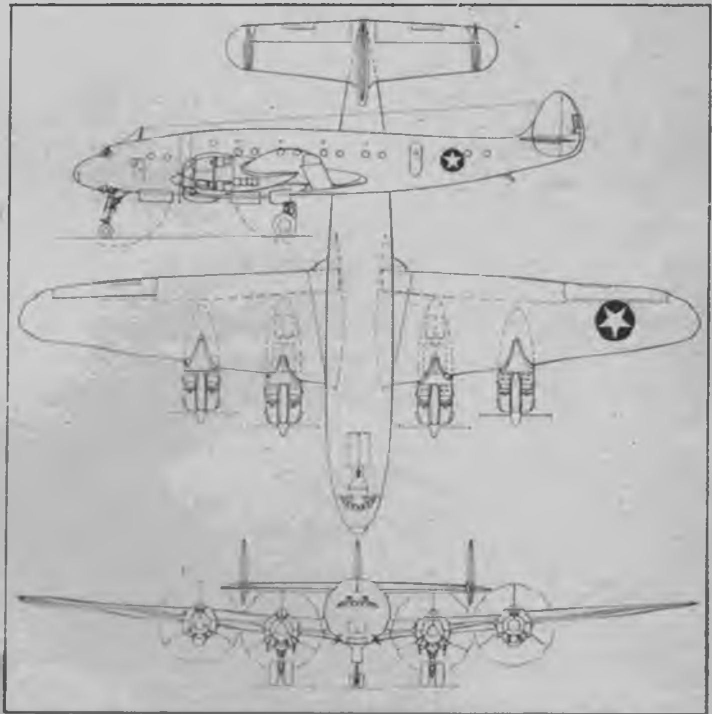
As for the power plants, engine nacelles and the interchangeability of engines present a combination of problems that must be solved before the prototype flies for the first time. The reason? Military planes may fly anywhere and everywhere, and the designers must not only provide adequate power, but make it possible for pilots and mechanics to keep them flying no matter where they may go.

Four important reasons why the Constellation is a high-performance transport are her engines. These are Wright Cyclone 18s (the most powerful aircraft engines now in service anywhere), of the 2,000 h. p. series, and are built in two banks of nine cylinders each. These engines have a displacement of 3,350 cu. in. and possess the low weight ratio of 1.1 pounds for horsepower. This great power per pound plus low fuel consumption plus high horsepower take-off with heavy load combine to form an important factor in the Constellation's long range.

Because the Constellation is designed to cruise at high speed at high altitude, with perhaps fifty-seven persons aboard, including the crew, the aerodynamic problems are similar to those encountered in designing a pursuit. Low-speed climbs combined with high-speed level flying at altitude necessitate special attention to nacelle contours. There is the further problem of anticipating changing versions or modifications for the various military uses to which the airplane may be put.

The contour of the nacelles has been especially designed to avoid compressibility shocks on the nose cowl and still develop sufficient pressure to cool the engines adequately during low-speed climbs. Because the plane flies faster than some pursuits, *(Turn to page 50)*

Three view of the Constellation, showing circular cross section of fuselage common to aircraft having pressurized cabin necessary for stratoflying.



Future models of the giant transport will be equipped with hot wing de-icing device using heat from exhaust to melt ice. First experience in that line was conducted successfully some time ago on a Lockheed Model 12 by the N. A. C. A. This method has been used in Germany ever since beginning of war.

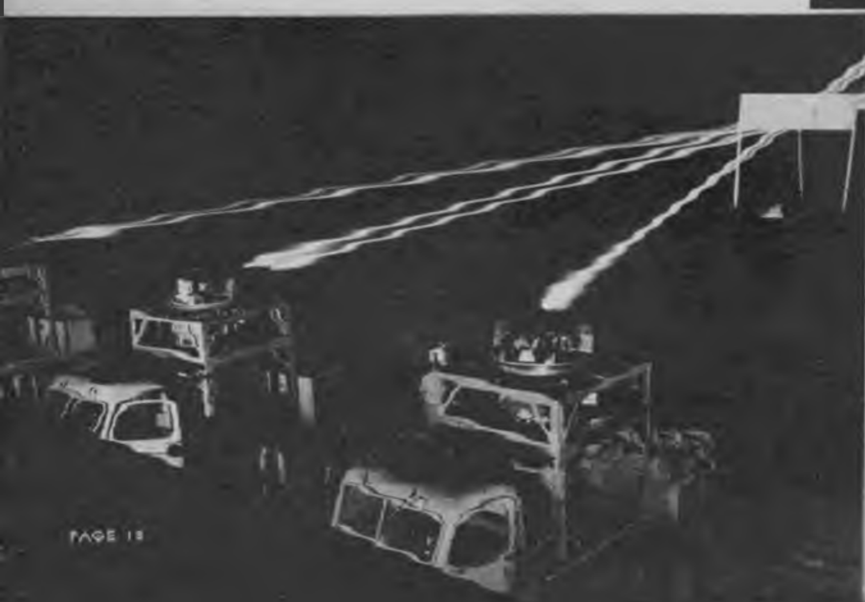
Half-hidden gunner in Martin turret sights in special eyepiece. Muzzles of guns are taped to keep out dirt, moisture, prevent rust.

In Sperry Fortress turrets mounted on moving trucks gunners learn to "lead" enemy planes. Turrets are operated by electric or hydraulic power. Some have armor plate.

TURRET TAMERS

THE WHIRLING DERVISHES WHO MAN UNCLE SAM'S TURRETED FIFTIES ARE WORLD'S BEST-TRAINED GUNNERS. SCENES BELOW ARE AT FLEXIBLE GUNNERY SCHOOL AT TYNDALL FIELD, FLORIDA.

Firing tracer bullets at moving target at night. Note that one gun, left, has jammed. An automatic interrupter gear prevents excited gunners from shooting off own tail surfaces and propellers in battle.



As student elevates guns of the truck-mounted Martin turret, the mechanism automatically swings him lower to keep target in his sights at all times.

There are more comfortable places! Gunner enters Sperry ball turret after take-off, exits before landing.

Closeup of Consolidated tail turret, sans twin .50-caliber guns which have effective range of 600 yards!

In last few weeks of course, students manipulate turrets on real planes and fire at sleeve targets. The B-25 shown has top and bottom Sperry turrets, minimizing blind area.

Below: As dummy plane scoots about field, students follow it in sights. Chap at right has lost target.

Instructor points out easily identified features of a British Whitley bomber to student. Gunners must know speed and span of planes to judge distances in combat.

ON SPLIT-SECOND RECOGNITION HINGE THE LIVES OF PILOTS AND THEIR CREWS AS WELL AS SUCCESSFUL ACCOMPLISHMENT OF MISSION.

Walls in aircraft-recognition room are covered with planes in every possible position. In foreground, projector for slides.

Who GOES THERE?

By James Montagnes

THE speed of today's warplanes leaves no time for the pilot or his crew to spend in making up their minds whether the approaching aircraft is their own or an enemy ship. Instantaneous recognition is absolutely necessary; on it hinge the pilot's life and that of his crew. That's why aircraft and ship recognition is so important a part of the British Commonwealth Air Training Plan, why every member of an air crew has a period of advanced recognition work on the types of surface ships and enemy aircraft he will meet in the particular section of the war front to which he is sent.

Aircraft recognition is part of the course taken by every air-crew candidate for the Royal Canadian Air Force. After he graduates he takes a special operational course which includes advanced aircraft recognition, and, if he is on coastal patrol operations, surface ship recognition. Here the speed in aircraft recognition which he has developed will be accelerated still more.

Before a recruit starts his training in aircraft recognition, he is given a series of lectures on the theory of flight. This is to acquaint him with the various sections of an airplane and their purposes, so that, if he has no previous knowledge of aeronautics, he will be able to recognize the component parts of an aircraft, will know what to look for when studying more advanced stages of the course.

Next is the study of aircraft silhouettes. At the Manning Pools, where all recruits go before being posted to the various flying schools throughout Canada, there are large wall boards depicting in neat rows every type of Allied and most enemy aircraft. The RCAF recruit must know about ninety different types of aircraft, and, in advanced courses, he learns additional types which he will meet in certain specific war zones. As an aid to the silhouette method of aircraft recognition he plays cards with aircraft silhouettes instead of the conventional card pictures and numbers.

He must know each silhouette, head-on, from below and from above, sideways and from the rear; he must be familiar with the type of motors the aircraft has, its dimensions, characteristics which make it easily recognizable or distinguish it from other similar aircraft. To help in learning all the details, various gadgets are in use at different schools. They are mechanical contrivances on the pinball or peep-show principle. The student looks through a slot in the machine, names the type of plane he thinks it is and pushes a corresponding button. If he is right, a red light flashes; if he is wrong, he gets a "bird." Another patterned on a ship's wheel shows small photos of aircraft. The student identifies the plane, its characteristics, armament, type of engines and other data by pushing a button; a door opens in the wheel under the picture, revealing all the data from which he can check his answers.

With silhouettes mastered, the course goes on to photos of aircraft, which give more opportunity to study details of different types of planes from every conceivable angle. Part of the instruction consists of the "Aircraft of the Day" system which is used at every RCAF school. The photo of a different type of aircraft is shown in one or more boxes posted throughout the school area where airmen pass. The photo is shown for a limited number of hours, then removed. At any time during the day instructors or officers can ask an airman what airplane is shown in the box that day, its characteristics and other data about it.

There is an aircraft recognition room at each school, where photos, silhouettes and drawings of all types of aircraft in all types of positions in the air and on the ground and actual combat scenes are depicted on wall boards. Here students are taught recognition by the pointer or game method. Pictures of different types of aircraft taken from all angles are also flashed on a screen in a darkened room, with students being given a limited number of seconds to identify the aircraft. For examination purposes they must recognize aircraft shown on the screen in three seconds. A new system, soon to be in use, will speed this up to one twenty-fifth of a second. This system is used on a development of the U. S. Army Air Forces, where an ophthalmic system is in use in some schools. In this system students are trained to recognize objects from their pictures in split seconds, based on photographic memory. Speeds up to one seventy-fifth of a second are claimed for this system.

From the photographs the students progress to models built to scale, so that each aircraft compares in size to other models exactly as the actual aircraft does to other aircraft. Models have other advantages, such as showing a plane's vulnerability and the scope of its armament. Models are placed on wire slides which pass quickly through screens or overhead, giving students a limited time in which to announce its type. Models are also used to enable students to sketch various views of the aircraft. Each air-crew candidate must sketch a head-on view of every model, and make as many other sketches as possible. In the limited time of the course, there is no opportunity for the students to make models of all the different aircraft; sketches must be used.

Models mounted on brackets so that they can be turned into a large number of different stances are used in the shadowgraph method of aircraft recognition. The model on its bracket or stand has a bright light shining on it from behind. A screen is in front of the model; the students sit in front of the screen and see the model as a shadow.

The course is one which requires each man to do most of the work himself. Between forty and fifty hours of the entire air-crew training plan is devoted to aircraft recognition with pilots averaging about forty-five hours. A wireless air gunner must do the heaviest stint of fifty hours. Additional time is put in at the advanced courses after graduating and just prior to combat service.

Somewhat similar schooling is given in warship and cargo ship recognition to those airmen who will be on coastal patrol and in naval fighting units. They are taught to recognize different classes of warships and how to spot enemy merchant ships. A thorough knowledge of Allied and enemy ships is necessary to airmen operating over water; they won't make the mistake reported recently by a British merchant ship bound for Malta; it seems that it had three days' protection by Italian seaplanes and Italian fighters who mistook the ship for an Axis merchant ship. The main schools for ship recognition are located in Great Britain, but some instruction is also given in Canada, in both cases after RCAF and British Commonwealth Air Training Plan students graduate.

Models for the air and ship recognition courses are largely made by technical and high-school pupils as part of their aeronautics and craft studies. In many Canadian technical schools, mass-production systems for making scale models for the RCAF have been set up, the models being used at all flying schools to teach aircraft recognition and other phases of training.

While many an air-crew candidate starts out thinking aircraft recognition work is an easy part of the training course, he soon learns that it is not easy; guesswork is not tolerated. For both his life and that of his colleagues in his aircraft depend on how well he has mastered the memory of different types of airplanes and ships. There's no time in actual combat to look through the book. He must know what his enemy looks like if he wants to live!

RCAF observers and pilots getting a ship-recognition course given to all air crews who go out on coastal patrol. They must identify ships at a glance.

Wiley Post poses before Lockheed Orion purchased from Charlie Babb, right. This was plane in which Post and Will Rogers started ill-fated flight.

OLD PLANES NEVER DIE

THROUGH THE SHREWD HANDS OF CHARLES BABB FLOW LEGIONS OF OLD PLANES FOLKS WANT AND DON'T WANT.

By William H. Taylor

MOST people have probably wondered, one time or another, what becomes of old airplanes when they die. The answer, according to the man who probably knows that answer as well as anybody, is that old airplanes never die. Or to be more exact, they never wear out. They may crack up, of course, like new airplanes. Otherwise they go on working at one kind of job after another until, finally, they're so obsolete that they can't compete economically with slightly less obsolete planes on jobs made to order for ancient planes.

The man who knows the answer is Charles H. Babb, broker of second- (and third-, fourth- and fifth-) hand airplanes. Mr. Babb is one of the most interesting men, in one of the most fascinating businesses, that you'll find anywhere. That is, if you can find him. What with offices in New York, Los Angeles, Mexico City and other places; shops scattered here and there around the hemisphere; and customers and business interests all over the world, it's generally about as easy to find him as to keep a squirrel on the ground.

Babb's connection with aviation started in 1919. In recent years, he has averaged a turnover of 200 airplanes a year; their average age, he figures, is *(Turn to page 54)*

Plane designer as well as broker, Babb has originated many construction innovations. Here's the Babbco cargo plane loaded through nose.

Typical of Babb's ships is this rugged old Condor now in service in Alaska as a cargo ship handling vital freight.

Babb & Co. and some of their stock. At Glendale, Calif., Babb, third from left, poses with some of his hangar staff and a few of his planes. Foreign sales are a large part of his business. Markets run from tropics to the Arctic Circle.

Vultee Vengeance dive bomber used by army and navy. Grills on upper and lower wing surfaces are dive brakes.

Heinkel He-177 four-engined bomber has its power plants combined into two units, each driving a four-bladed propeller.

Latest cargo plane by Curtiss: the C-76 Caravan of all-wood construction. Span, 108 feet; engines, each 1,200 h. p.

The new Spitfire. Powered by a Rolls-Royce Merlin LXI. Bumps next to guns are faired stubs for two more cannons.

The Airspeed Horsa, England's largest troop glider, said to accommodate 30 fully armed soldiers. Wing span is 88 feet.

Lockheed Constellation, new giant cargo plane, takes to the air on its maiden flight. Powered by four 2,000 h. p. engines, it has pressurized cabin for flying at 35,000 feet, can cross the continent in 9 hours, flying at cruising speed.

NEW PLANES

Drum containing shells for one of the two 22-mm. Spitfire cannons is placed in wing by armorers.

Low-flying Spitfires like this one have been strafing Nazi convoys, trains and various ground installations.

SPITFIRE SQUADRON

NEVER in the history of military aviation has an airplane been so acclaimed as World War II's Spitfire. Beyond any doubt the best fighter ever to come off the drawing board, it has been constantly improved by its makers to meet the new designs which the enemy launches against it —yet it always commands the sky. Spitfire squadrons in England and in the Middle East number a most varied assortment of nationalities: French, Polish, Greek, Czech, Norwegian, Dutch. The latest bit of international amity is the formation of U. S. Army Air Force squadrons which are Spitfire-equipped. Primarily a high-altitude interceptor fighter, the latest edition of the Spitfire powered by a Rolls-Royce Merlin 61 engine has a ceiling of more than 50,000 feet.

Officers of an American Spitfire squadron being "briefed" prior to operations. Many of them were members of the Eagle Squadron.

In the cockpit of a Spitfire belonging to one of the U. S. Army Air Force fighter groups, pilot and staff mechanic make last-minute adjustments, checking belt and 'chute harness.

To minimize damage from bombing and strafing attacks the aircraft are widely dispersed on airfield. When "scramble" is sounded, pilots are driven to planes in jeeps.

One of the four rifle-caliber machine guns is loaded up in AAF group flying Spitfires.

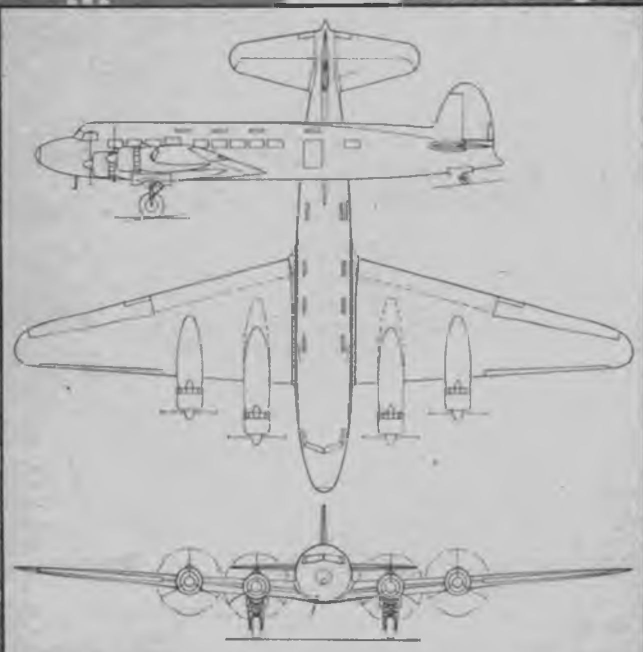
Silhouetted against the evening sun a Spitfire is about to take off on a mission which may be either a Channel sweep or escort.

High above the clouds is a squadron of the latest high-altitude Spitfires. Four-bladed propellers and highly supercharged engines permit fighting at extreme altitudes.

AIR TRAILS PLANBOOK NO. 2

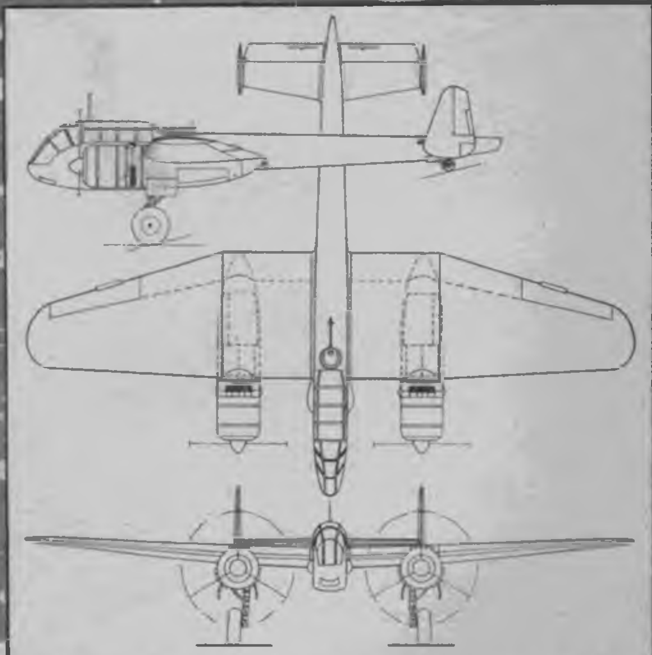
DRAWINGS BY H. A. THOMAS

PIAGGIO P-108C



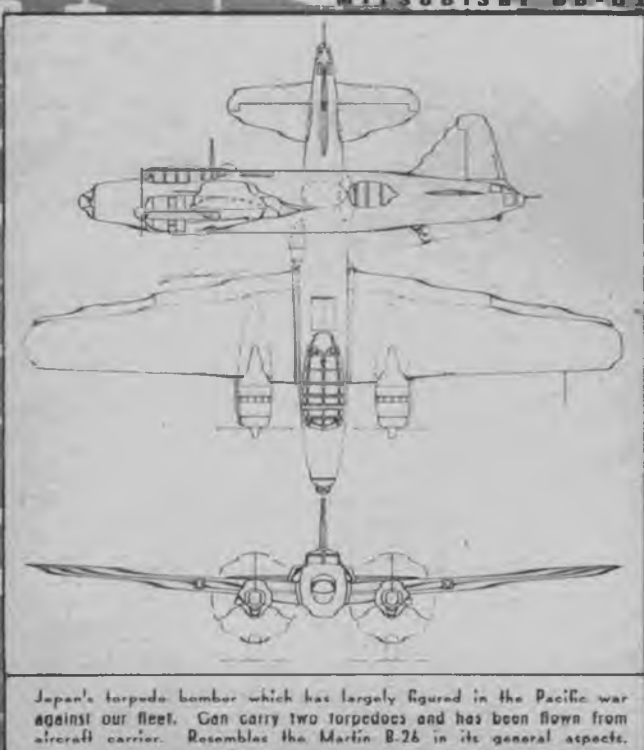
Italy's Stratoliner: Supercharged Piaggio PXII. Engines each of 1,000 h. p. and pressurized cabin enable Mussolini's new transport to fly at great altitudes. Wing span is 108 feet 3½ inches; top speed, 280 m. p. h.

JUNKERS JU-288



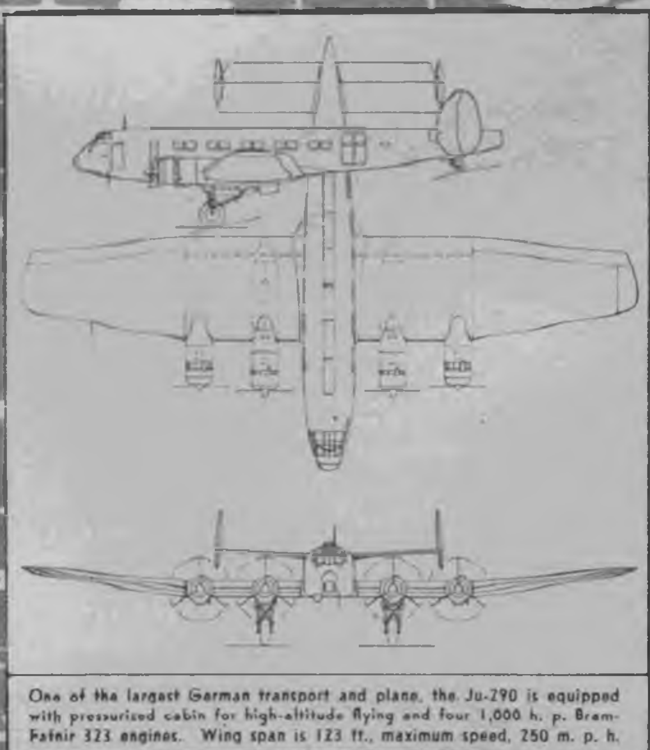
This German fighter bomber bears a close resemblance to the Do-217E known as the Dangling Dornier. Power is supplied by two B. M. W. 801 radial engines of 1,600 h. p. Extension of tail cone suggests use of drogue.

MITSUBISHI OB-01



Japan's torpedo bomber which has largely figured in the Pacific war against our fleet. Can carry two torpedoes and has been flown from aircraft carrier. Resembles the Martin B-26 in its general aspects.

JUNKERS JU-290



One of the largest German transport and plane, the Ju-290 is equipped with pressurized cabin for high-altitude flying and four 1,000 h. p. Bram-Fafnir 323 engines. Wing span is 123 ft., maximum speed, 250 m. p. h.

WHAT ABOUT MODELBUILDING ?

By E. B. Miller

BECAUSE OUR VICTORY CORPS DOES NOT INCLUDE MODEL BUILDING, AN EXAMINATION OF HOW GERMANY BASED HER YOUTH TRAINING ON IT IS VITAL.

EDDIE RICKENBACKER'S public and hearty indorsement of the High School Victory Corps has spotlighted that movement as a vital means of preparation of young men for future training for service in the air, on the land and on the sea. But despite the rapid start in aviation training (more than half the schools are giving preflight courses) there are many people who feel that this is only the beginning. So far, there have been only test courses of actual pilot training in twenty-two schools. Model airplane building, as an unparalleled means of correlating theory and practice, construction and design, is unfortunately not in the grade schools. Because Germany utilized school model building so successfully in building her Luftwaffe, it is interesting to examine just how she went about it, not because we praise the German way of doing things, but because, through their "youth in aviation" program, about 150,000 boys could be taught to fly each year. The Germans accepted model building as a basis of this training and, as such, it contributed greatly to an air force which had to be large enough for Hitler to pit it foolishly against the world.

Dr. Oskar Ursinus, editor of the aviation magazine *Flugsport*, was long an advocate of air power. As early as 1920, he published an appeal to members of model and glider clubs to promote their activities to a greater extent. Gradually model building and flying, gliding and soaring grew, so that by the early '30s they had developed as national sports for young and old, under the guidance of the D. L. V.* Then there was a change. For the Nazis these national sports formed the cornerstone for building air power, and ironically for the inhabitants of neighboring nations—a tombstone. Early in 1933 the Nazis came into power and soon law making was done by decree. For nearly two years, youth air training was left largely to Nazi youth organizations.

However, in November, 1934, the Reich and Prussian minister of knowledge, education and national culture—by this time an old hand at "decreeing"—made aeronautics training a *must* for the schools. The decree applied to *all educational institutions, all pupils* and *all subject matter*. Courses in physics became the physics of flight; foreign language students read about aviation; shop students learned to build and fly models; model designing was injected into mechanical drawing; and so on through each school subject. The construction and flying of models was made compulsory for students in the sixth and seventh school years in small schools, and extended on through the eighth year in larger schools. The decree stated, in part, *(Turn to page 69)*

**D. L. V. (Deutscher Luftsport Verband) was an aeronautic association supervising all organizations engaging in aviation.*

YOUTH IN AVIATION

Model construction and flying was made compulsory in sixth and seventh grades in small schools, included eighth grade in larger schools. Models were instrumental in teaching aerodynamics as attested by diagrams on this blackboard at left.

Towed behind an automobile, the Kiwi glider never leaves the ground. Method safely teaches rudiments of airplane control, develops air sense.

Before being towed, the student is taught to keep the wings level; improper control may otherwise cause the trainer to damage wing tips.

SCHOOL GLIDER

ALTHOUGH it is generally admitted that flight instruction should be given in the high schools, sheer inertia has delayed attempts of the C. A. A. to extend actual flight training on a wide scale to teen-age enthusiasts. Bridging the gap is this ground trainer by the California Aero Glider Co. of Los Angeles. Towed by a car, it scoots realistically across the field, responding to stick and rudder bar control just like a real airplane. Safety features designed into the little ship practically eliminate the chance of even being scratched, thus making happy parents—though trial C. A. A. flight courses in twenty-two high schools resulted in only three minor injuries. Shop teachers have an ideal project, for the glider can be built by the students of woodworking classes.

YOUTH IN AVIATION

In top picture section of fuselage is being built up in jig. Fast and simple assembly methods (lower picture) allow mass production of ships.

For transportation to and from field, the wings and tail surfaces are dismantled and fastened flat on fuselage. Ship can be towed by a car, eliminating use of trailer.

By H. A. Thomas

YOUTH IN AVIATION

AIR MANUAL, LESSON NO. 8—CONTROL DETAILS

AIR YOUTH GLIDER NO. 1

By W. F. Tyler

THIS MODEL, FEATURING HARDWOOD CONSTRUCTION AND MOVABLE CONTROL SURFACES, HAS BEEN DESIGNED ESPECIALLY FOR GROUP CONSTRUCTION IN SCHOOLS.

AIR TRAILS offers this simple, hand-launched glider as the first of a series designed for classroom construction. It incorporates all the qualities required for a successful flying model, yet its construction is simple enough for a novice. It differs from the usual hand-launched model in that hinged control surfaces have been added so that, by experimenting with different control settings, the student "learns by doing." The model is built from sugar pine, but other hardwoods can be used; additional weight means increased flying speed, but the gliding angle remains about the same.

Enlarge the drawings to full size by using the graphic scale given. After the enlargements are made, make cardboard patterns of the various parts. Start the wing construction by tracing the wings (2) onto the wood (Fig. A); cut the extra wood down to the outline. Use a sandpaper block to finish the tips and remove irregularities (Fig. B). Hold the wing halves together while sanding to keep the outlines identical. The wings are tapered to $1/16''$ Begin the shaping (Fig. C) by taking off thin shavings with a small block plane; check the contours after every few chips. Keep the trailing edge, rear edge of wing, as thin as possible. Finish to size with rough and finally fine sandpaper (Fig. D). Bevel the ends of the wings for the proper dihedral angle (Fig. E). Block up one wing tip to 3" and carefully sand the bevel until the angle matches the dihedral (Fig. I). Wing supports are now made from $1/16''$ sheet.

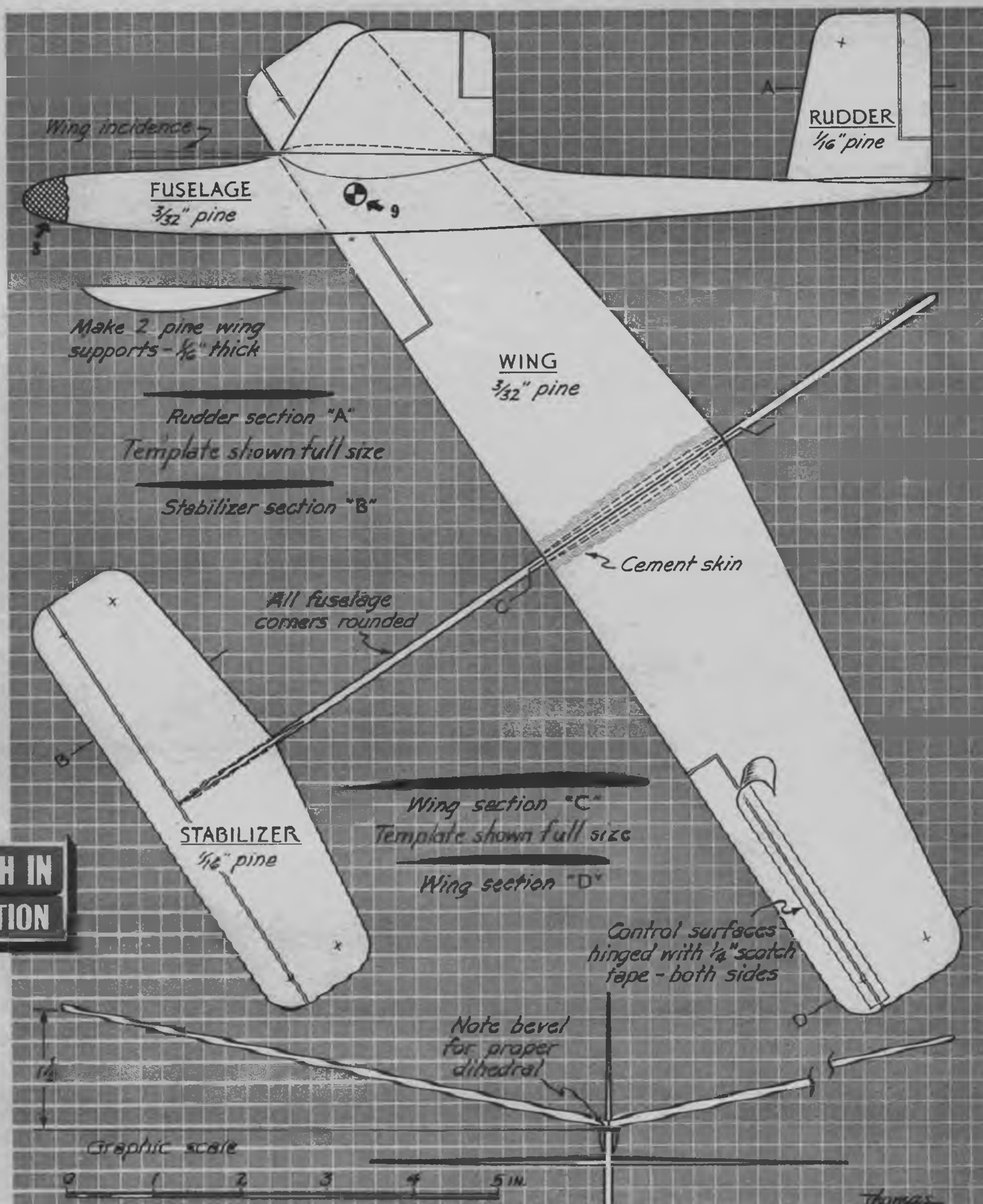
1—fuselage; 2—wings; 3—ailerons; 4—wing support; 5—stabilizer; 6—rudder; 7—Scotch tape; 8—modeling clay for balance; 9—center of gravity.

Make certain that the top slope of the fuselage is at the proper angle for wing (see Fig. G). Make the stabilizer (5) and rudder (6) by the same method as the wing; both have maximum thickness at center of $1/16''$ and taper to $1/32''$ at the tips.

Give all surfaces one coat of clear dope and a final sanding. Cut the control surfaces (Fig. F), and hinge with Scotch tape.

Check the model over carefully to make sure that everything is in line. For ordinary flying, all the controls should be set at zero. If your controls are extra flexible, a small piece of Scotch tape placed over the edge of the controls and the main surface will keep them in line. Add weight, preferably modeling clay or putty, to the nose until the model balances at 9 (side view of main plan). If the model tends to stall, add more weight until the plane glides in a straight line. Once the adjustment is correct, you can use more powerful launching by turning the rudder slightly to the left so that the model glides in counterclockwise circles. Then turn the right aileron down slightly to hold the circle adjustment.

YOUTH IN AVIATION




FLYING
Kit X6—Lockheed "Lightning"
Kit X1—British "Spitfire"
Names
that are making
AVIATION
HISTORY...
Megow
PHILADELPHIA, PA.
Kit X7—Grumman "Wildcat"
Kit X9—Blackburn "Skua"
Kit X11—Henschel


WARPLANES 95¢
Kit X8—Grumman "Skyrocket"
Kit X9—Westland "Lysander"
Kit X10—Focke-Wulf
CORSAIR, WILDCAT, SKYROCKET, LIGHTNING, SPITFIRE . . . these are names that are writing history in the skies . . . and all, plus many more, are among the 95c Megow Flying Models that every model builder wants today!
With 30-inch wingspan, they are impressive in size, fascinating in design . . . and boy! the way they fly! Easy to build, too . . . with Megow plans that picture every detail.
Build a few of these Megow Warplanes now — develop your skill with tools and learn more about aviation, while you familiarize yourself with the air fighters of the great warring nations. See them at your dealer's, or write direct to us.
Kit X12—Fairchild Trainer
Kit X2—Republic "Guardsman"
Kit X5—Vought "Corsair"
Kit X4—Douglas 8A5

The rubber version of this design produced flights of over a minute and a half. It proved slightly tricky as a gas job; the wings were found too weak.

FLYING WINGS

FLYING WINGS REPRESENT THE THEORETICAL ULTIMATE IN AIRCRAFT DESIGN. USE THESE IDEAS, AVAILABLE AFTER A YEAR OF RESEARCH, TO DEVELOP PRACTICAL MODELS.

THE absence of fuselages and tail surfaces makes the flying wing aerodynamically and structurally superior to conventional types of aircraft. Nevertheless, despite these advantages, there have been few successful tailless designs—and yet birds prove that high performance is attainable.

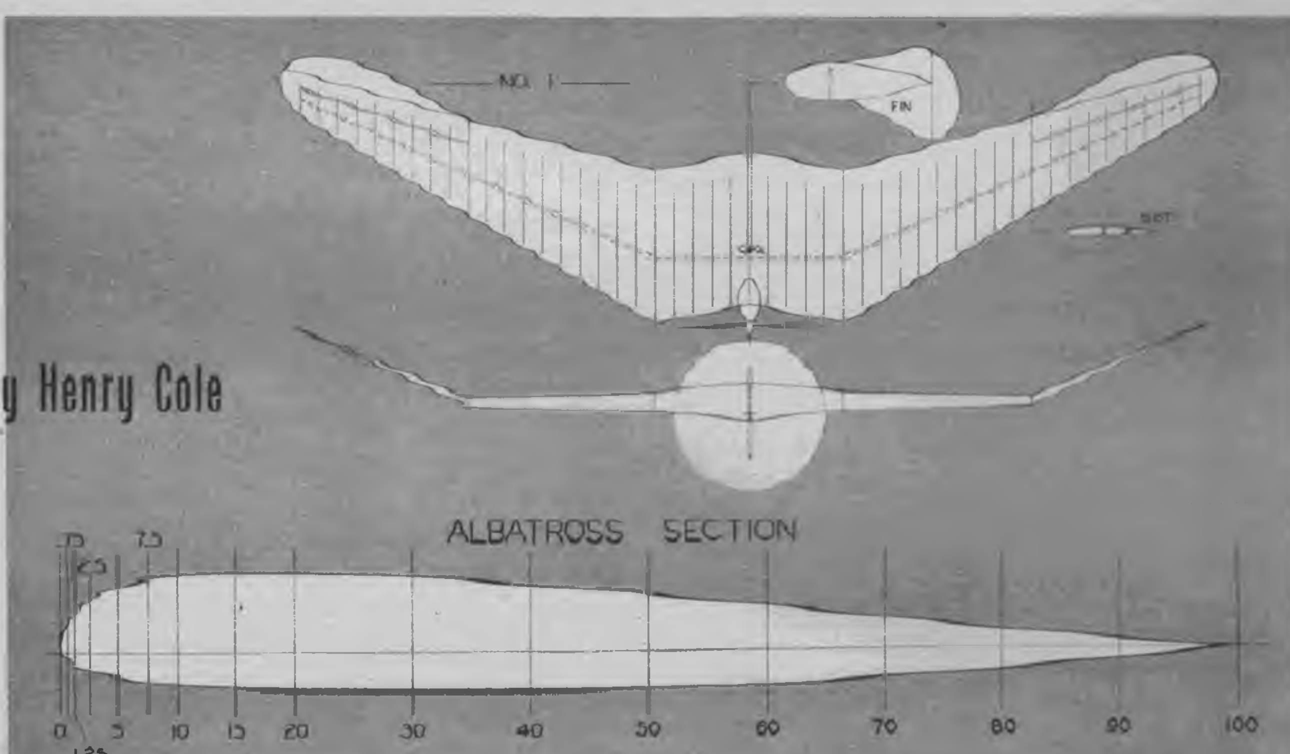
The most well-known among manmade tailless airplanes are Waterman's Arrowbile and, more recently, the Northrop Flying Wing. The development of these planes and the remarkable flights of the birds indicate that further experiment will pay great dividends.

Presented in this article are three basic designs which were developed through glider experiments and bird observation. The many problems which come up in building a tailless model will be discussed so that the reader will have an insight into tailless design and avoid many of the pitfalls of experimentation.

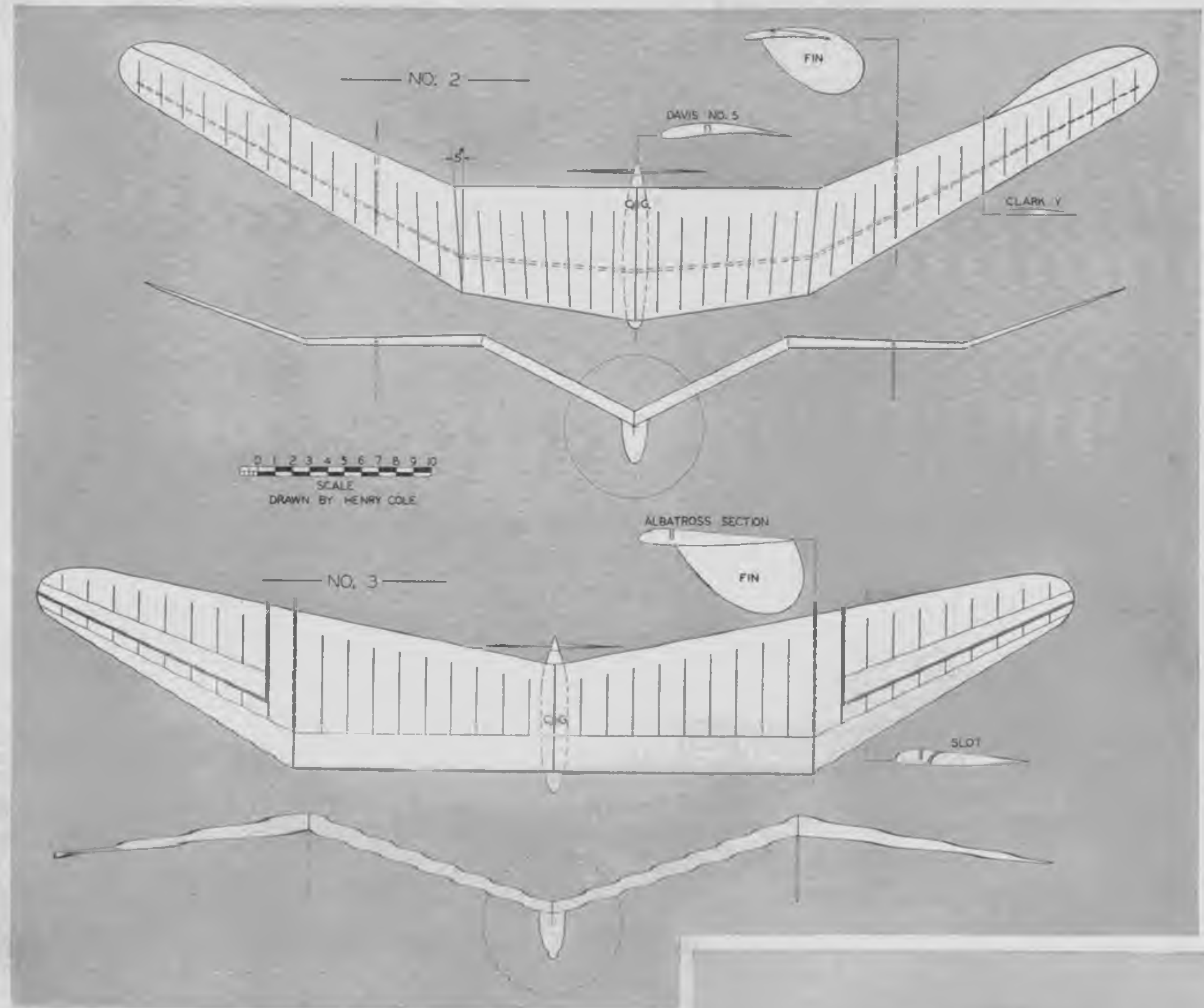
Design No. 1 was selected from a number of balsa test gliders because it showed the greatest stability and could be made to circle very tightly without spiraling in. This enables the model to stay in the slightest updraft and ride the wind like the birds, a great advantage over normal craft. After thorough glider tests, the design was scaled up to Class A size and powered with an Elf single. The symmetrical Davis section and slotted wing tips were the key-points of the design.

Test flights verified the stability of the design, but two defects were brought out: (1) the streamlined airfoil induced excessive speeds; (2) the tractor arrangement increased the prop shortage.

By Henry Cole



% CHORD	0.00	0.75	1.25	2.5	5	7.5	10	15	20	30	40	50	60	70	80	90	100
UPPER	0.00	2.40	3.18	4.22	5.33	5.91	6.30	6.70	6.63	6.17	5.45	4.55	3.64	2.60	1.56	0.78	0.00
LOWER	0.00	-071	-117	-1.68	-2.28	-2.60	-2.92	-318	-344	-344	-344	-3.32	-2.99	-2.40	-1.69	-0.91	0.00



Design No. 3 was lifted directly from bird study. It features flexible slotted tip ailerons, uses airfoil developed exclusively for flying wings.

The model as it stands would make an excellent speed job, but for endurance purposes it is out of the question. The model could be slowed down by building it larger and decreasing the wing loading, or by using a high-lift wing with washout.

Design No. 2 shows the changes which were made to produce a slower model. The use of a high-lift section insured a high positive pressure, but also induced a diving moment. Rather than turn up the ailerons to excessive angles for control, the diving moment was compensated for by varying the airfoil section and by incorporating a slight washout. Note that the forward section is the very high-lift Davis No. 5 which gradually changes to a Clark Y near the tips. This produces a moment which counteracts the airfoil diving tendencies. (The principle is analogous to the lifting stabilizer.) With this arrangement the center of gravity must be moved back, and a high-aspect ratio must be used to minimize the center pressure movement in any one section. The slight washout is built in by making the dihedral break at a five-degree angle.

Two models of this design were built and flown, one a rubber job, and the other an Elf-powered gas model. For the length of motor, the rubber model turned in remarkable performance, averaging over a minute and thirty seconds. Approximately thirty flights were made with the gas model, and although it was much slower than Design No. 1, it was still too fast. The model made a number of good flights, but was far from consistent, a defect which may be attributed to structural weakness of the high-aspect ratio wing. The wings could actually be seen to *(Turn to page 62)*

CONSOLIDATED LIBERATOR HIGH-SPEED, LONG-RANGE BOMBER WHOSE BOMB

Photo Courtesy Consolidated Aircraft Corp.

RAIDS ON AXIS SUPPLY LINES WERE AMONG MAIN REASONS FOR ROMMEL'S COLLAPSE

SPITFIRE

By Harold E. Coovert

HAVING MATERIAL TROUBLES? WELL, THERE'S STILL NO HEADACHE WITH SOLIDS! JUST REACH INTO THE WOOD SHED AND WHITTLE YOURSELF THIS FAMOUS SPITFIRE.

THE Spitfire, the world's most famous fighter, is presented for model builders to add to their collections of famous planes. The original Spitfire, which appeared for the first time in 1936, has undergone many changes and has become one of the heaviest armed and highest altitude fighters that the world has seen. The Spitfire Mark V, this month's model, with a Merlin engine of approximately 1,300 horsepower, fights at altitudes up to 40,000 feet at speeds around 400 m. p. h. It sports two 20-mm. cannon and four .303-caliber machine guns, all located in the wings. The specifications of the standard Spitfire are: Span—36 ft., 10 in.; height—11 ft., 5 in.; length—29 ft., 11 in.; weight (empty)—over 5,000 pounds.

The scale model has a twelve-inch wing span and can be made either of white pine or balsa. Trace the side and top views of the fuselage onto stiff paper for use as templates; the rudder is not included. The cockpit may be carved as a part of the fuselage or shaped from celluloid and added later. Carve and sand the fuselage, using the cross-section templates to get the proper shape. The bottom is cut out to receive the wing. The wing fillets are put on after the wing is fastened to the fuselage. Slot the fuselage in the rear to receive the stabilizer.

The wing is made in three sections, a center and two outer panels. It can be made in one piece which, when finished, is cut into three sections as shown in the front view. The outline for the left panel is traced by reversing the template. Hardwood dowels are used at the joints. The front view is carved first, followed by the top-view outline. Carve the section, checking from time to time carefully with the templates. In the final stages, use sandpaper to insure a more accurate shape. Give several coats of tissue cement, sanding lightly between each coat.

Follow the same procedure for shaping the rudder and stabilizer as for the wing. The top outlines of each are cut to shape after the front view is tapered. The rudder is cut from $^5/_{32}$" sheet stock, the stabilizer is cut from $^1/_8$".

The first step in assembly is to cement the wing to the fuselage, being careful to get it properly lined up. Plastic wood is used for the fillet between the wing and the fuselage; sawdust and glue mixed make a good plastic wood. The rudder and stabilizer are now cemented into place. While the glue is drying, check often to make sure that the surfaces have not shifted.

The propeller can be carved from pine or bass and painted a dull black, or a three-bladed prop with spinner can be purchased.

The painting can make or ruin a beautiful model. With care and patience, a good-looking model will result. After several coats of tissue cement have been applied and carefully sanded, apply a few coats of wood filler; this should also be sanded between coats. Take care not to sand through to the wood. Grade 400-A wet-or-dry sandpaper, used wet, will give a metallic finish. It costs a few cents more, but the finish is worth it and it will last much longer.

In applying the camouflage paint, first apply the light blue gray followed by the spinach green and sand brown. Allow time for drying between each coat. The movable control-surface joints are best represented by painting a black line with a draftsman's ruling pen and black dope. Use a straight edge as a guide for making these lines.

If the model is going to be mounted on the pedestal, the landing gear should be omitted. The proper location of the retracted landing gear is shown clearly on the wing plan.

EACH SQUARE EQUALS 1 FOOT

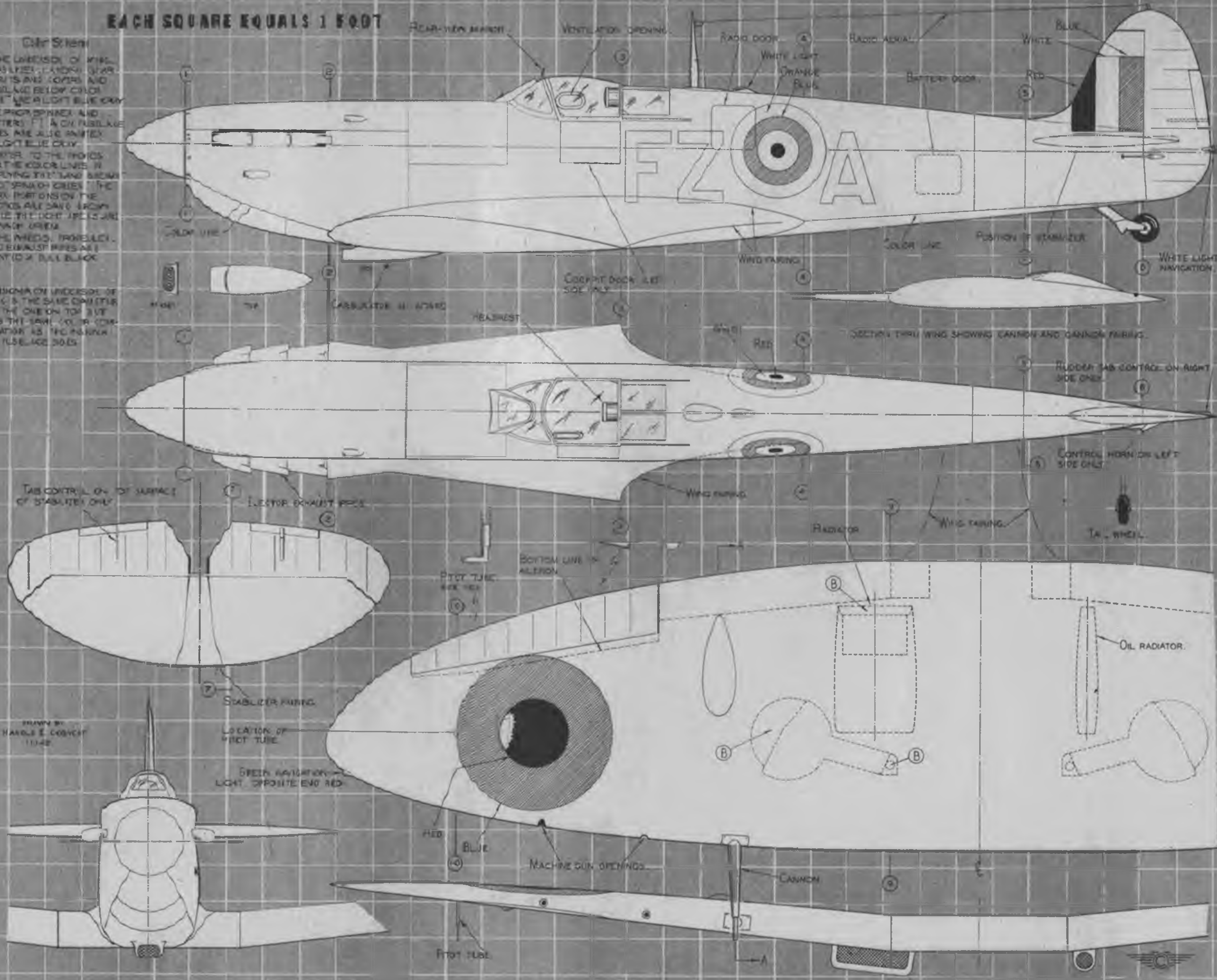
Color Scheme

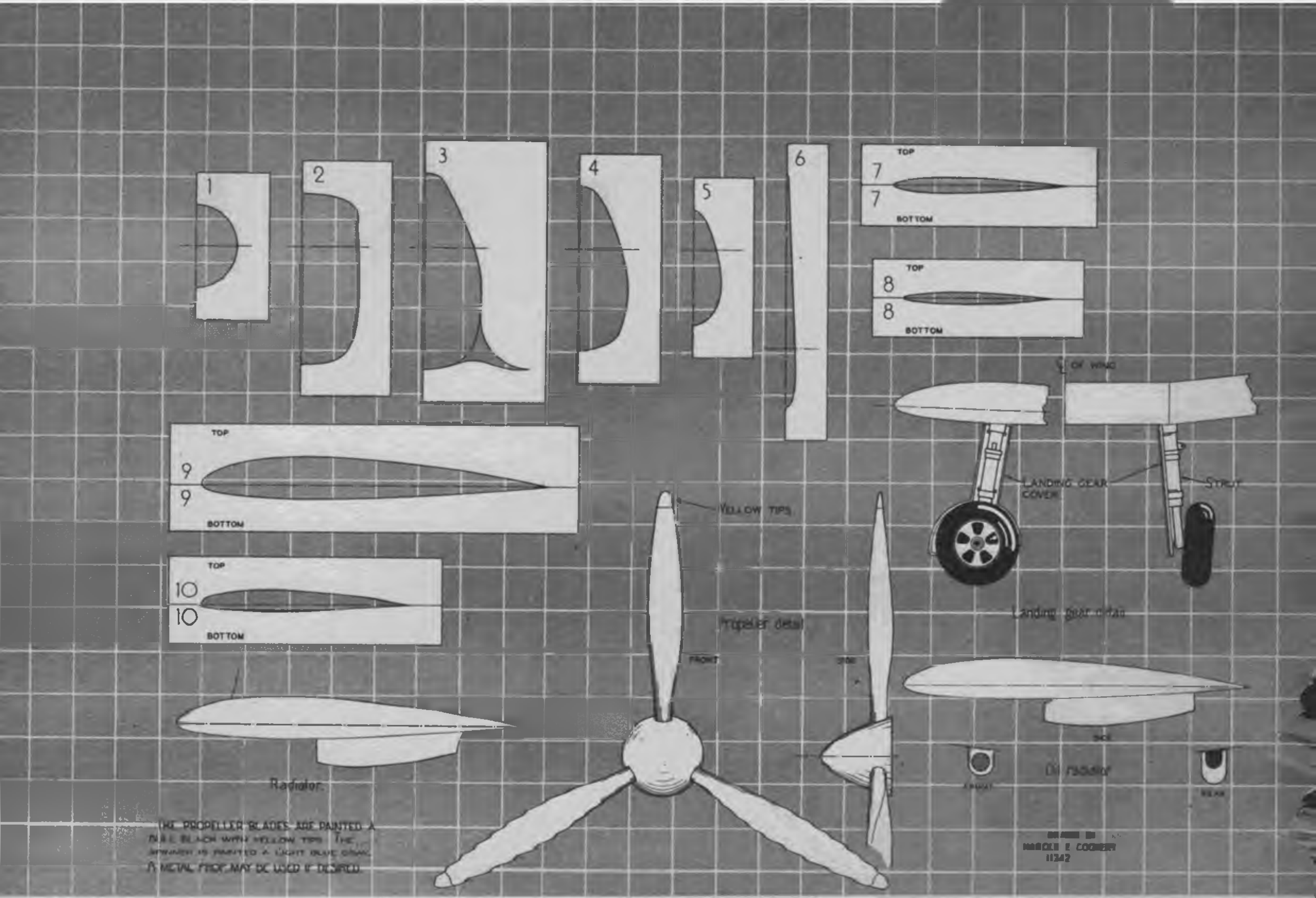
The underside of wing, stabilizer, landing gear struts and covers and fuselage below color line are a light blue gray. The prop spinner and letters "FZ A" on fuselage sides are also painted a light blue gray.

Refer to the photos for the color lines in applying the "sand brown" and "spinach green." The dark portions on the photos are sand brown while the light areas are spinach green.

The wheels, propeller, and exhaust pipes are painted a dull black.

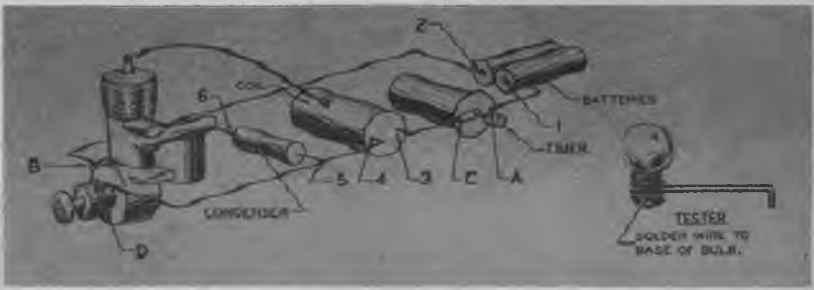
Insignia on underside of wing is the same diameter as the one on top but has the same color combination as the insignia on fuselage sides.





GET THE POINT

By Carroll K. Moon



(See chart on page 60)

IT'S TEN TO ONE A BALKY MOTOR IS DUE TO POOR IGNITION. TROUBLE SHOOT WIRING THIS WAY.

THERE is nothing worse on the contest or sport field than a balky motor. According to some authority or other, there are over 100,000 model motors in use throughout the country; we're willing to bet that there are over 100,000 model motors that, at some time or other in their active lives, have refused to start.

After many tedious hours of prying through tangled circuits, we borrowed from an old radio technique. The system was devised by taking a trick known as point-to-point testing and modifying it for the purpose it now serves. It's exceedingly simple and very efficient. Once the fundamental test points have been memorized, a ship can be thoroughly checked, as far as ignition goes, in a few seconds.

The essential tool used for the test is simply an ordinary 2.3-volt (twin-cell) flashlight bulb and a piece of wire. Wrap or solder the wire around the screw portion of the bulb, leaving one end of it free. This free end and the center contact on the base of the bulb become the contact points.

The circuit diagram is standard, adapted from the standby diagram. Note that there are four main test points. Two of these are readily available on any ship and, if a compressed air timer is used, all points are accessible from the outside of the ship.

The process of checking is simplicity itself. First check the batteries. Then take the A—B check. Follow the indication on the chart. Bad battery-case connections are easily repaired. If a broken wire is suspected, make your test between A and 2. If the bulb lights, the wire from the timer to the battery case is all right. A check from Points 1 to B will soon show whether the main connecting wire between battery case and ground of the motor is all right.

The B—C test should next be tried. Switch *(Turn to page 60)*

STIRLING ON A STRING

By Ellis Sigmon

Here she is, scaled even to dummy pilot, co-pilot, Mae West and all. You'll get an idea of its size from the middle photo. Top—it proves that it flies.

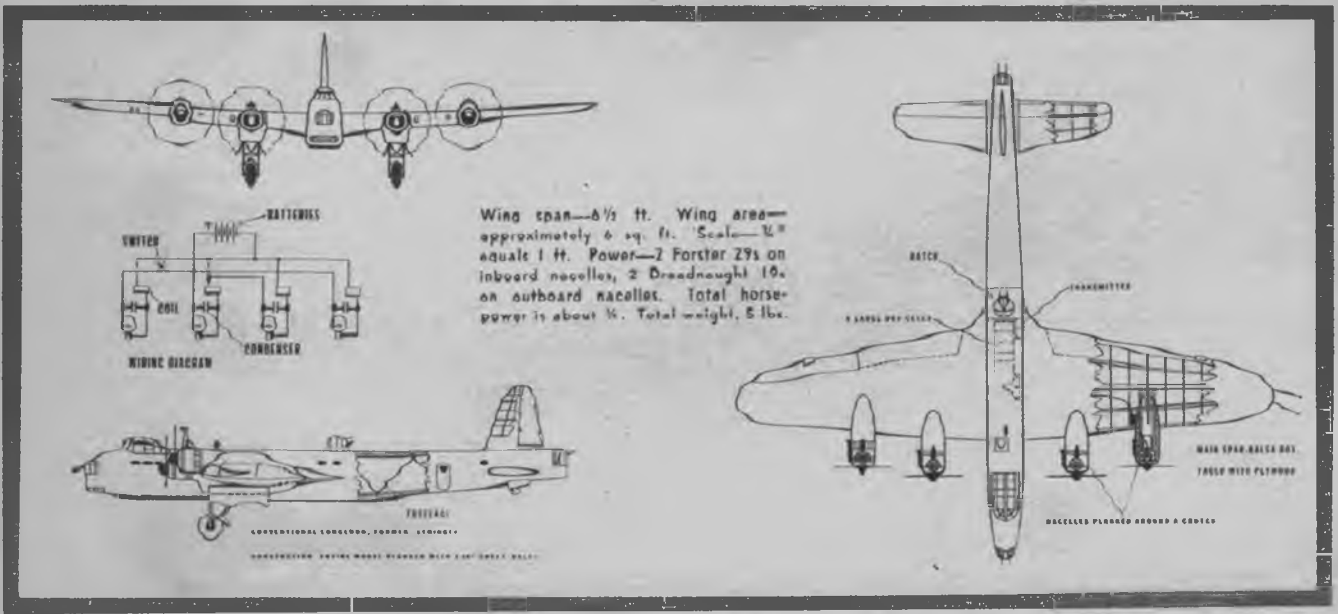
THE SKY'S THE LIMIT WITH CONTROL LINING. YOU CAN EVEN FLY A SIX-FOOT STIRLING IF YOU'RE AGILE ENOUGH TO KEEP ALL FOUR ENGINES GOING BEFORE THE FIRST ONE RUNS OUT OF GAS.

ABOUT four months ago a group of us control-line addicts were hangar flying. The conversation led to the old, old story—what to build next. Spitfires, 'Cobras and such were to be seen in abundance. The problem was to find something a little different. With the fact securely in mind that *anything* can be flown by control line, I was finally sold on the new Short Stirling, the British heavy bomber then very much in the news. My friends were somewhat floored by the idea. Most left my company shaking their heads and muttering.

With the help of a fellow control-liner, I set to work on the design. It was decided to build the job to a three-quarter-inch-to-the-foot scale. This would give a six-and-one-half-foot span and six square feet of area. We scaled up the plans from those in Air Trails, and obtained most of the details from cutaway drawings published in *Flight*.

The job is built somewhat on the heavy side, though it is all balsa. It was expected that it would get quite a beating, so besides completely sheeting the job with 1/16" balsa, the wing spars were built up from 1/8" stock in the box design and then sheeted with plywood. The whole job is in one piece for strength.

Power for the Stirling is provided by two Forsters 29s and two Dreadnaught 19s. The 29s are placed in the two inboard nacelles, and the 19s, in the outboard ones. This array of power adds up to around three quarters of a horsepower. The job will fly on either of the two matched engines. Large capacity gas tanks are used, one in each nacelle, both for endurance and *(Turn to page 58)*



Wing span—6½ ft. Wing area—approximately 6 sq. ft. Scale—¾" equals 1 ft. Power—2 Forster 29s on inboard nacelles, 2 Dreadnaught 19s on outboard nacelles. Total horsepower is about ¾. Total weight, 5 lbs.


Once a familiar sight, but it won't come back until we lick the Axis.

Model Matters

THE DOPE CAN

A few years ago the wrath of the rulemakers descended upon a young Californian who dared to show some originality. Elbert Weathers built his famous Mystery Man back in 1939.


The much discussed Mystery Man.

This gull-wing gas job looked and flew like the real McCoy. (Incidentally, it had a wing loading of over fifteen ounces.) Mystery Man had a single wheel built into the fuselage. Being conscientious, Weathers realized that unassisted take-offs on one wheel are not practicable from a good engineering viewpoint. So he provided a take-off carriage. The model taxied on the carriage, taking off when it attained flying speed. The carriage never left the ground. This was not a dodge to bypass the rules, but a sincere effort to live up to them. The AMA officials didn't think so. They tossed Mystery Man and its take-off carriage out on its ear by ruling that the model took off from the carriage


Airplanitus—or flying broomstick.

and not from the ground. Mystery Man had already been accepted in AMA-sanctioned meets on the Pacific coast. Rather than tangle with the officials, Weathers canceled his trip to the Detroit Nationals.

Had Weathers been content to violate the unassisted take-off rule with a good healthy push instead of resorting to something as clever as a take-off carriage, no one would have raised a murmur. He engineered his problem to a logical conclusion and the boys tossed him out and have been merrily tossing their one-wheel jellopies into the air ever since.

The average newcomer expects models to look and fly like real airplanes; he's startled by the scores of "freaks" churning up the air. Uninitiated as he is, he'll soon figure out that air currents determine the winner in too many cases. Out-of-sight flights impress him, but make him happy that it wasn't his money and effort that went over the hill. Those that didn't fly away always cracked up. (How is the spectator supposed to know that landing gears are strictly ornamental and models are expected to nose over?) But the last straw is when the neophyte, confused by all the hand launching, asks the embarrassing question: "Why can't the models take off by themselves?"

This possible recruit carries away the sorry impressions that a model must be screwball. Gone is his pet idea of building (Turn to page 65)

WHAT DO YOU THINK?

WALKER SPEAKS OUT . . .

Judging from the looks of the latest monstrosities which pass as control-line models, it may not be premature to guess where this branch of the hobby will go unless the rulemakers do something soon. Since the advent of the Fireball two years ago, the air has been full of suggestions. Wing area, meanwhile, is down to the point where it couldn't take off a healthy, old-fashioned R. O. G. We know of at least one model without any wings at all. Yes, they're flying the stabilizers these days.

Fortunately, there are some sound suggestions. Coming from Jim Walker, the following may prove the basis of tether-flying rules. Walker feels that some restriction should be placed on the matter of clipping wing area to the point where a model becomes a flying engine. He proposes to do this by specifying that the model R. O. G. and be capable of landing after its speed run without nosing over or touching the ground with its wing tips. This would not stimulate the design of unorthodox aircraft whose resemblance to real airplanes is only coincidental. Suspense would be built up, for a hot flight might be disqualified by a poor landing. Not only would some sensible limits be placed on design, but flying skill would be encouraged.

Secondly, his experience in coast contests indicates that engines of displacements of less than .60 cubic inches should be separated by class from engines of greater displacement.


Is control lining doomed to this?

Class A engines so far have not proved a factor worth considering since larger engines have been used for speed. Two lengths of wire have been used: 52 feet 6 inches for models under .30-cubic-inch displacement and 70 feet for the larger jobs. Short lines with high-powered stuff just aren't safe.

Thirdly, he believes that speed runs should be made over quarter- or half-mile courses to rule out slapdash modelers who may get a lucky burst of engine power and then slow down, or the guy with the powerhouse capable of only a few laps. Longer courses protect the painstaking modeler. One interesting sidelight is that the ordinary tank holds insufficient gas


This is our idea of a swell model!

for more than a quarter mile and this factor should be carefully considered. An altitude restriction of, say, twenty feet should be observed, although the exact amount is something to be settled only by hashing over opinions.

Since most control-line contests on the Coast are held in ball parks, arenas or similar places, where there are wire screens in front of the

THIS DEPARTMENT IS DEDICATED TO STRENGTHEN AND SUPPORT CLUBS, CONTEST ACTIVITIES AND INDIVIDUAL EN

stands, a rope has been strung along the wire twenty feet from the ground. A marker is placed on a pole in the center of the circle at the same height. Seated in the stands, the judges can sight the speeding model between the rope line and the pylon marker, time being halted when the model goes above this line. By signaling, the flier can immediately request

Try using scale models for dogfights.

that time be resumed for a new flight without landing his model. But even in an open field the judge should be elevated on some kind of stand.

Fifth in Walker's suggestions is the opinion that precision landings, slow-speed flight and novelty acrobatics should not be separate events. These trials might be worked in at the end of the ordinary speed run if the model has sufficient gas left. Precision landings assuredly might be made at the end of a speed flight. Theoretically this arrangement *(Turn to page 66)*

WEST COAST MUTINY

Until a few years ago, with a few exceptions, there was no AMA on the Pacific coast. Every contest had its own rules and none were run under the auspices of the academy.

Then a few of us banded together and decided to unify the coast under AMA. This action was taken for several reasons: first, we wanted to go after the national records; second, we wanted a standardization of rules for all

Western meets are really promoted.

contests on the coast so that a new ship would not have to be built for each contest; third, we felt that we should support a national organization for the advancement of the hobby.

Two outstanding men were chosen to become leader members and a number of the rest of us joined up to take a crack at the records. Our first AMA contests were poorly attended and we were severely criticized for not allowing non-AMA members to participate. But they began to realize also that the Academy was actually benefiting them and joined in droves. Thus, the Pacific coast went AMA almost to a man.

Soon, however, it became evident that something was wrong with our organization. Although we were practically one hundred percent AMA, we "foreigners" out here in the "Coastal Colonies" didn't seem to amount to much. As long as we stayed in our own backyard and obeyed the commands of headquarters, everything went fine. But when it came to determining the policies of our organization on the conditions under which we should fly, headquarters didn't even know we existed.

Criticism of our then existing rules and suggestions for improvements were made by our fliers and transmitted through our leader members to headquarters. The resulting conflict and final adoption of the 1942 rules showed us what was wrong with the AMA. It was not only the fliers of the Pacific coast who had no voice in making the rules; it was every section of the United States.

The rules question was first brought up in the middle of 1941. Letters of comment came from all sections of the country and were published in the official publication, *Model Aviation*. Mr. Blank's letter appeared which absolutely laid down the law to the modelers of the country. Protests came from every section of the country. This letter was printed long before our country went to war. Time wore on without any action whatsoever on the rules. Suddenly Mr. Blank's rules were announced by the Academy as the official rules, in spite of the protests of the fliers throughout the entire country. And the war was given as the excuse for the adoption of these rules.

There has not been, to my knowledge, one single contest held on the coast under the 1942 AMA rules and sanction. Many communities have adopted the "Pacific coast rules," but some communities have made their own rules, and the result has been a complete disorganization with every contest run under a different set of regulations.

Why, for instance, was hand launching allowed to replace R. O. G.? Why was the cross-section rule eliminated? The reason given for the latter is that it will permit the development of the flying wing. Yet, under the old rules, the cross section of the fuselage was determined by the length of the fuselage. A flying wing has no fuselage and therefore would be perfectly legal under the old rules.

A great many fliers on the coast have not renewed their membership in the Academy. Some of us have, with the hope that, by fighting, we can save our organi- *(Turn to page 67)*

CLUB CHATTER

What's happened to model plane clubs? Surely the war and its restrictions aren't solely to blame for the appalling lack of club or unit activity in the last year or so. Although it must be admitted that the government restrictions on balsa and the rationing of gasoline for pleasure use have contributed to this condition —as has the induction of young fellows into the armed forces, there must be other reasons for the inactivity of groups that formerly were constantly "on the go."

One thing is true: members of a club have ideas and are willing to work to put those ideas into action, but rare indeed is the group that does not need a leader or director to co-ordinate the efforts of the individuals. Perhaps the lack of club activity can be charged in part to apathetic leaders. It's easy to say, "The war and its restrictions interfere with everything we used to do, so why try new activities?" If many leader members of other men in key positions in model aviation adopt that theme, everyone can readily foresee the downfall of active model clubs.

We are not trying to condemn model leaders in general. We're merely attempting to point out that, when certain model activities strike

Fine indoor pusher for club meet.

a snag due to restrictions imposed by world conditions, that is the time to concentrate on other phases of activities that were perhaps secondary in the past. Some clubs have looked to "greener fields," but unfortunately their number is few compared to the clubs that are inactive.

Indoor flying, for example, is within the reach of any club. Durations of a minute or more have been made by tissue-covered indoor models in small clubrooms handicapped by lights hanging from the ceiling. Small, frequent club contests will undoubtedly *(Turn to page 67)*

THIS AND THAT

AL LEWIS' RECENT ARTICLE "Wanted—Ideas" certainly brought it to our attention that the good old Yankee ingenuity is still plenty prevalent. From a mounting pile of suggestions, we select a few examples.

Bill Loftis of Cookeville, Tenn., tells how he laminates seven layers of paper strips with paste to mold the cowl and spinner on his control-line Manta fighter. And Ellis Sigmon of the Seattle Guideliners tells of a new type of motive

No gas? Use this trailer on a bike.

power: rockets. The device burns gas and develops the power of a Class B engine. James Moulder of Roach, Mo., asks the Model Industry Association to have all dealers sell tubes of cement only if an equal number of empty ones are turned in by customers. And speaking of cements, a homemade brand has been developed by Jack Nolan, Creve Coeur, Ill. Jack claims that he uses acetone to dissolve steering wheels and plastic knobs of wrecked automobiles to make a cement that holds.

THUSIASTS IN THESE DIFFICULT DAYS OF WINNING THE WAR. HELP YOURSELF AND OTHERS BY WRITING REGULARLY.

Private Hoopengarner, designer of Porkey, demonstrates engine-starting technique. Successful performance is the result of sturdy construction and clever design.

PORKEY

By Eldred Hoopengarner

YOU'LL NEED A SURE-FIRE CONTEST DESIGN FOR SUMMER COMPETITIONS. HERE'S A PROVEN WINNER FOR CLASS A OR B EVENTS.

PORKEY has become almost a model tradition around Cleveland. Even her "son," Corkey, built over the same design, has turned in almost perfect performances. When she leaves your hands, she goes right up, and leveling off into a beautiful, flat glide, she is reluctant to come down.

Make a full-sized outline drawing of the top view of the fuselage, using the dimensions given on the side view. Cut out the fuselage formers and notch them as shown in Plate 2; notice that former C is cut from 1/8" sheet. Use the formers for measuring the width of each station. From this layout, mark on the 1/8"-sq. longerons the location of each former. Now cement the formers into place, starting at the front and working toward the rear. The longerons at the rear of the fuselage are tapered so that the finished width is 1/8". Check frequently to make sure that they have not dried crookedly. Now cement the top and bottom longerons into place, working from front to rear. The top longerons, two pieces of 1/8" sq., between formers C and G, are spaced 3/64" apart to receive the pylon stiffener. In doing this, be sure to keep the horizontal longerons straight.

The inside planking, used for the ignition-unit housing, is of 1/32" sheet stock. The full-sized templates on Plate 2 show how the four separate pieces are installed. Two pieces of balsa 3/16" sq. x 7/8" long, are notched in back and bottom for wire part Y. Cement them to the fuselage with the wire hook in place. These blocks are flush with the longerons upon which they are cemented.

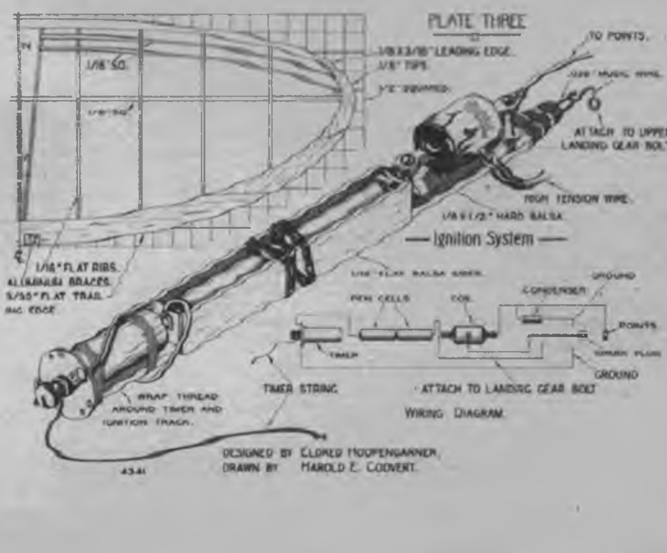
The outline pieces of the rudder, stabilizer and wing are drawn out in the full size and used as templates. First rule off a sheet of paper into half-inch squares, with the same number of squares as shown in the drawing. Now reproduce the surfaces into the full-sized squared paper. These drawings can be used not only for templates, but also to build the parts upon. The tail skid is laminated as shown and cemented into place.

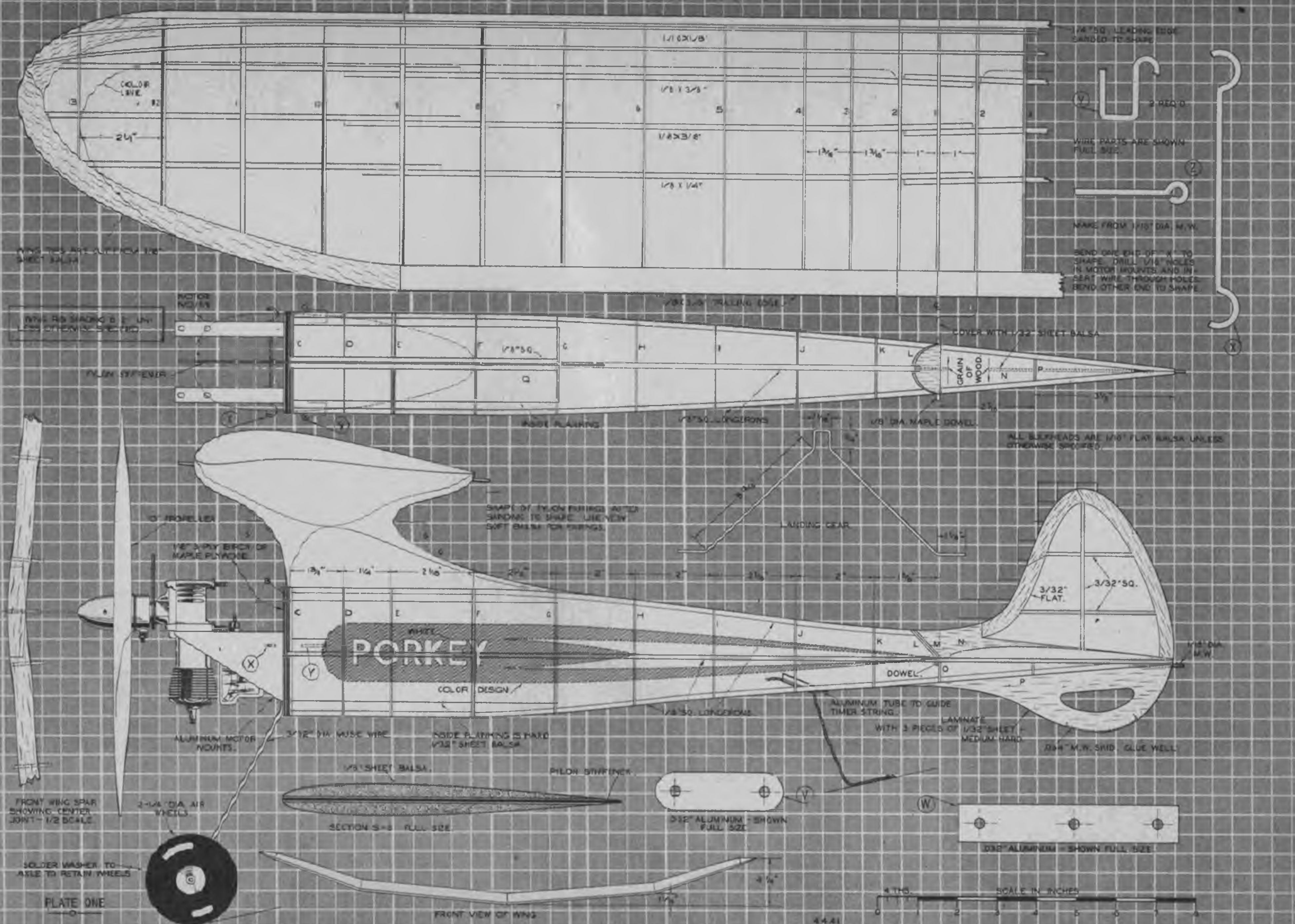
The pylon stiffener is cut from 3/64" three-ply aircraft plywood. Two pieces of 1/32" flat bass or balsa cemented together with the grain at right angles may be used as a substitute if the plywood is not available. Cement this into place. Now cement 1/8" sheet to both sides with the grain running as shown by the dotted line on the pylon-stiffener template. Two wire hooks bent from 1/16" music wire fit into the slots; let a half inch project from the edge of the stiffener. The wing platform is cut from 1/16" sheet with the grain running with the span of the wing. The front part of the platform can be easily shaped by soaking the balsa wood in water for a few minutes and then wrapping it around a 1/8"-diameter wood dowel. A strip of cloth about a half-inch wide is wrapped around it and left to dry for about twelve hours. When dry, glue in place, being sure to get it perpendicular with the pylon.

The pylon fairing is carved from extremely soft balsa. If desired, the fairing may be formed by covering with silk, although it is much more difficult to do. A 1/8"-diameter maple dowel 1 3/4" long is attached to the front face of former O.

The fuselage is planked with 1/32" sheet stock put on in four or more separate pieces. If desired, stringers may be added between the four 1/8"-sq. longerons and the plane covered with either bamboo or Silkspan paper. Cut former B from 1/32" plywood and attach it to the front of fuselage. Bulkhead A (firewall) is cut from 1/8" three-ply wood. Hold the firewall against the fuselage and drill two holes on the outside of motor mounts, 1/8" in diameter x 1" deep. Remove the firewall and cement two 1/8"-diameter maple dowels 1 1/16" long in place. Sand the projecting end round so the firewall can be slipped easily into place. Drill the rest of the holes in the firewall. Give several coats of lacquer to prevent oil from soaking into the wood. If it is desired to leave the plywood natural, give several coats of varnish, which will last much longer than the lacquer.

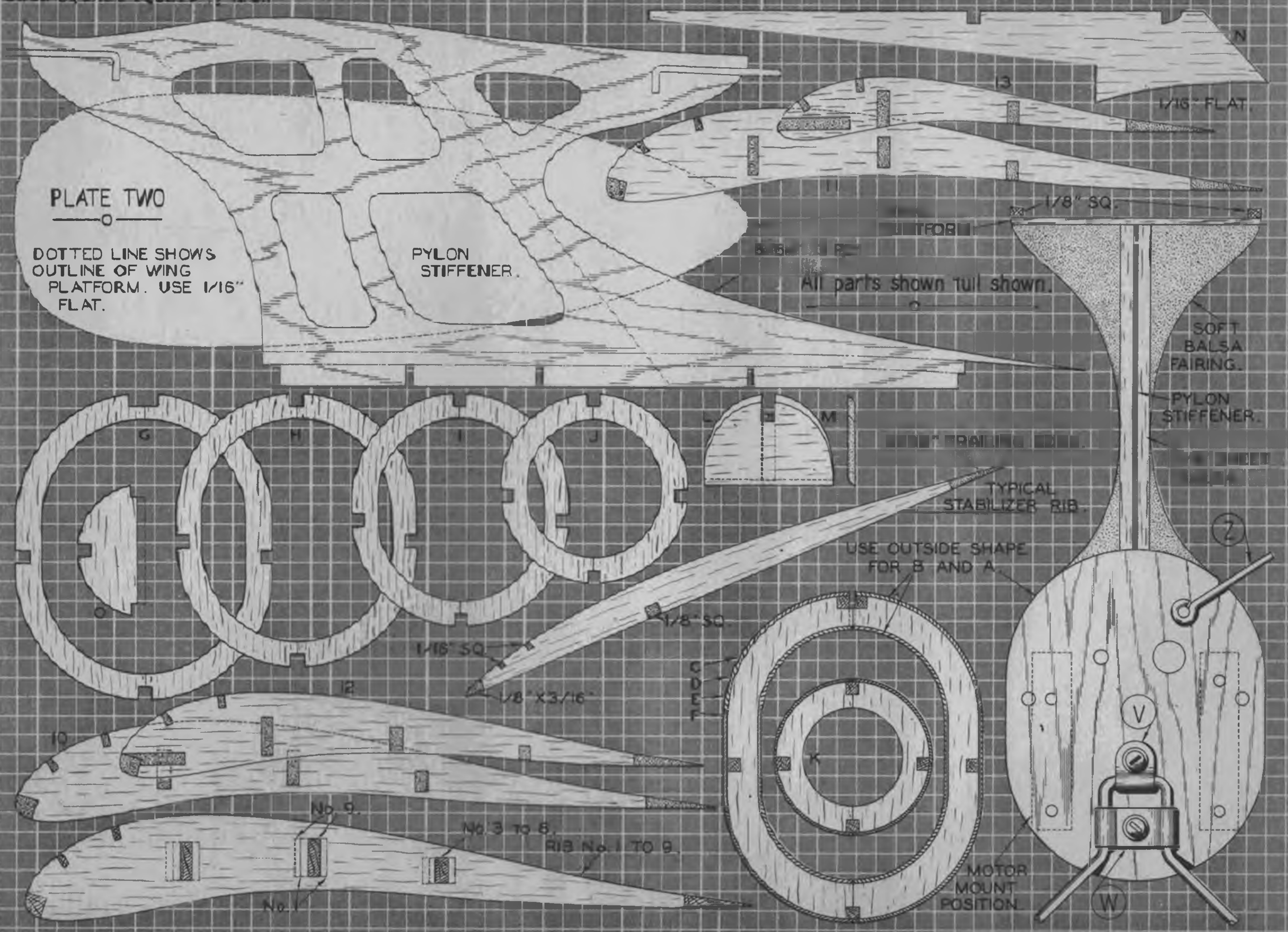
The landing gear is bent to shape from 3/32"- *(Turn to page 60)*





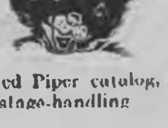
1/4" SQ. LEADING EDGE SANDED TO SHAPE.
1/16 X 1/8"
1/8 X 3/8"
1/8 X 3/8"
1/8 X 1/4"
COLOR LINE
2 1/4"
2 REQ'D.
WIRE PARTS ARE SHOWN FULL SIZE.
MAKE FROM 1/16" DIA. M.W.
BEND ONE END OF "X" TO SHAPE. DRILL 1/16" HOLES IN MOTOR MOUNTS AND INSERT WIRE THROUGH HOLES. BEND OTHER END TO SHAPE.
COVER WITH 1/32" SHEET BALSA
GRAIN OF WOOD
1/8" SQ.
1/8" SQ. LONGERONS
1/8" DIA. MAPLE DOWEL
INSIDE PLANKING
ALL BULKHEADS ARE 1/16" FLAT BALSA UNLESS OTHERWISE SPECIFIED.
LANDING GEAR
PROPELLER
SHAPE OF PYLON FAIRINGS AFTER SANDING TO SHAPE. USE VERY SOFT BALSA FOR FAIRINGS.
1/16" 3-PLY BIRCH OR MAPLE PLYWOOD
3/32" FLAT.
3/32" SQ.
WHITE
PORKEY
COLOR DESIGN
DOWEL
1/16" DIA. M.W.
ALUMINUM TUBE TO GUIDE TIMER STRING.
LAMINATE WITH 3 PIECES OF 1/32" SHEET - MEDIUM HARD.
.034" M.W. SKID. GLUE WELL.
1/8" SQ. LONGERONS
ALUMINUM MOTOR MOUNTS.
3/32" DIA. MUSIC WIRE
INSIDE PLANKING IS HARD 1/32" SHEET BALSA
1/8" SHEET BALSA
PYLON STIFFENER
SECTION S-S FULL SIZE.
.032" ALUMINUM - SHOWN FULL SIZE
.032" ALUMINUM - SHOWN FULL SIZE
FRONT WING SPAR SHOWING CENTER JOINT - 1/2 SCALE.
2-1/4" DIA. AIR WHEELS
SOLDER WASHER TO AXLE TO RETAIN WHEELS
PLATE ONE
FRONT VIEW OF WING
SCALE IN INCHES
4-4-41

EACH SQUARE EQUALS ½ INCH



Winged Courier...

PIPER L-4



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PIPER POINTS THE WAY TO WINGS FOR ALL AMERICANS

Aerial Argonaut

(Continued from page 6)

1906. Of all his accomplishments, General Lahm derives the greatest pleasure from this one. It certainly had a pleasant aftermath for him, because it enabled him to qualify as the army's first balloonist and lighter-than-air aircraft pilot.

Had Lahm not decided that a military career offered most opportunity for direct advancement of his aeronautical dream, he would have taken up civil engineering. But he matriculated at West Point. Except for exciting days on varied fields of sport, the academy was an endurance contest for him. He captained the army baseball team, turned in a good record as quarterback on the gridiron, and had enough wind left to capture a spot on the track team. Today he names baseball, ballooning and football as his three favorite sports, in that order. Like many pioneer airmen, he does not like to regard airships and airplanes as instruments of war; that's why he designates ballooning as a sport.

No pilot ever forgets his first solo; it was a memorable day for young Cavalry Lieutenant Lahm in November, 1909, when Wilbur Wright was scheduled to solo the brothers' first two students at College Park, Md. Lahm had selected the site from a balloon. He says, "I sailed around the Maryland countryside until I found a field that looked big enough for us to take off. Then I marked it carefully on a map."

At that time there was no air service or anything that resembled one. The army's first airplane, purchased from the Wrights for $30,000, was hauled by horse and wagon to the field. A few bumps were shoveled away; a shed was erected for use as a hangar; and a monorail runway, tilted upward to provide lift, was stretched out sixty feet. Engineer Lieutenant Frederic E. Humphreys was the other student; both had had three weeks of dual instruction. Humphreys took off first; he soloed three minutes. Then Lahm stepped up. Wilbur Wright nodded. "Go ahead and take it up." The words still sing in Lahm's ears.

A mechanic applied a gas-soaked rag to the 35-h. p. engine's air intake while two men cranked the spindly propellers. The skeletal structure quivered and shook into life. It was a two-place ship. Ailerons were lacking, but there was a rudder control that literally warped the wings to get the same effect. (Later an international controversy raged about who it was that first put ailerons on airplanes.)

Lahm took off. He stayed aloft for thirteen minutes. When he came down, he and Humphreys were qualified to begin "advanced" training, using the same ship and staying upstairs for slightly longer periods. At any rate, both could now call themselves pilots. Very soon thereafter the Wright brothers had three pupils whose names are worth noting: Arnold, Milling and Foulois; that Arnold is now Lieut. General Henry H. Arnold, chief of the Army Air Forces.

Flying in those early days, despite its constant risks and discomforts, lived up to all Frank Lahm's expectations. He recalls that his narrowest escape was when he plunged into Manila Bay in 1913, from a height of fifteen feet at a speed of sixty m. p. h. He was testing a Wright Type C, equipped with new pontoon equipment.

His favorite yarn concerns the way he started the U. S. navy in aeronautics. It was later in the same month in which he "graduated" from the Wright school at College Park. He took up as a passenger Lieutenant George Sweet, U. S. N. It was not only Sweet's first ride, but the first for a United States naval officer. General Lahm asks, with a twinkle in his eye, whether that doesn't entitle him to the claim.

At the end of the century's first decade, Lahm and others of his ambitions were considerably saddened at the prospects for their chosen profession. Lahm had determined that he would build his career in the air long before he soloed a power craft. He stayed with flying until the congressional appropriation ran out and there seemed only a slight chance of finding more airplanes to fly—for a while. He accepted foreign duty as a cavalry officer.

During the early days of World War I, he was a combat observer. He watched the development of military aviation from the early period when fighter pilots fired shotguns, threw bricks at each other and dropped darts on ground troops. In April of 1916 the army was struggling to build up its air force. Captain Lahm went to the Aviation Section Signal Corps, where he was indeed welcome. The year following saw the outbreak of war. The War Department made him a major and handed him a difficult assignment. He was sent to France to organize the A. E. F.'s lighter-than-air service. His command of the air service of the Second Army earned him a D. S. M., but, for reasons pilots of that day can best explain, it was not accompanied by a promotion. Only in mid-1920, when the air service was barely out of its swaddling clothes as a unit distinct from the Signal Corps, did Lahm don the silver leaves of a lieutenant colonel.

All this time the thoughtful veteran had been constantly teaching and organizing. He believed the army needed a system of centralized pilot training and had had definite ideas about what was needed. When he took the temporary rank of brigadier general in 1926, as assistant to the chief of the air corps, he realized that a great opportunity to put his ideas into being had arrived. He made the most of it. He preached the doctrine of "training centers" where all the facilities of the War Department could be concentrated for furtherance of its pilot training program. The similarity of his idea to the successful training curricula for ground officers at the military acad-

(Turn to page 50)

(Continued from page 48)

emy at West Point was a strong point in its favor.

He finally obtained permission to set up a center at Duncan Field, Texas, near San Antonio. He commanded at Duncan until July, 1930, a period of nearly four years. The experiment proved a notable success and the way was paved for a greater development of Lahm's idea. If Frank Lahm didn't originate the expression "West Point of the Air," the sobriquet of Randolph Field, it is only because he is an aviator, not a word coiner. Certain it is, however, that he spread his conception of a great air corps academy.

Inspired by the success of the Duncan project, air corps men looked around for a place for a supertraining center experiment. Their glances fell favorably on San Antonio, Texas, where nearby Duncan, Kelly and Brooks Fields formed an admirable nucleus for such an ambitious undertaking.

Right from the start there was plenty of co-operation from civilians. A site was chosen. The name of an illustrious son of the service, Capt. William M. Randolph of Austin, Texas, was selected. Ground was broken. General Lahm officiated at a dedication exercise; Randolph Field was born to be the home of the Gulf Coast Air Corps Training Center and an army show place.

From its very beginning, Randolph Field was a success. The dedication took place in June of 1930, and early in the autumn of 1931 the training center was in full operation. The father of the idea ended his temporary service as a brigadier general in San Antonio and returned to San Francisco as a colonel in charge of air activities for the Ninth Corps Area.

The four-year turn of duty that Frank Lahm entered late in 1931 represents one of the most important, significant and yet, by its very nature, least known achievements of his career. He went to Paris as military attaché for air. A more fortunate choice could not have been made. He knew Europe. He knew Paris. He knew the military side of the diplomatic service. War to him was quite familiar, and he was soldier enough to recognize significant events in peace or war.

As military attaché General Lahm looked on as some of the most cataclysmic developments of modern history took place. He watched a Viennese ex-paperhanger rise to the head of the world's most militant State. He watched the forging of Hitler's sword and heard the sound of its rattling. He noted the effects of the world's most terrible economic depression sweeping their way into twisted minds and haranguing fools. Only the War Department knows the whole story of what was probably the greatest service Frank Lahm performed for his country. But the War Department won't tell it, and the chances are that it never will.

In 1941 he faced retirement with trained equanimity. Army officers don't look forward to getting out of harness any more than do civilians; perhaps they enjoy the prospect even less. In September of 1941 President Roosevelt nominated him for the rank of major general. He was sent to command the training center at Randolph Field. When Major General Gerald C. Brant was transferred to Newfoundland, Lahm replaced him, to complete his military service at a post whose founding was so closely identified with his career.

Frank Lahm had spent forty-four years of his life in the military service of his country. There was but a month left before his retirement. With great pleasure he spent that time amid scenes he had had a major part in creating. He preferred to think of airplanes as mechanisms of peace, but the handwriting on the wall was apparent to him.

Randolph Field's greatest review took place in his honor when the day of his retirement arrived. Hundreds of airplanes from Randolph, Kelly and Brooks swarmed above as 5,000 ground troops and aviation cadets and 25,000 civilians joined in paying their respects. The elite of the U. S. army was well represented. Then, in accordance with the curious military custom in such matters, Major General Frank Lahm retired as a brigadier general.

What does he say today, as he continues with many war activities in New York? It is to be noted well. "Our growing air power is of great significance in the entire war program. There will be no victory without it."

The Constellation

(Continued from page 17)

the range of speeds for which the cowl must be designed is comparable to that common to the design of pursuits. In consequence, we made wind-tunnel tests up to speeds of several hundred miles an hour, since these speeds could be attained in glides from high altitude during the course of operation. A small inlet area and the gradual, increasing radius from the nose back to the maximum section characterizes the cowling. This gently increasing radius of the nose cowl permits uniform acceleration of the air stream around the nacelle and eliminates extremely high velocities over any one part.

Of course, such efficiency doesn't interest a squad of air-force mechanics faced with the necessity of changing an engine at some advanced base. They want to know how easily and quickly they can get the job done. They needn't worry about the Constellation engines, for they can make a complete installation in forty-five minutes by changing the power-plant assembly forward of the firewall! They can perform this task swiftly because we provide interchangeable engine installations as integral assemblies, including oil-cooler flaps, carburetor ducts and other parts.

The same feature of interchangeability applies to other subassemblies.

(Turn to page 52)

"Model building has greatly facilitated the task of teaching aircraft identification to our pilots" writes Lt. B. A. R., Westover Field, Mass.
Continuing, he says: "By actually constructing these models with their own hands, pilots seem to develop a "feeling" for the plane which results in greatly increased speed of recognition. Then, too, the work is a splendid morale builder for them when the weather it closed, and the big planes grounded."
KDN
Junkers JU87 "Stuka"
Here is the Nazi Stuka Dive Bomber "ugly duckling" of modern war planes that the so-called Master race thought couldn't be equalled. But now when the United Nations have consolidated their bombing attacks on the many German targets with Flying Fortresses, Liberators, Sterlings, Halifaxes and others, with their block busters and super block busters, the Stuka is destined soon to become a museum piece. An important model for instructional purposes, and as a memento of the days of bullying tyranny over unprepared nations, which it attacked relatively unopposed. Span 34". C-D Master Kit SF-84. $3.50
Build the World's Hardest-Hitting Dive Bomber Douglas SBD "DAUNTLESS"
Has a speed of around 300 m.p.h. carrying a 500 lb. bomb beneath fuselage. Also widely used as a scout. Delivering heavy damage against the enemy. Span 30¾". C-D Master Kit SF-89.. $3.50
GRUMMAN "SKYROCKET"
Navy's "Terror of the Skies." Reputed 450 m.p.h. speed. Span 31½". C-D Master Kit SF-75 $3.50
Brewster "BUFFALO"
Also known as "Peanut Special," Span 20⅝". C-D "Master" Kit SF-87 $3.00
Grumman F4F "WILDCAT"
An excellent U. S. Navy Shipboard and Marine fighter. Very maneuverable. Has a speed of 325 m.p.h. Model Span is C-D Master Kit $3.00
Republic P-47 "THUNDERBOLT"
The Army's top single motored fighter, replacing P-40's on the production lines.
Model is a beautiful 20¾" span replica, with four-bladed propeller, easily made. A "must" model for all modelbuilders. C-D Master Kit SF-91 $4.00
Lockheed "HUDSON" Bomber
Used with terrific effect on the Japs in the Solomons. Used for bombing, fighting and reconnaissance. Called "Old Boomerang" by British, for it usually comes back. One of the most popular models in the whole C-D line. C-D Master Kit SF-95 $7.50
BELL "AIRACOBRA"
The swift flying "cannon plane" that stings with the deadliness of a cobra. Doing great work over Africa and the Solomons. Model has beautiful streamline grace of prototype and cuts through the air with a knifelike flight. C-D Master Kit SF-70 $3.00
Curtiss "HELLDIVER"
This design made dive-bombing C-D "Master" Kit SF-80 $3.50
Vought Sikorsky "CORSAIR"
A Navy fighter in the 500 m.p.h. class. Span 30 3/16". C-D Master Kit SF-79 $3.50
Curtiss P-40 "TOMAHAWK"
Span 20½". C-D "Master" Kit SF-77 $3.00
Messerschmitt Me-109
Span 24½". C-D "Master" Kit SF-74 $3.00
U. S. Army's Top Fighter LOCKHEED P-38 "Lightning"
Super-powered twin motor interceptor, claimed by Army to be "fastest thing on wings." Doing a terrific job in the Solomons and Africa. C-D Master Kit SF-85 $4.00
North American P-51 "MUSTANG"
A tough, vicious fighter that is today very much in the news. $3.00
Hawker "HURRICANE"
England's great night fighter. Span 30". C-D Master Kit SF-78 $3.00
Largest $1.00 Plane in U. S.
New, Redesigned 7-Ft. Super CONDOR Soaring Glider
Stronger, longer flights, more graceful lines, construction simplified. Easier than ever to build. Soars for hours. Kit YE-3013, only $1.00
T-77
T-76
T-70
T-85
T-91
T-78
Build These 6 Big 3-Foot Warplanes. Each Complete Kit only $1.50
Ordering Instructions! See your dealer first, if he can't supply you, send check or money order—cash at your own risk. Minimum order $1.00 No C.O.D.'s. Postal restrictions no longer permit shipments except to customers in U. S., Canada and Mexico unless on bona fide military order. For service men still stationed in the U. S., we advise against using A.P.O. or Fleet P.O. box numbers to avoid usual delays because of parcel size restrictions. Use a local address near you if possible. For P.P. Special Delivery in U.S. only add 25c. (Ohio residents only, add 3% sales tax.) All kit contents and prices subject to change or cancellation without notice. The usual C-D "Lightning Service" guaranteed—No Waiting—No. 40 Catalog 5c.
CLEVELAND MODEL & SUPPLY, CO., INC.
Manufacturers of America's Foremost Line of Model Aircraft—Since 1919
4508C31 Lorain Avenue, Cleveland, Ohio, U. S. A.
New No. 40 Catalog a "Knockout"
Features C-D War Models in thrilling action "shots" in various fighting fronts. Many others. No catalog ever before like it. Send 5c for your copy — none free.
T74—Messerschmitt ME-109
T70—"Airacobra"
T77—"Warhawk"
T78—"Hurricane"
T85—Lockheed P-38 "Lightning"
T91—"Mustang"
When You Build CLEVELAND MODELS You're Building
Models that Pilots, Instructors, Cadets-in-Training and Mechanics of all Classes in the Air Forces Build

(Continued from page 50)

Such things as the wing tips, ailerons, trimming tabs, elevator, seats, berths and landing gear may be exchanged between one plane and another. Too, the number of right- and left-hand parts has been reduced to a minimum. Among the identical parts are the elevators, landing-gear wheels, brakes, retracting mechanism and exhaust-collector rings.

Mechanics, of course, are more interested in facility of repair than in beauty. Yet the Constellation's very appearance indicates something of her performance possibilities, including high-altitude flying.

We know that neither crew nor passengers could withstand very long flights at high altitude with oxygen supplied through masks alone. For this reason, we have pressurized the cabin by means of two superchargers, either of which will maintain correct air density in the cabin. The special supercharger has been especially designed and developed by Lockheed for this particular job. Because the atmosphere-control system will maintain both proper pressure and temperature, passengers will be as comfortable at 25,000 feet as at low altitudes. The cabin is contained in a unique fuselage, unique in both appearance and function. Its contour, as a result of much consideration of design, is such that the lift distribution over the wing is only slightly affected. We have been able to achieve this partly by so designing the fuselage that in some respects it resembles an airfoil.

Because the cabin is pressurized, providing pressure found at 8,000 feet when the plane is flying at the four-mile level, circular cross sections were used throughout. By cambering the fuselage center lines we obtained near-maximum floor arrangement, essential to provide maximum seat space and berth width, especially in the nose and tail sections.

Although we are not yet permitted to disclose by text or photographs details of the interior arrangement, I can outline the more general divisions. Pilot and co-pilot, flight engineer and radio operator sit in the forward upper portion, pilot on left, co-pilot on right, engineer and radioman behind each, respectively. Back of the flight station and separated from it by a bulkhead and curtain are the navigator's station and accommodations for the crew. Space is provided beyond a bulkhead and door aft of the crew's quarters for cargo and communicating equipment.

Passengers will ride in the main compartment aft of the cargo spaces. Arrangements within this space will vary from plane to plane, depending upon the number of persons carried, type and amount of cargo, nonstop range desired, and whether the ship will fly at normal cruising speed or rush troops at full throttle to some outpost or battle line. Incidentally, the plane can carry a small tank and complement of troops across the Atlantic.

Although the plane is designed to carry fifty-five passengers across the continent, one arrangement would permit seating sixty passengers. Other details: Food lockers are installed at after end of the main cabin. The cabin has many circular windows, varying in size and number to meet specific requirements. Lavatory facilities are provided aft of the passenger cabin. Passengers enter through door on left, near aft end of main cabin; the crew enter the flight station from door on right side. Underneath the floor is additional space for cargo.

There are other details of construction and performance that help make this a noteworthy airplane. The double wheels have double brake connections, making improbable failure of braking on either wheel. The ship can maintain a 25,000-foot altitude on three engines. Hydraulic steering prevents pilot fatigue. The triple tail helps keep the plane's over-all height at a minimum, enabling the ship to fit more easily into a hangar and providing maximum control in the emergency of an engine failure.

How will the ship react to bad weather and—ice?

In the future, as troops or civilian passengers ride over storms and through icing conditions, they need not worry about the ship's maneuverability or its ability to shed ice as it forms. One of the novel features incorporated in the Constellation is the use of maneuverable Fowler flaps. To both pilots and laymen, this means that a particular setting of the flaps is so designed that the plane has excellent maneuverability at low speed and can thus climb rapidly or maneuver at low speeds during icing or other bad weather conditions. As future Constellations roll off the assembly line, they will be equipped for hot wing de-icing, employing exhaust gas rather than a type of rubber boot fitted over the leading edge of the wing.

All these factors combine not only to make an airplane; they make possible flying the heaviest load over the longest distances in the shortest time with the greatest safety and at the least cost. They enable army pilots to carry goods and troops above weather to the battle fronts of a global war. They give us the fastest, most powerful land plane yet created. They are the Constellation.

Photo Credit List

The following list shows the sources from which credited photos were obtained. Abbreviations: Bot., bottom; T., top; U.L., upper left; U.R., upper right; L.C., left center; R.C., right center; L.L., lower left; L.R., lower right; Cen., center; T.C., top center; B.C., bottom center.

Page 6—Official U. S. army photo.

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Page 27—European.

Page 29—International.

Page 12—L.R., Harold Kulick


AA Gunners Train with Jim Walker Planes
THOUSANDS of AJ Interceptors are being knocked out of the sky by machine gun fire at the nation's principal anti-aircraft training centers. Here at last has been found the ideal free target for machine gun practice against low flying and attacking aircraft.
To be suitable for anti-aircraft training, a target must glide straight, circle or dive as desired. These three flight paths simulate the maneuvers of enemy planes in strafing attack, or circling into position, or dive bombing.
Jim Walker's AJ Interceptor model planes perform these maneuvers at will. Using a specially built catapult, the AJ Interceptor is shot into the air to an altitude of about 300 feet. At this distance the scale effect is approximately the same as a full size plane at an altitude of 1500 feet, traveling 300 m.p.h.
When a gunner can consistently hit this elusive target he is ready for actual combat, and woe to the enemy plane that comes within range of his gun!
Furnishing these targets is American Junior Aircraft's most important job. Naturally, our production of planes for civilian use is limited, and possibly you cannot get all you would like to have. However, we are sure you will gladly give first call to our armed forces.
Our Plans for the Future
American Junior Aircraft promises that after the requirements of the armed services are met it will produce as many AJ planes for you as our facilities will permit. We shall continue our research and development work in order that future designs will be even better than the Fireball, U-Control, AJ Pursuit, Interceptor, Bomber, and other American Junior Aircraft planes which have made and will continue to make model airplane history.
New Sensation to be Announced
Jim Walker has just completed final tests on a new and revolutionary type plane flown by Whip-Power with U-Control. This plane will be in production soon. Watch for detailed announcement next month.
AMERICAN JUNIOR AIRCRAFT COMPANY Jim Walker, President, PORTLAND, OREGON

Old Planes Never Die

(Continued from page 22)

about seven years. It's a business that has given him an unrivaled knowledge of what odd jobs airplanes can be used for, a knowledge that is extremely valuable right now and will probably be even more so after the war.

For example: With mahogany in great demand at high prices, a big stand of virgin mahogany went uncut for many years in Yucatan because impassable swamps and jungles prevented getting it out. Babb was called down to Yucatan for a survey and soon had the answer. He fitted up a Curtiss Condor plane to carry 8,000-pound logs under its belly, like a torpedo bomber. Now the mahogany is being cut and floated to a lagoon where the Condor picks it up and flies it, in a few minutes, to another lagoon whence it can be floated down to the coast.

Again, there was a contractor building an airfield in Alaska who was faced with the problem of freighting in 5,000 tons of equipment and supplies seventy miles from the nearest seaport. The heaviest single item was a generator that, with all removable parts taken off, still weighed 6,800 pounds. Babb found the contractor a Boeing 80, vintage of 1929, which at this writing is cleaning up the freighting job in jig-time, with three crews keeping her flying eighteen hours a day.

And there's a gold mine in Mexico that formerly could be reached only during three dry months of the year when ox carts could make an eight-day trip up the dry bed of a river while the driver prayed there'd be no freshet. Now a plane, furnished by Babb, makes two round trips a day from the mine to the nearest civilized town. The mine crew probably complains bitterly if the mail is late or the milk and vegetables aren't fresh.

By and large, Babb believes in the newest, fastest and most efficient planes available. Fast planes are more economical than slow ones, he says, where the distances are fairly long. But for some jobs the old crates are better: with a light wing loading they can get in and out of places where a newer ship couldn't. For runs of under a hundred miles, he says, the old planes will take off and land with less fuss and, being cheaper to buy, are more efficient.

When you go to Babb to buy a plane, he checks the job thoroughly. He wants to know how long your trips will be; whether they'll be at low altitude or in mountain country; whether your landing field is large or small, rough or smooth; whether you plan to carry light, bulky cargo or heavy, concentrated weights.

By the time he gets through asking you questions, he knows just what you need; and the chances are he knows how to find it. As a matter of fact he knows where just about every commercially usable airplane in the world is—who owns it, what it's doing for a living and in what condition it is.

If it doesn't quite fit the job, he'll make it fit. His equipment includes shops where he can not only put the plane and its engines into first-class shape, but equip it with pontoons or skis if necessary; cut a cargo hatch in it through which you can drive a horse and wagon if you must; strengthen the floor to sustain heavy, concentrated weights; or even beef up the whole fuselage to carry light, bulky cargoes like coffee.

Planes never wear out, Babb says, but motors do, or at least parts of them do. Even so, he can cite cases like that of the second Wasp Junior ever shipped out of the Pratt & Whitney shops; it was built in 1929 for an experimental navy plane that won all sorts of prizes in the air races for three years. Later this motor, in an S-39 Sikorsky, carried the late Martin Johnson on exploration and hunting trips all over Africa and in the East Indies. It's still in operation—probably with few of its original parts—as one of a pair in a commercial transport plane operating on a Central American line.

Babb can give you the history of some interesting airplanes, some of which are old friends he's bought and sold four or five times over. There's the Vega in which Comdr. Donald B. McMillan mapped Newfoundland, and another in which Amelia Earhart made her transatlantic passage. Both are now on the United States-Cuba run. So is another ship originally built for Cuba, later sold to one South American gold mine and then another, and finally bought back by Babb. One of the last objects exported from the Philippines before the Jap invasion was a Bellanca cargo cruiser Babb had bought for a man who wanted to use it somewhere up around the Arctic Circle. A lot of the old Ford tri-motored "tin geese" are still doing their share of the world's work in out-of-the-way places. And long before the Japs took the Burma Road, Babb had sold half a dozen cargo planes to China to supplement the road traffic.

As a sample of what he means by obsolescence, Babb recently sold the Australian government ten DC-2s that were obsolete as far as Eastern Air Lines was concerned. They'd flown 2,000,000 miles, and were being replaced with more modern passenger ships. But they were just what Australia needed, and they'll probably get another 2,000,000 miles out of them, down under.

Babb's relations with foreign governments—he's acted as purchasing agent for most of the United Nations and Latin American republics at one time or other—are rather unique and certainly a testimonial to his reputation. Time and again, governments have handed him virtually blank checks with no strings whatever attached. Babb gets them what they want and returns the change, if any. One of his business principles is that he won't sell anyone a plane that isn't in first-class shape at any price. Either you pay enough to put the

(Turn to page 58)


SOLID
We're 'sending solid'—right on the beam with the most representative choice of solid-model kits available today! Whatever your contemplated project—small, medium, large—'if it's available' it's here at Polk's!
CUT-TO-OUTLINE SHAPE
WINGS—FUSELAGE—TAIL SURFACES
½" scale kits with cut-to-outline shape fuselage, wings, tail surfaces, turned wheels, simplified construction plans: Choice of Japanese ZERO, Russian STORMOVIK, LOCKHEED P-38 (Lightning), GRUMMAN WILDCAT, N. A. MUSTANG, CURTISS P-40, B-J SEAPLANE, STUKA DIVE BOMBER, GLOSTER GAUNTLET, DOUGLAS ATTACK.
50c ea.
(By mail: 10c postage-packing per kit!)
35c ea.
BOEING P-26A, HAWKER HURRICANE, HAWKER FURY, HAWKER P6-E, CURTISS P-37, SEVERSKY P-35, BELL P-39, MESSERSCHMITT, SPITFIRE, HEINKEL, DEFIANT, RYAN, N. A. APACHE, CURTISS KITTYHAWK.
(By mail, 45c each, or any 5 for $2.00).
BEE $1.95
Semi-monocoupe fuselage, covering material. For A & B flight. 48" wingspan.
GRUMMAN SKYROCKET $1.00
Full size 3 view plans makes model easy to complete. ½" scale.
LOCKHEED P-38 LIGHTNING $1.00
½" scale, balsa throughout, complete with 3 view plans. 13" wingspan.
MESSERSCHMITT $1.00
14" wingspan, ½" scale of Nazi's Messerschmitt 110. Complete kit, includes easy-to-work with 3 view plans.
DOUGLAS B-19 BOMBER $1.00
Giant size (19") solid of U. S. Army's famous Bomber. Everything's in the kit.
CAPITOL FLIERS
Multi-Stringer Construction kits, famous for design and championship flight. 30" span—
PLANE-O-GRAPH
PLANE DETECTOR
Single dial setting identifies any plane completely; 19 models listed. 13" dia. Postpaid
35c
CAMOUFLAGE $1.00
"The real thing!"
Identical in quality with vast quantities used in actual camouflage projects under actual war conditions! 7 Authentic colors with 16 page, illustrated CAMOUFLAGE HANDBOOK! Non-inflammable. May be applied with brush or spray. Cold water cleans! (By MAIL: Weighs 2 lbs., be sure to include sufficient postage to your postal zone!)
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The following are outstanding values in ship construction kits. Each is designed for rapid assembly. All parts are precision cut to shape. They're in the news daily.
TORPEDO BOAT
Heroic Mosquito boat—writing naval history. 16" long. Most popular ship model to-day. Others with shaped hulls and super detailed $2.00 and $3.00
$1.00
DESTROYER
Greyhound of the sea. Guard convoys. Poison to submarines. 20" long. Interesting to build and own
$1.00
HARBOR PATROL
Seen in every coastal harbor. Carries two deck guns. 15" long. Very easy to build
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FREIGHTER
These ships make the life line to Europe—the U.S. Merchant Marine. Nice detail. 13" long
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ORE BOAT
Seen on the Great Lakes. Carry cargoes of grain, coal and ore. 10 inches long
$1.00
NO AMERICAN MODELLER NEEDS "Shortage Apologies" from UNCLE SAM!
We've been thinking about this 'shortage' business and talked with scores of modellers! Unanimity is the ONLY word to describe their reaction! No grumbling! No apologies expected! A confidence in the future that makes present inconvenience matters of small moment! Frank y, we've erred in this direction! We apologize to you now, for our oft-repeated shortage apologies until now! But we're 'hep' now—thoroughly and delightedly so! Rather than apologize for shortages (though you wouldn't think so to see our shelves!) we offer you a limitless choice of alternates in NON-CRITICAL materials PLUS scores of BRAND NEW ITEMS! Under the pressure of war conditions the ingenuity of designers and producers has soared to new heights! Fortunately, it is NOT necessary to ration that precious relaxation which hobby-activities provide from today's stress and strain! KEEP BUILDING, KEEP HAPPY!
Everyone CAN'T fight BUT EVERYBODY CAN BUY STAMPS AND BONDS
SCALE TANKS
4 for $1.20 p.p.
¼" to ½" scale. Choice of US Williams, Amsco or Liberty; Canadian Vickers, Greek Carden, Swiss Reggi, British Whippet, Anzac Hornet. 8 for $2, plus 30c postage.
IDENT-O-PLANES
24 silhouette models of Allied and enemy planes. Ideal for spotter recognition study, can be converted to gliders. Postpaid
70¢
POWER SAW
No rotating parts, nothing to go wrong, no oiling. Many uses, extreme flexibility. 7200 strokes p m assures smooth cutting. Very portable, 10" sq. table, 13½" throat. 110-120v. 60 cycle. AC only (Express collect) $14.75.
FOLDING GAS PROP
Improves flight and glide! Select birch, lacquer finish. Stamped hub. 9". 10". 11". 12".
PURSUIT & INTERCEPTOR SQUADRON
Makes an interesting 'dog-fight' squadron! 19" rubber-power pursuit, Catapult interceptor-glider with folding wings. Ready to fly, both. By mail: add 15c
$1.00
GLIDER KITS
CONDOR $1.00
Advanced soarer, 7 ft. Class "E." 324 sq. in. wing area. For towline or hand launching.
SINBAD $1.00
50" span glider with spiral control for towline launching. Releases automatically at peak of launch.
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4 ft., pod shape fuselage, unusual tail boom. Class "D" Towline or Hand Launch.
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JEEP
Paper construction model 29c (plus 10c postage) ½" and 1" wood and combination for
$1.25 and 50c
STINSON RELIANT 30" 65c
SKYWAY KNIFE INCLUDED! Popular model, detailed plans with turned nose, all balsa. Kit alone valued at 69c, special, only, POSTPAID
65c
HAYMAKER $1.50
Simplified monocoque design. Removable nose unit. 33" span. 165 sq. in., 4 ozs.
MIKE $1.49
1st small ship in gas model history. 48" span. A or small "B" engine flight. Kit includes liquids (less wheels only) $1.49.
EVERY KIT BY CLEVELAND YOURS FOR THE ASKING
Come in—see the kit you plan to construct, study the plans! We carry the complete line for immediate delivery right over the counter, or by mail if you're at a distant point! From the enormous 7" to ft., radio control STINSON ($12.50) to the extra-value 50c glider—WE HAVE 'EM ALL.
LOCKHEED HUDSON $7.50
Big 40¼" span model of powerful bomber and reconnaissance plane. An advanced project for serious modeller; Super-detailed, complete kit!
REPUBLIC THUNDERBOLT $4.00
30⅔" span model of Army's flying "battleship" Lightning-fast, 6 mile ceiling, terrific fire power. Detailed down to 4 blade prop.
BREWSTER
In deluxe MASTER KIT style! 26¼" span! Makes up into a magnificent model of this fast-climbing (4000 ft. per min.) maneuverable fighter!
$3.00
DAUNTLESS
The hard-hitting DIVE BOMBER which Navy & Marine Corps used so brilliantly at Midway and elsewhere! 30⅝" span, master kit.
$3.50
CORSAIR
Vought - Sikorsky's high-altitude, super-speed fighter. Finished span 30 3/16". Master Kit
$3.50
CHOICE OF ALL MAKES!
Kits illustrated above (throughout the ad) are representative of standard producers. If not specifically named, we carry complete lines of COMET, HAWK, BUNO, CAPITOL, SCIENTIFIC, BERKELEY, MASTER MODELCRAFT, CONSOLIDATED (Burkard, Bay-Ridge) Joe Ott, Megow, C-2. Ideal! Speedier service assured by consolidating orders for ALL needs from the ONE central supply source!
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Contains lots of valuable data including trouble-shooting chart, ignition data, etc. (By mail 10c.)
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Flying Wings

(Continued from page 35)

flutter in flight and on one occasion broke in midair. However, tests on the whole were encouraging and the model showed tendencies toward a fast climb and exceptional glide. A larger model with a low wing loading should turn the trick. The one weakness of the model was its low stalling angle. A slot like that used on No. 1 would eliminate this undesirable characteristic and add much to the stability of the design.

Design No. 3 came directly from the birds. Through careful study of the seagull and the albatross, several new principles were discovered: (1) the flexible-slotted tip aileron, (2) the dihedral-chord relationship. The flexible tip aileron when used in connection with gull dihedral increases lateral stability by decreasing the pressure at the tips in the side slip. The spring adjustment is quite sensitive and is not advised for everyday flying. The ailerons should, instead, be locked at the proper setting. The dihedral-chord relationship on the model increases lateral and longitudinal stability. In simple terms it is the ratio of the chord to the height above the center line. Note how the chord is largest at the high point and decreases progressively in the lower sections. The albatross section used was developed through observations of the albatross as applied to the Davis airfoil formulas. Tests indicate that it is a stable section and possesses a higher lift than other stable sections of the same thickness. It has many of the characteristics of some of N. A. C. A.'s famous five-numbered series.

At present the model has only been tested with the high start. With two strands of 3/16" rubber twenty-five feet long and seventy-five feet of towline, the model shoots skyward at a fast rate, releases and sets into a slow, steady glide. The whole flight is exceptionally smooth and the model soars with all of the grace of a bird. The consistency of the flights indicates that the design will make a good gas model. (The plans show the top view drawn flat for construction.)

The elements of tailless design are based primarily on three factors.

Longitudinal stability is mainly dependent upon the type of airfoil used. With stable sections a very consistent model can be produced with only small amounts of sweepback and washout. Note how little sweepback was necessary on No. 3. Some good stable sections are: N. A. C. A. M—6, U. S. A. 27, and the albatross section presented first in this article. With high-lift sections more sweepback and washout must be used in connection with high aspect ratios. Good sections are Clark Y, Eiffel 400 and Davis No. 5. Variation of the airfoil as used on No. 2 is best when using high-lift sections.

On all tailless models a small amount of washout is necessary. Adjustable tip ailerons are the best way to get this effect, for the framework often twists with the tightening of the covering and any built-in wash-out is lost. The most effective way to get longitudinal stability is with a large slotted aileron as used on Design No. 3. Small deflections give the desired effect and have the advantage of low drag.

The exact position of the center of gravity is best determined by experiment. Many glide tests should be made, first with a low wing loading and later with a high wing loading. Any radical changes with the C. G. should be noted and their cause determined.

Lateral stability is dependent mainly on the dihedral and the height of the center of lift above the C. G. The position of the rudders also has a pronounced effect on the lateral stability of a tailless design. Note that on all three designs rudders at the tips have been avoided because it was found that they have a detrimental effect upon spiral and lateral stability. In deciding upon the dihedral, the importance of keeping the center of lateral area low should be considered, for it determines the spiral characteristics of the airplane. In addition, excessive dihedral induces the plane to rock, causing great losses of efficiency.

Design No. 3 is a perfect example of keeping the C. L. A. low and yet incorporating sufficient lateral stability. The dihedral-chord relationship builds up a high pressure at the peak and the gull tips keep the C. L. A. low. The result is a stable model with smooth flying characteristics.

Directional control is one of the greatest problems of tailless models. Since the rudders must be placed close to the C. G., the directional moments are small unless billboard-sized rudders are used. The best solution is to place the rudders where they will be most effective without changing the lateral stability. In the case of a tractor (Design No. 1), the rudder should be placed directly in the slipstream with most of the area below the wing. In the case of pushers, the rudders must be placed outboard on the wing. It was found that the area above the wing has practically no effect, so the rudders should be placed entirely underneath the wing. The most effective place is at the points of high pressure. On No. 2 the rudder is placed on the flat section of the dihedral. The ideal setup is on No. 3, where the fin is at the high-pressure point at the peak.

Possibly sufficient directional control can be obtained by using extreme sweepback and depressed tips as on the Northrop, but the loss of lift due to sweepback is not worth the little extra drag of auxiliary rudders. The position of the C. G. is important for directional control; the most trouble will be experienced with tailless models using high-lift airfoils which require that the C. G. be moved back.

To present a complete and absolutely accurate report on a highly experimental type like the tailless design would not be possible at this time. The three designs and the discussion on stability should serve as a guide to the inexperienced designer. The increase in performance from Design No. 1 to Design No. 3 indicates that the basic ideas are

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plane in proper condition, or you don't do business with Charlie Babb. On that basis, he says, the customers come back for more.

Babb once recalled his agents from a certain country because they were unable to do business with its government without paying out large sums of graft to certain officials—all to be added onto the price, of course. The president of the country found out what had happened, came to the conclusion that here, at last, was the guy Diogenes had been hunting some centuries ago, and ordered that all airplane business from then on be done through Babb.

One of the great disappointments in Babb's career has to do with the design of a cargo plane. Six years ago he stepped out of his character as a used-plane broker and spent some $40,000 on the design and engineering of a cargo plane for military transport. The plane, designed out of twenty years of experience with freighting by air, was six years ahead of its time. It would carry thirty-six wounded men in stretchers, a tank, or a pair of army ambulances which, incidentally, could be driven right into the plane through its nose, the whole forward end of the fuselage, including the pilot's cockpit, being removable for the purpose.

Babb still keeps the sketches of that plane in his desk, and looks at them now and then. "The army laughed at me six years ago," he says. "They wish they had a lot of those planes now." Some of the features of the design will be seen in new cargo planes which, as yet, aren't even under actual construction.

Right now, the used-plane brokerage business isn't so good. There are plenty of customers but nobody'll sell, as Babb found out when he tried to buy back, at big advances in price, planes he had sold to their present owners. But there's plenty of future in it. He's holding his organization together against the day when this war will be over and there will be not only thousands of used airplanes for sale, but a huge market for them.

The transport planes now being built for various governments will be naturals for Babb, of course. Some of the medium and four-motored bombers will make good commercial ships, too, though others won't be economically practicable for either passenger or cargo use. But even those might have possibilities if, say, you save the engines and other parts and give them new fuselages.

Stirling On A String

(Continued from page 41)

to give enough time to start all four motors before one runs out of gas.

I'll tell you how to start a four-engined gas job so that, when you build one, you won't have any trouble. (Yes, I'm kidding.) First, you get on one side of the body with your helper on the other side. Then, pretend you are at a free-flight meet with a timer peering over each shoulder, and start flipping the prop. It doesn't start, does it? You know the feeling. Well, start in again, and, of course, disregard the crowd gathered around. Kibitzers should come here for a postgraduate course. The advice comes thick and fast, and daylight is completely blocked out by a horde of people crowded around. You feel the control lines jerk and twist as kids, dogs and people walk and trip over them. Just as you are about to go berserk with a hatchet, your helper gets a burst from one motor. You start flipping again, and eventually, with all the engines firing, you sit back and gloat at the mob. You synchronize the engines with maybe just a little beat note to make it sound pretty. By this time the tanks are running dry, and you rush frantically to fill them. Close the battery hatch. Clap on the cowls. Run out to the control handle. Wait, unkink the lines first. Wave to your helper—and she's away! Was it worth it? You bet.

The ignition on the Stirling is a seven days' wonder. There are fifteen feet of wire in the circuit, and a coil in each nacelle. Boosters are not used, for enough voltage is supplied by four large flashlight batteries wired in parallel series. The main factor of safety in the Stirling is provided by a knife switch mounted on the side of the fuselage. A tug on this by a third line will cut the two outboard engines and leave the others still running. If any one, two or three motors fail in flight, this switch eliminates any form of danger from turning moments.

The finished job weighs about five pounds, giving an eighteen-ounce wing loading. It is fairly fast in flight because of the low power loading. The long tail moment arm makes it very directionally stable.

With a plane as large as the Stirling, the chance for super detailing could not be resisted. The crew doesn't ride up to the ship and climb in as in real life—because they are already there, Mae Wests and all. The pilot and co-pilot are at the controls, while the navigator-bombardier rests behind them on a folding bunk. The radio operator is the little man who wasn't there because you couldn't see him anyway. His equipment is there, however. My bomber is, I think, the only model with a working radio transmitter. It can send any code message for about a block. How it works is a secret to everybody except gas-model builders who have heard their spark-plug discharge in the family radio. I put no bomb racks in the model because I expected to be busy enough just keeping it in the air. I was quite justified in that belief, too. With a ten-pound pull on the line one gets that all-the-eggs-in-one-basket feeling.

Here in Seattle with the great Boeing plant close by, I hear a number of suggestions. "Why don't you build a Flying Fortress?" The innocent bystanders who haven't seen the Stirling, retort, "A four-engined gas job? 'Twon't fly!"

Your Question?

E. S., Myrtle Beach, S. C.—The Republic P-43 has a wing span of 36 ft.; length, 28 ft. 6 in. Its top speed is supposed to be around 350 m. p. h. The wings of the Douglas Devastator are covered with corrugated sheet dural, giving them an aspect of furrows. The P-47 has been accepted by the army, and the F4U-1 by the navy. We have no information regarding the Skyrocket.

K. R., New York, N. Y.—Japanese airplanes are classified according to the year in which they were put into service. Their calendar begins with the year 660 B. C., thus making our year, 1940, 2600 in Japan. Only the last two numerals are used in designating their planes, so a machine built in 1940 is designated "00," or, for the sake of simplicity, "Zero"; one built in 1941 would be "01," et cetera. This designation applies to all of their airplanes, regardless of type. For instance, Zero can mean an observation plane, bomber or fighter. The famed Zero fighter is built by Mitsubishi.

Miss B. A. K., Littletown, Pa.—Sorry, we do not have any information regarding girls in Ferry Command Service. Suggest you either write directly to the Air Transport Command, Army Air Forces Bldg., Washington, D. C., or to the Civil Aeronautics Administration, Washington, D. C.

P. R., Dover, N. J.—The CAP (Civil Air Patrol) does not sponsor flight training. The minimum age limit for the Civil Pilot Training Program is eighteen. For further information write to the Civil Aeronautics Administration, Washington, D. C.

E. J. D., Osceola, Fla.—As far as we know, there are no other airplanes similar to the Blohm & Voss 141 and the Blohm & Voss 222.

P. D. A., Philadelphia, Pa.—When an airplane is in flight the noise you hear is made by both the engine and the propeller. The propeller noise predominates. Sorry, but we cannot get into a controversy regarding the maneuverability and performances of different types of fighter planes. The latest pursuit plane to be accepted by the army is the Republic P-47.

A. F. R., Jr., Swarthmore, Pa.—You can purchase a set of drawings for constructing a glider from either Joseph Steinhauser, 1011 Addison Street, Chicago, Ill., or from Volmer Sailplanes, 1010 Mariposa Avenue, Glendale, Calif.

J. C., Henrietta, Texas.—The army air forces have only one Douglas B-19; no other B-19s have been built as yet.

Get The Point

(Continued from page 40)

troubles on timers frequently occur; they are especially prevalent on dusty fields. A bit of paper inserted between contacts is usually a sure cure for dirt. A slight bend with round-nosed pliers will usually fix up other troubles.

The A—C check is important. Assuming the first two checks (A—B and B—C) are satisfactory, make the test. Because of the resistance of the coil primary, the light should be dimmer than usual on the first check. If, however, no noticeable difference in brightness is noted, there may be a shorted coil primary. This will, of course, result in an absence of spark. If motor points are fouled, a bit of cleaning may be necessary; if the motor points do not close, adjustment may be needed. Wiring must also be checked. A test from Point 1 to Point 4 with the flight timer open will show (if the bulb lights) whether the wire is open all through the circuit from Point 2 through B, D and 4. In this test the motor points must be closed.

The A—D test is rather satisfactory for a shorted condenser. Shorted condenser, of course, acts as a direct short across the points. To make a perfect check, disconnect the wire leading to the motor timer and test from Points 1 to 5. If the bulb lights, the condenser is definitely shorted.

You will note that the diagram has been greatly simplified; there are no crossed connections whatsoever to confuse the builder. A few notes on hookups may be noted. Booster connections are made to the base of the motor (the minus lead) and to Point C (the positive lead). The ground connection, going from Point 2 to B, should be negative. If boosters are hooked up in this manner, a motor may be started on the outside battery. When the motor is running well, the timer is connected (pulled out) and the connection at C may be removed.

A further test, familiar to most experienced builders, is one for a burned-out condenser. When such trouble occurs, the spark between the motor point (D) and the motor base (B) is satisfactory when a direct short is tried, usually with a screwdriver. But what if there's no spark at the plug? In such a case, brother, go diving for that spare condenser; it will usually solve the trouble.

A few more hints may be helpful. When battery cases, especially the manufactured type, give poor contact, a small rubber band will usually hold the contacts tighter to the cells. Always remove cells after using the ship; for, if the cells corrode in the aluminum case, it usually means replacing the case—and probably tearing half the ship apart in the bargain.

Yes, the point-to-point test is simple, practical and easy to use. However, it won't cover *all* troubles. Model motors and model planes are peculiar things, but we sincerely believe checking by this method will be of great assistance to your sport or contest flying during the coming season.

Test Between	Motor Timer	Flight Timer	Light	Test	Trouble
A—B	Open	Off	On	OK	
	Open	Off	Off	NG	Bad battery Bad battery-case connection (If batteries good, check between Points 1 and 2) Broken wire from B to battery case or from A to case
B—C	Open	Off	Off	OK	
	Open	On	On	OK	
	Open	Off	On	NG	Shorted switch on flight timer
	Open	On	Off	NG	Open switch on flight timer
A—C	Closed	Off	On	OK	Light should be dimmer than usual
	Closed	Off	On	?	If light is bright as usual, may be shorted coil primary
	Closed	Off	Off	NG	Motor points open or fouled Open coil primary Bad wiring
A—D	Closed	Off	On	OK	
	Closed	Off	Off	NG	Shorted condenser Open motor points

Porkey

(Continued from page 45)

diameter music wire. The metal clips V and W are shown in full size. Use #4-40 machine screws for landing gear attachment. Bend wire hook X as described and attach to motor mounts.

The outlines of the stabilizer should be cut from the required thickness of sheet materials. Pin the 1/8"-sq. spar in place and cement the outline pieces and leading edge together. Cement the ribs (pieces of 1/32" wide by the desired length) into place. The ribs should now be trimmed with a sharp knife and sanded to conform with the typical stabilizer rib shown on Plate 2. Cement the two 1/16"-sq. top spars in place. Sand the leading and trailing edges to shape.

The rudder is constructed in the same manner as the stabilizer except that the ribs are 3/32" sq. and do not conform to an airfoil shape. Part N is assembled to rudder at this time. Cut out former M and attach to part N. Cement the rudder and stabilizer units together.

Now for the wings. One of the best procedures is to start with the spars. On Plate 1, at the bottom, is the front view of the wing. Draw the bottom line full size to construct the spars upon. The spar sizes are given along with the joints at the center section of the front spar. The rest of the joints are made in the same manner. Leave the spars long enough to insure a good joint at the wing outline. While the spars are drying, cut out the tip outlines and glue them together. All of the ribs are given in full size. Cut out the required number from 1/16" sheet of medium-hard-grade balsa. After the spars are completed, mark the location of each rib to facilitate assembly. The ribs are slipped onto the spars, starting from the center and working out. Glue in place as you go along. The ribs are at right angles to the spars at all points. After the ribs are in place, pin the assembly on the drawing. The leading and trailing edges are glued in place, followed by the tips. Add the 1/16" x 1/8" top spars and sand to shape. Now add the 1/32" sheet covering on top and bottom between ribs 1 and 2. This forms the wing rest on the bottom and prevents the rubber bands from going through the covering on top.

The ignition system is clearly shown on the drawing (Plate 3). The timer is not fastened permanently until proper flight adjustments have been made after a few flights. The original model balanced with the coil, batteries and timer in the position shown. The U-shaped piece of music wire at the front of the track is embedded in the wood, wrapped with thread and doped.

The model should balance, when completed and ready to fly, at one half of the wing chord. Glide the model several times over tall grass to check the balance. It should be tested until it has a long, flat glide.

Now comes the real thing—testing the model under power! First you offset the motor about one degree toward the right, and place a 1/32" flat washer under the rear mounting bolt of the motor for downthrust. Turn the rudder slightly so that the plane will make large circles to the right in the glide. Next test your motor and adjust it to run at low speed without sputtering or cutting.

Start your motor, set it at about one-third speed, set your timer for approximately ten seconds and throw the ship, with only a little harder shove than when gliding, gently into the wind. The ship should turn very slightly toward the right under this power, but it will straighten out and finally turn toward the left as more power is given.

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sound and will eventually lead to models as efficient as the birds.

Model builders should have no illusions about developing a super contest model of this type under the present AMA rules. Conventional models are allowed a large stabilizer upon which no loading penalty is placed. Consequently, the surface loading required is twenty-five percent less on conventional models. Therefore, it is suggested that, for comparison, tailless models should be built with a six-ounce-per-square-foot wing loading. All of the designs presented should be scaled up for contest flying.

At present the tailless design does have two fields of possibility in competition, as a towline glider and in control-line speed contests. It is hard to understand why it has not been developed in these fields before, for the tailless design presents the ideal setup for soaring, the ideal setup for speed. The following reccommendations can be made: No. 1 for speed; No. 2 for powered endurance models; No. 3 for tow-line and high-start gliders. Remember that No. 2 should be scaled up and the wing loading kept to 6 oz./sq. ft.

A complete explanation about adjustments would be too lengthy; it is advised that the builder experiment with small gliders before building the larger models. In short, the procedure is to turn the ailerons slightly up and add weight to the nose until a smooth glide is obtained. The ship is then power-flown and stalls, dives or turns are ironed out with thrust adjustments. For towline gliders, the rudders are set for the desired turn and the towline hook is set to one side so that the model tows straight. The high-start glider should be tried by all model builders. With a well-stretched line, the model starts out at tremendous speed and climbs high overhead before releasing—and all of this without running or cranking a motor.

The next time you see a bird soaring high overhead, watch its slow, majestic flight and see how truly remarkable it is. Essentially a tailless model, the bird is the perfect flying machine, representing the goal which we seek.

"You've got to learn you can only take off on a catapult—not land!"

THE DOPE CAN

(Continued from page 42)

a model with all the trimmings to fly in the nearby lot. Contest freaks leave him cold. It will be hard to convince him there are thousands of builders who specialize in the type of model he has in mind. He'll never see them if he hangs around contests. But let him look in on some informal flying session and see realistic-looking models taking off, flying and landing like real airplanes. He'll then be in the market for sticks and cement.

The boys who spread the doctrine of good modeling stay far away from contests where illogical rules permit any crate to win. If they come at all, they sacrifice originality for some hackneyed pylon design and battle the boys with their own weapons. Interesting designs remain safe and cozy in the workshop. Not only do the rules fail to encourage unusual types, they definitely handicap the poor fellow who is going around in circles like his spindizzy pylon jobs.

Take biplanes for example—now and then one turns up at a contest despite the rules. Experts argue the biplane's inefficiency, but certainly few of the builders ever bother to verify this for themselves. The rules never gave them a break. Anyone who built a contest biplane ended up with two inconsequential wings if he used the minimum allowable wing loading. The rules should include a biplane factor, just as real aerodynamics do, to put it on a competitive basis and encourage builders to follow this line of development.

Twin-boom jobs have possibilities, especially in rubber, and offer such features as easy wheel (two wheels!) retraction into the booms. There was no place for them when we had a minimum cross-section rule. With the minimum rule washed out there's still no place for it. Rules encourage originality, but for a long time it's been in the wrong direction.

Back in 1932, Maxwell Basset started the hobby of gas models at the Atlantic City National Contest. In the 1933 Nationals, Basset cleaned up all the rubber events (with his gas jobs) because the rules had not been changed to put gas models into separate categories. The model gas engine had arrived. Builders at last had plenty of lightweight power for any model they cared to build. It was a natural. Gone was the handicap of a long rubber motor which had always dictated fuselage design. The weight of a gas engine is concentrated for better balance. Props are smaller and gone is the need for bean-pole landing gears. Engine could be upright, inverted, pusher, tractor, direct-drive or extension shaft, with single or contrarotating props. At last the model builder had the equipment to tackle design problems in good engineering fashion. The sky should have been the limit for originality—not the model's flight.

Climb depends on horsepower. An engineer once calculated that the contest gas model has sixty times the power of a pursuit plane! Put enough in a model and it'll go sky-high. All except the die-hards are convinced by now. It's high time we started proving some other aerodynamic law.

What makes a good flying wing tick? Do you accept the pylon and high wing as the answer to prayer? Is there a chance for something better? We know all about low wings, don't we? How about a canard? Who says we have to build tractors? Do you know the answers to spiral instability, Dutch roll, dihedral and empennage areas? Maybe present airfoils aren't so wonderful after all? Has propeller design reached maximum efficiency? Of course, if you've reached the ultimate in design, pack up your sticks, give your engines to the racing-car boys and settle down to model trains or stamp collecting. But if those questions rate some thought, let's change the rules so that the clever contest designers will be forced to look into them before they can win trophies.

There was a glimmer of hope for a more progressive gas model program at the 1937 national meet in Detroit. Richard du Pont put up a trophy for a weight-lifting contest. Pete Dillon of Jackson, Michigan, won the event with a Corbin Super Ace, a flying-scale model weighing 4¼ pounds that carried 2¼ pounds—a large dry cell taped to the bottom of the fuselage. But that was the one and only weight-lifting event we ever had at a national contest. The noble effort was a dead duck by 1938.

Weight carrying should be revived. Here's a method to use horsepower in a way other than trying to fly to the moon. Contest models would be of sturdier breed today if weight contests had continued. Think of the storehouse of information we'd have on airfoils, auxiliary lift devices and stable landing-gear design. We wouldn't have the ridiculous situation of model builders refusing to paint their models, avoiding the extra weight to keep as near the minimum wing loading as possible. And while on that subject, why shouldn't minimum wing loading allow for paint without placing the contestant under a handicap? Who ever heard of unpainted airplanes? (Yes, we know all-metal is the exception.) Here is strong evidence why wing loading should be a couple of ounces greater per square foot, and don't tell us the result will be mayhem by fast models. Power flight couldn't be more rambunctious than it is now, unless you put your Ohlsson 60 on the end of an arrow.

Helicopters, flying wings, canards, autogiros and other experimental types have been neglected. We need more than a category for them in the official rules. That's mighty feeble encouragement when all the official emphasis still goes into fostering screwy duration models. A national trophy would help wake up experimenters. All these new types present serious problems, although no more so than radio-control models. Offer a trophy year after year until somebody claims it. The trophy for radio control was several years old before Chester Lanzo took it back to Cleveland in 1937. Since then the interest and enthusiasm in radio-control con-

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tests have proved the wisdom of Lieutenant Alden, founder of the Academy, who earmarked a trophy for the event back in 1935. Using this same progressive outlook, the rules can be designed to stimulate every worth-while phase of model flying. —*Gordon S. Light.*

WHAT DO YOU THINK?

(Continued from page 43)

might earn the "pilot" four prizes with one flight! If this doesn't whet the prize appetite of those Brooklyn Balsa Butchers, we don't know what will. An interesting discovery was that spectator interest doesn't count, the field rules having been devised with that as a guiding factor. In Walker's experience this factor proved the least important of all. All these suggestions do not represent a complete coverage of the rules question, but they do offer some worthy thoughts on some very arbitrary points.

ON THE OTHER HAND . . .

Organization of rules is certainly needed for control-line flying, but these rules should not be so rigid as to hamper the progress of the sport. Its flexibility is the factor that makes it what it is. Flying is the goal; to restrict flying in any way is to restrict the enjoyment. *Anything* will fly on strings. Our 6½-foot Stirling is proof of that, and on the other extreme we have a freak composed of a square piece of plywood with a cut out for the motor, ignition piled on top, with an elevator stuck in the rear, that really flies. What control lining does need is a semiauthoritative co-ordinating body.
—*Ellis Sigmon, Seattle Guideliners.*

CANADIAN COMMENTS . . .

A few weeks ago I had the pleasure of reading your interesting article on the new rules. Here in Windsor we are of the opinion that the rules could be greatly improved if the power loading were increased from 80 oz. per cubic inch to about 110 or 120 oz. per cubic inch. In such a case models with .19 engines would weigh 21 oz. instead of the present 16; .29 engines must weigh 27 oz. instead of 18, as at the present time; and Class C's with .60 engines which now pull only 48 oz., would have to weigh 72 oz.

From experience it has been found that the only way to keep a gas job down to the minimum weight is to use light construction, small batteries and skimp on the paper and dope. The usual result of this policy is that the contest model is flown at a few contests, becomes oil soaked, and either falls apart or splatters itself all over the field at the business end of a spiral dive. This policy was bad enough when motors and materials were obtainable, but now, when balsa and motors are scarcer than a clear conscience in Germany, it's absolute sabotage.

How will the higher power loading eliminate this problem? First of all the model may be constructed of heavier material (hardwood) and col-

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ored dope may be applied, even to Class A's. This will not only make the model look better, but will also protect it from the oil. With a higher power loading the model will be forced to fly up instead of being dragged along behind the motor. Under these conditions the motor run may be extended, and the gas model will again become something besides a tow-line glider with an automatic tow. With the model climbing slowly there will no longer be any necessity to stick the wing up on a pylon half as long as the Golden Gate Bridge, and decent-looking models may become the rule at contests rather than the exception.

—*Charles Fox, President of Windsor Model Aircraft Club, Ontario, Canada*

WEST COAST MUTINY

(Continued from page 43)

zation from the complete destruction that is evidently being planned by the experts. —*Don Foote.*

(Mr. Foote's opinions are not necessarily those of this magazine. As active model builders, we also dislike several technical phases of the rules; but we know that, if model building "as usual" were to continue, government authorities might ban all gas-model flying—as has already been done in England. When he mentions that model builders are not renewing their AMA memberships, we feel it to be a rather negative form of protest and one of no benefit to themselves or the hobby. That there's strength in numbers can be applied to the situation, and we hope that the Westerners will get together and, by forming active clubs make themselves a power whose opinions can't be overlooked. That's why we have an Academy, and we're for it.—Edit.)

CLUB CHATTER

(Continued from page 43)

lead to interclub meets, if sufficient aid is given the groups by their leaders.

Outdoor flying need not be totally abandoned because of restrictions or lack of large contests. This is an excellent time for groups to try different methods of timing contests and to experiment with different wing and power loadings. They should let their results and opinions be known to the AMA so that the rules situation can be ironed out to the satisfaction of the majority of modelers.

A majority of clubs lose sight of the existence of a "younger element" which is constantly flowing into model aviation, just as the older fellows frequently find themselves with less and less time to devote to modeling—and there are more coming in than going out. That's what has been causing the tremendous group of aeromodeling in the last five years. But the younger group needs coaching and instruction. Why can't the club leaders and older members make the hard way of learning a little bit easier for these fellows by occasional lectures, frequent club discussions, or by obtaining 16-mm. films from aircraft companies or from lists furnished by the AMA? Discussions will often make the written word that the inexperienced fellow studies just a little clearer. Who knows but what the older fellows may find they have a bit to learn, too?

Although this column is given over almost entirely to editorial matter this month, it isn't the basic intention. If club leaders and publicity directors will send in reports of activities such as contests, or new models—anything that might be of interest to others, this column will make every attempt to publish it.

—*Ed Yulke*

CONNECTICUT CLUB CARRIES ON . . .

Because people outside the State don't know anything about the amount of activity going on in Connecticut, we'd like to enlighten them. We have heard rumors from New York that clubs down there seem to have amazing difficulty holding together. We have been very successful and we would like to have it known.

About five years ago, the Elm City Gas Bugs was organized. It has been going strong ever since. Its membership now numbers thirty-two, including several girls. The only fellow who has been able to cut a crimp into our activities is Uncle Sam. We have managed to fly at least once a week; if the gas situation gets too tough, we have arranged to use bicycles and trailers, although the field is seven miles away. The same Uncle Sam has been taking members from us with a fast and furious pace, but so far we have been able to get along. We maintain a good-sized field, a former airport, for the use of our members. We also publish a monthly club paper; it has never been less than three pages. The paper is paid for out of the club treasury. Each member pays twenty-five cents a month; we consider this pretty good because we have a large field and a newspaper to take care of. Meetings are held every two weeks in members' houses. Our officials are elected once a year, usually in February.

The club is also proud of the fact that we rarely miss flying on Sunday. During the winter, we have been flying on a snowy field which sometimes becomes very muddy. By pooling our cars and gasoline, we managed to get to several meets last summer where we did pretty well for ourselves. In one meet we took seven out of a possible ten places.

If you don't remember us, you will probably recall that we were the ones who flew first in 1942 by flying at night on New Year's Eve.

—*Harry E. Lawlor.*

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Miss C. L., Box 625, Wake Forest, N. C.—Consult your nearest high school (usually the shop instructor) for information and instructions regarding the building of model airplanes for governmental use.

R. D., 177-54 105th Ave., Jamaica, N. Y.—The engine you mention isn't bad and should do you well, particularly for your first ship. However, try to get an Ohlsson if you can. As for cartoons, send us a few and we'll see how good they are.

L. C., 36 Kenmare St., New York, N. Y.—You ask an awful lot of questions, and buddy, it would take a book to answer them. However, all of them are answered in William Winter's book, "Model Aircraft Handbook" (T. Y. Crowell Co., 432 Fourth Ave., New York, $2.00). The complete description of a gas motor would take at least five hundred words, as would the dope on radio-control and control-line flying. Glad to hear about your towline Buzzard. It must have really been somethin'.

J. T. G., 2238 Wilson Ave., Chicago, Ill.—Glad to meet a real Air Trails plugger. Thanks. Oh, yes, space prevented including Balsa Butch in some issues. However, the department is still functioning. Don't try to invert a Phantom P-30. I tried it for almost a week, then gave it up. The motor is good, dependable, and very hot. The timer is the only weakness, but don't beat up the ship and it will last. Write our circulation department for 1941 issues. If they have them they'll supply them at regular cost. Enlarge those plans three times to get proper scale on the Neptune. We don't know of any plans for the Westland Lysander. Sorry.

Sgt. G. V. S., 709th T. E. F. T. S., George Field Army Air Base, Lawrenceville, Ill.—Dear Sarge: I wouldn't advise writing to any of the men you mention for dope on control-line flying. Write to the Vic Stanzel Co., makers of Baby Shark, and they'll have much more dope. In fact, I don't know a single one of the addresses.

H. F., Jr., 7512 Second Ave., North Bergen, N. J.—The center of gravity is the point where the ship balances as far as front to rear is concerned. Usually any ship should balance at a point about one third of the wing chord back from the leading edge. Try this on your ship, with everything in place. Put your fingertips under the wing, next to the body, and move them back and forth (front to rear) until you find the balancing point. A little clay will bring the ship to balance at the proper place.

A. B., 827 So. Racine Ave., Chicago, Ill.—As far as we know, there is no special airfoil for control-line models. A semistreamlined section would seem to be about the best, if speed is desired. Some foil such as the NACA 0012. The American Junior Fireball should use an Ohlsson 60, Super Cyclone, or similar engine for best results. Sorry, there are no plans left for the Republic P-47. Enlarge the plans in the magazine three times and you can make your own.

G. C. T., 84 Prescott St., Cambridge, Mass.—Sorry, we have never put out full-sized plans for any large ship suitable for radio control. If you are looking for such a ship, we might suggest writing to Berkeley Model Inc., Steuben St., Brooklyn, N. Y.

B. B., 17 Myrtle Ave., Chatham, N. J.—If you can start your motor in the way you describe, then it is O. K. You can choke a Rogers by putting your finger over the intake hole, which is right below the timer where the gas tube comes into the front of the motor. Turn the motor over slowly, about three turns open, then close down to two turns and give her a flip. The Baby Shark should be fair with your motor, although it really needs more power. It has elevator control. There are a lot of planes good for your motor. To name a few, there are the American Ace and Buccaneer B Special (Berkeley) Zipper and Mercury (Comet) Zombie (Megow). Don't know whether the kits have balsa, but assume that most of them do. Yes, the Polkoil is excellent. The Ensign is a swell ship, too.

W. R., Box 61, Bellingham, Mass.—The Perky is as good as the Atom—probably has a little more power. Probably your needle valve is critical on your Rogers. It evidently runs out the gas in the choke, then starves for lack of fuel. An Atom should break in after about two hours of running.

D. O., 316 N. Maple Ave., Oak Park, Ill.—Use strong fishline for the average control-line model, and if the motor is very heavy, use fine wire which is available at most dealers. For a ship to have a seven to one gliding ratio, a great number of factors have to be considered. Generally we would say that an eight-ounce wing loading would give that ratio easily if the ship were well designed and built. Control-line airfoils haven't been developed much as yet. Try a streamline section. We've heard of control-line speeds well over the 100 m. p. h. mark. Read the advertisements for dope on motor manufacturers; only a few of them are in production now.

AIR TRAILS PICTORIAL ADVERTISERS, APRIL, 1943

While every precaution is taken to insure accuracy, we cannot guarantee against the possibility of an occasional change or omission in the preparation of this index.

What About Model Building?

(Continued from page 27)

". . . Model building has been introduced in the schools . . . its further promotion is of the utmost importance." In the professional, trade and secondary schools a full course in aviation was provided for. This consisted of theory, shop work including glider construction, and flight training in gliders.

By the end of 1936 the complete air plan was functioning. The three components of it were: (1) extensive research and development; (2) production of military aircraft; (3) education of the public in the implications of aviation and a comprehensive air-training program for youth. The D. V. L. (Deutscher Versuchsanstalt fur Luftfahrt) was handling research and development in new experimental laboratories at Adlershof; the V. L. F. (Vereinigung für Luftfahrt Forschung) acted as a clearinghouse for technical developments being done at such universities as Gottingen, Hanover, Stuttgart, Aachen and Berlin; the educational program was functioning in most schools and universities, and was being augmented by parallel training in youth organizations. These youth groups, organized to promote the ideology of Nazism, were the Jungvolk for boys aged ten to thirteen years, and Hitler Jugend for boys fourteen to eighteen years. Members of the H. J. aviation groups who passed their examinations became members of the N. S. F. K. (National Socialist Flying Corps) at the age of eighteen, and as such were given six months of training in power flight, and then transferred into the Luftwaffe.

The N. S. F. K. was the organization responsible for supplying recruits for the Luftwaffe; it therefore supervised aviation activities of the schools and youth organizations. The Corps also furnished workshops where models and gliders were built, provided for model and glider competition and glider flight training. Each young Nazi carried an efficiency record (Leistungbuch) intended to help guide him into the type of war work for which he was best adapted.

The North African offensive presages an "all-out" air battle, when the full air power of the United Nations will be thrown against the Luftwaffe. To date our air forces have performed their function well and we can feel confident they will drive Nazi air power from the skies. On our home front a program of air-age education is under way. The first phase was a near miracle which pointed out the effectiveness of a democracy in an emergency. A year ago only a small percent of our schools offered courses pertaining to aviation; today, fifty-five percent of our secondary schools are giving courses in preflight aeronautics. This is the beginning, but only that. The program must be broadened to include all schools, all courses, and there should be no hesitancy to utilize every incentive and instrument of education to make ours a nation on wings. Our effort should be commensurate with the task that confronts us.

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