FLYING ACES

WILL HITLER LAUNCH A GAS BLITZ?
by LUCIEN ZACHAROFF

NEW WARPLANES CLASH ON WESTERN FRONT!
(Westland Whirlwind vs. Focke-Wulf Fw 190)

“SO YOU WANT TO BE A CATAPULT PILOT!” by WILLIAM HERBERT RANDALL
ERIC TRENT AND MORT CRABB • PHINEAS IN “MALTESE DOUBLE-CROSS”
MODEL SECTION: “FROM R.O.G. TO AT-6!” • BELL AIRACOBRA SOLID SCALE
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Do You Know Why catapult pilots are drawn from the best stock in the Navy, and why they are usually Annapolis graduates? Bill Randall tells about these men in “So You Want to Be a Catapult Pilot!”

FLYING Aces

VOLUME XLI
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FACT AND FICTION

WILL HITLER LAUNCH A GAS BLITZ? Lucien Zacharoff 4
RAF WESTLAND WHIRLWIND William H. Randall 10
SO YOU WANT TO BE A CATAPULT PILOT! Ray Gill 14
THE CAMERA GOES TO WAR Donald E. Keyhoe 16
ON HAUNTED WINGS Charles Yerkow 28
A DAY WITH HEINKEL Joe Archibald 28
NOTHING BUT AIRWARs IN THE FUTURE David C. Cooke 30
MALTESE DOUBLE-CROSS
WAR PLANES OF THE AXIS

MODEL BUILDING

WITH THE MODEL BUILDERS Seton David, Jr. 42
AIRACOBRA! Harry Appel 45
TAYLORCRAFT L-57A THREE-VIEW Milt Kahn 49
MODEL MANEUVERS Harold W. Kulick 50
FROM R.O.G. TO AT-6 Jerome Jacobs 62
FLIP THE “FLIPSTICK” Louis Bucalo 53
NEWS OF THE MODELLERS Ray Weeks 55
NOTES FROM THE WORKBENCH Gerald Mapper 56
FOKKER D-VII THREE-VIEW Friedman and Ruthlein 57
MICROFILM-COVERED R.O.G. Abe Shaw 59
JAPANESE MITSUBISHI 96
YOU SAID IT! WORKBENCH TIPS 60
LOGGING THE MOTOR MARKET

DEPARTMENTS AND FEATURES

FLYING INTO FOCUS 8
AMERICA’S NEWEST ACES 13
KNOW AMERICA’S PLANES 19
MODERN PLANES ALBUM 22
IN THE SLIPSTREAM 24

KNOW THE ENEMY’S PLANES 29
ON THE LIGHT PLANE TARMAC 34
WAR FLYERS IN THE HEADLINES 36
FLYING ACES CLUB NEWS 38
ALL QUESTIONS ANSWERED 40

Cover Painting by August Schomburg
HUNDREDS OF LARGE MAPS, PHOTOGRAPHS, DRAWINGS, Etc.

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Will Hitler

If—and when—the Germans actually get their backs to the wall, will they again resort to gas warfare? This eminent analyst is positive that they will!

by Lucien Zacharoff

Mr. Zacharoff, author of "This Is War!", "We Made a Mistake—Hitler", the "Voice of Fighting Russia", and other books, is an internationally known commentator on aviation developments for leading American and British newspapers, magazines, and syndicates. He recently returned to New York after an extended aviation lecture tour.

In his hour of frenzied desperation toward the close of the first World War, the Kaiser ordered his Supreme Command to resort to horrible chemical warfare. Now the world is wondering if Hitler will repeat that frightfulness, with the added advantage which his chemistry has in combination with the powerful Luftwaffe.

As the final traces of lightning war vanish on the Eastern Front and the going gets rougher and tougher for the Nazis faced with the mighty military-economic coalition of the Soviet Union, Great Britain, and the United States, it is a certainty that chemical weapons will be brought into play by the Axis.

What of the prospects in the Far East? When the Allied Nations swing into their victorious counter-offensive, will the double-crossing samurais, who started the war with a stab in our backs at Pearl Harbor, try to end it with poison gases for our troops and hundreds of millions of civilians in the teeming countries of the Pacific? Again, the answer is: They will, without doubt!

I am not guessing or speculating about this. I am telling you. My files are bulging with unimpeachable evidence to support this outlook. Just take a look at some of my data:

When the Japanese generals became frantic after the disastrous defeats delivered to them by the united Chinese armies in the heavy fighting around Southern Shantung more than four years ago, they had hurled into action poison gases and dum-dum bullets, although both had been outlawed by humanitarian international covenants. This information was cabled from Shanghai in April, 1938.

Again, when floods, mosquitoes, and cholera aided the courageous Chinese defenders during the offensive up the Yangtse River toward Hankow, the Tokyo militarists had applied poison gas. An official communiqué from Hankow, made known by the United Press on August 20, 1938, declared that a counter-attack by the Chinese in the Kukiang sector failed only when gas was used.

There is very recent proof of similar measures by the Japanese invader in China. I don't think it is necessary to take up space with that, as two cases are sufficient; I cited the foregoing merely to show that the Nipponese are well versed in chemical warfare and prepared for its use.

As for Germany, its blitz smash into Russia was not a month old when in the bitter fighting west of Sitnia, east of Pskov, the Soviet troops captured documents and equipment of the Nazi 152nd Chemical Regiment. On one of the seized envelopes was this inscription:

**MOBILIZATION FILE**

**Under No Circumstances to Fall Into Enemy Hands**

**OPEN ONLY UPON ORDER**

**STAFF OF THE SUPREME COMMAND**

The text of the secret document is in my possession. It is quite long and consists of detailed instructions on the tactics of chemical combat, de-
Launch a Gas Blitz?

scribes the various types of chemical bombs which were being dispatched to the front, advises use of toxic substances on a large scale and in surprise raids. These papers, which were not intended for our reading until the Hitlerites had pulled off their charming surprise, once more confirm that it was not for nothing that Germany had long been a world leader in the chemical industry.

Bearing out my contention that a gas blitz will be launched, our War Department, which is not given to extravagant or sensational pronouncements, recently stated: "It is known definitely that considerable quantities of poison gases have been prepared by the warring European nations, and it must be realized that extensive use of poison gas might yet occur." Coming from that conservative and authoritative source, these words carry more significance than meets the eye.

NEW, TERRIBLE potency is given to chemical warfare by its coordination with aerial operations. In the first World War aircraft were mainly used for reconnaissance; air bombardment at the front, and particularly far behind the lines, was a mere sideline. But even before the second World War burst upon mankind, the German-Italian interventionists in Spain and the Japanese despoilers of China had established the fact that modern warfare made for mass extermination of innocent non-combatants in the rear. Needless to add, the new bomber aircraft are equally intended for the annihilation of troops on the march, to prevent their concentration or to wipe out the meeting spots.

From the standpoint of an artillery specialist, the airplane represents a long-range cannon which delivers its firing power over a distance of hundreds and even thousands of miles. The "shells" of this cannon are bombs of various calibers—incendiary, explosive, fragmentation, screen-smoke, illumination—all with chemical action, many specifically assigned as the weapons of chemical warfare service.

As for the poison chemicals designed to strike at hostile manpower, these need not necessarily come in aviation bombs, for the planes mount spraying devices. When the Axis chemists are sent into action, they will choose an Allied troop concentration at bivouac, or in thick marching columns, perhaps at the approaches to the battle grounds or at a river crossing. Their low-flying machines will suddenly emerge from behind

After the initial "softening" attack, low-flying craft would spray their lethal load of poison gases. By using airplanes, the surprise element would give offensive advantage.
some forest or hill to shower the enemy from such installations. The entire procedure will be a matter of seconds, because of the speed of the aircraft. Undoubtedly it will be painstblingly rehearsed, and it may be a part of wisdom for our side to perfect the spotting and observation of such raiders and the instantaneous measures of anti-chemical defense.

Summing up the uses of chemical agents which the aircraft will dispense, we may say that they will be the following: (a) inflicting casualties; (b) denying certain areas to the enemy; (c) destroying or contamiating materiel and supplies; (d) harassing opposing troops and forcing them to wear gas masks, thus reducing their freedom of movement and interfering with their eating and sleeping; (e) obscuring observation with screening smokes.

I want to remind the readers that while for the purposes of this publication I am discussing chemical warfare in relation to aviation, there are other methods for spreading among opposing forces tear gases, screening smokes, irritant smokes, lung irritants, and vesicants or agents that form blisters on the body.

Aviation bombs and spraying apparatus will be particularly concerned with incendiardism, poisoning, and smoke-screening, while those and many other chemical functions will also be undertaken by the ground troops.

On the basis of the ascertained accomplishments of military chemists and of well-founded suspicions of some of their secret weapons, it is possible to visualize the nature of the impending chemical air raid.

**LET US SUPPOSE** that the enemy decides to stage a series of raids. Earlier I made the assumption that the enemy's resort to chemical combat will be the result of our growing strength. Hence, our then powerful air force may be expected to strike a daring, well-planned, sudden blow at the hostile air bases and fields, wrecking hostile aircraft on the ground and in the air, thus nullifying their potency.

Attaining mastery in the air over the terrain adjoining our frontier, we would compel the enemy to transfer his air bases into his own interior, greatly complicating his subsequent offensive operations.

However, we must never underestimate his potentialities. So, let us suppose that the Axis still succeeds in re-concentrating some of its squadrons. These swarms of aircraft, loaded with incendiary, explosive, and poison substances, are en route to some important Allied center. Their mission is to wreak havoc that cannot be readily rectified.

Our vigilant observation posts, equipped with sound locators and both inertial and optical equipment, suitably spaced throughout the zones of approach to our important center, detect the winged foe. In a short space of time, our spotter transmits—by telephone, telegraph, radio, or visual signal—the information.

As the whereabouts, numbers, itinerary, and other pertinent data are transmitted, our mighty A-A batteries open up with their hurricane fire. Shells of various calibers sweep the sky for the highest-flying invaders. Those that descend to low altitudes are showered with armor-piercing and incendiary bullets from anti-aircraft machine guns.

During a night raid, groups of powerful searchlights assist the defense. They discover the enemy and blind him with their crossing beams of million-candlepower light. Then daring interceptors lung about to meet the bombers laden with chemical missiles. They subject the enemy to their fire at close quarters and destroy him.

If any bombers manage to break through, they are apt to strike our balloon network and perish. Those that stay high enough to escape this and other hazards may release chemicals from tanks slung under their wings or in the fuselage bottoms.

Their chance of success is negligible, for our population, forewarned, has extinguished lights in good time, also putting into operation all the anti-fire precautions which never fail to be effective if properly employed. During the raids on Moscow last Summer, more than 200 small incendiaries fell on a single neighborhood one night. However, so well prepared were the fire brigades and volunteer squads of civilians that every bomb was promptly extinguished.

It is not easy but quite possible to organize a splendidly functioning defense against chemical raids, reducing damage to an insignificant factor. Just as chemical weapons are most effective in conjuction with airpower, so the defense against them is best in coordination with hard-hitting interceptor aviation.

**BECAUSE of the great menace which chemical agents pose over our heads, defense measures as elaborate as the better-known air-raid precautions have been worked out. So far as our armed forces are concerned, the Chemical Warfare Service of the U.S. Army, for example, is a great, efficient organization which concerns itself with the following problems: (1) research in and development of chemical warfare; (2) procurement and supply of chemical materials to the Army; (3) training in offensive and defensive procedure; (4) setting up and operating special gas troops.**

In fulfilling these responsibilities, the Service sees to the development and production of gas masks and gasproof garments which give protection against all known war gases. It evolves and develops chemical warfare agents and instructs personnel in protective measures through courses conducted at the Chemical Warfare School. Extensive experiments have been conducted by our Chemical Department with smoke, gases, and incendiaries to determine

(Continued on page 70)
RAF WESTLAND WHIRLWIND

British circles—especially aviation periodicals—have been prone to deride the Lockheed P-38 fighter on many occasions. They seemed to believe that twin-engine fighters were something to be avoided, that they would much rather risk their luck with a single-engine job. And after digesting reports of this sort for so many months, news now comes out that they have a twin-engine fighter of their own—the Westland Whirlwind—which seems like a strange paradox.

To begin, we must admit that the Whirlwind is undoubtedly an excellent machine, but—to do a little criticizing ourselves—it seems entirely too small for a twin-engine job. The span of this ship is only 45 feet, which is only 5 feet greater than that of the Hawker Hurricane; the length is 32 feet 3 inches, against the 31 feet 5 inches of the "Hurricane"; and the height is 10 feet 5 inches, whereas the Hawker job stands 13 feet 3 inches. From this it seems that the purpose of the plane has been defeated, for it is logical that two engines instead of one were mounted to step-up the cruising range for bomber-escort purposes. Too, the wing loading must be tremendously high, because of the extra engine and additional fuel which must be carried, thus increasing the landing speed far up the arc.

The Whirlwind is of all-metal construction, and is built-up on the usual transverse frames and longitudinal stringers; covering is smooth metal sheet. Armament consists of four 20mm cannon mounted in the nose. The wing is attached in the low position and is fully cantilever. Structure probably consists of two spars and main and auxiliary ribs; covering is smooth metal sheet. Both ailerons and flaps are on the trailing edge. An interesting feature is the tail unit, the horizontal surfaces of which are placed high above the fuselage. It is said that the prototype was tested with the stabilizers and elevators in the orthodox position, but that they were blanked out at times by the wing and thus could not be employed effectively. The surfaces were then raised to counteract this difficulty.

THE END
Glenn L. Martin gave Comedian Joe E. Brown his first airplane ride way back in 1911, and the two have since been fast friends. Here, Martin shows Brown the B-26 bomber.

Flying Into Focus

Five Stearman trainers for five services. From top to bottom, they are for U.S. Air Corps, U.S. Navy, China, England, Peru.

The world's largest twin-engine transport, the Curtiss C-46, dwarfs the bullet-like P-40's being built on adjacent lines.

Off to the wars. Familiar scene at the Martin plant these days is arrival of ferry pilots to fly away B-26 bombers.

Shown in flight is a Curtiss O-52 two seat monoplane used for photographic and liaison missions. Equipped with slots and flaps, the ship can operate from unusually small areas.
A production line of semi-finished steel propeller hubs at Curtiss-Wright. By such mass methods, U.S. industry has smashed the bottleneck of props for our aerial army.

Right: Every eight hours a fresh crew takes over the humming assembly lines at Douglas. This shows only a portion of the thousands of men waiting for whistle to blow.

Below: Grumman's F4F-4 Wildcat fighter holds the individual combat record as the most effective combat type. Flying a similar ship, Lieut. Edward O'Hare shot down five Jap planes early in February. Powered with an air-cooled radial Pratt & Whitney engine of 900 h.p. at 12,000 feet, the top speed is rated at 320 m.p.h.
Delivered to the Navy in 1940, the Vought-Sikorsky OS2U-1 was the first low-wing monoplane catapult job. The wheels may be replaced by a single float for shipboard duties.

So You Want to Be a Catapult Pilot!

Catapult pilots are invariably Annapolis graduates, for the average airman cannot perform the work successfully.

by William H. Randall

The flying of an observation or scout plane may seem an unimportant and comparatively simple field of aviation, but if that plane is one of the U.S. Navy's catapult jobs, it is certainly far from a tame and unadventurous occupation.

High school and civilian-college graduates may make excellent fighter, dive-bomber, or interceptor pilots, but it takes a really good naval officer, versed in naval warfare, to be of much use in the catapult planes. He must know enemy ship silhouettes by heart, must understand naval gunnery thoroughly, and must be a competent radio operator—both code and radiotelephone—as well as being thoroughly conversant with fleet tactics in maneuvering for contact with an enemy fleet.

The flying observer is the only officer who can actually see the enemy in modern long-range naval warfare, and he must necessarily be able to relay his observations in a thoroughly understandable and reliable manner to officers on surface vessels. It becomes his duty to get the big guns on their target, and, once the engagement has started, to keep them there, despite zigzagging and course-changing on the part of that enemy target.

Because of these special requirements, catapult pilots are invariably Annapolis graduates, experienced at sea before being sent to Pensacola for their pilot and radio training. Assignment to a battleship or cruiser as an air officer does not mean that the pilot is ready to take over his duties. He is first assigned to the rear cockpit of the plane as co-pilot and gunner to an experienced catapult officer. He will not be ranked as a qualified catapult pilot until this senior officer places the stamp of approval on his abilities. The senior air officer of such an air group is seldom lower in rank than a senior lieutenant, equivalent to captain in Army ranking.

The junior officer rides in the rear cockpit during his probationary period, making his own observations and comparing them with those transmitted by the senior pilot. In this manner he receives his training in the best possible way—through trial and error. If threatened by enemy planes, the junior pilot mans the rear machine gun to cover the pilot, and when no planes are threatening takes over the controls to allow the pilot full freedom for observation of the enemy fleet.

The idea of catapulting aircraft from capital vessels of the Navy was born early in the history of American naval aviation. Lieut. T. G. Ellyson, the pioneer of catapult flying, is credited with making the first catapult flight after two previous failures. Early in 1912, Lieutenant Ellyson made his first attempt by the use of a tight rope. Although successful on land, this method proved impracticable for shipboard installation. His second attempt, from the Annapolis docks, resulted in dismal failure and crack-up.

Lieutenant Ellyson escaped unhurt from this crash, which was fortunate for the Navy because on November 12th of that same year he made the first successful catapult flight from the Washington Navy Yard docks, employing a practicable catapult invented by Captain W. Chambers. Development of the powered catapult was rapid from 1912 to 1919, when the Navy department announced that every American battleship would carry a turntable power-catapult. The plane used in the initial shipboard
service installations was a Navy version of the Army Air Corps Vought VE-7. The machine was a two-seat double-bay biplane powered with a Hispano-Suiza in-line engine of 200 h.p. As in the usual Navy fashion, only one main float was mounted.

Many aircraft manufacturers have furnished the Navy with experimental catapult airplanes, but only two of the builders—Vought and Curtiss—have consistently been able to meet the rigid specifications set forth as essential to withstanding the severe strain of repeated catapulting. Since that early day, these two companies have consistently developed fine catapult aircraft for the Navy.

The VE-7 was joined in 1923 by the Curtiss SC. In 1928 Vought delivered the OU-1 and the improved O2U-1, to be followed in 1929 and 1930 by the improved versions, O2U-2 and O2U-3. In 1930 and 1931 Curtiss likewise delivered improvements on their original, designated O2C-1 and O3C-1. From 1931 to 1933 the Vought O3U-1, O3U-2, and O3U-3 were accepted by the Navy, to be followed in 1934 by the O4U-1. Curtiss seemed to take over the field for a few years with the SOC series that is still in service; the SOC-1 in 1935, the SOC-2 in 1936, and the SOC-3 in 1937. The SOC-4 was accepted late in 1938, when the Naval Aircraft Factory took over the design and turned out similar models under the SON designation. Thus ended the Navy's series of biplane catapult scout-observers.

Vought merged with Sikorsky in 1939 and designed the Navy's first low-wing monoplane catapult plane. In 1940, the OS2U-1 was accepted, to be followed in 1941 by the improved OS2U-2 and OS2U-3. A similar plane, powered by an air-cooled V-12 Ranger engine and designated the S02U-1, was also delivered for the cruiser catapults. The OS2U series was also taken over by the Naval Aircraft Factory and similar planes built under the OS2N-1 designation. In 1941, Curtiss also produced a low wing catapult monoplane after one failure on this type. It is authoritatively reported that this S03C-1 is the fastest catapult plane in the world. It is a mid-wing monoplane with extremely modernistic lines. Cockpit accommodations are for a crew of two under a long sliding canopy. The fuselage is long and slim and has little or no waste space. The rear cockpit is far aft and is just a few inches from the vertical fin. Power is supplied by an inverted Ranger engine of 520 h.p.

In 22 years of service-practice development, the catapulting of aircraft from naval vessels has become a technique individual in aviation, with the American Navy tops in performance and equipment. Compressed air catapults, located on the extreme aft end of the quarterdeck, have given way to gunpowder catapults mounted atop the big-gun turrets. On these catapults, a plane picks up speed from a dead stop to more than 60 knots in less than 60 feet.

The pontoon step of the plane fits snugly into a padded saddle that is shaped in the exact opposite contour of the pontoon step, thus assuring perfect fit. The saddle is a part of the pontoon car that is whipped along the 60-foot steel track during catapulting. Bumpers on the forward end of the track serve to arrest the car's forward motion, allowing the plane to fly clear and into the air. The principle of catapulting thus becomes similar to that of the sling shot. Forward motion of the car holds the pontoon snugly in the saddle until the bumper is reached; and when the car stops the plane is literally slung into the air. Light safety catches serve to hold the pontoon in the saddle while the ship's motor turns up preparatory to catapulting.

The effect of the terrific rate of acceleration on the human body presented many problems that have been overcome through a definite ritual that must be rigidly followed by the pilot and the deck catapult officer, who directs the launching.

Before entering a machine to be catapulted, the pilot makes a complete inspection of the catapult car and his plane. Satisfied with his inspection, he climbs into the ship and dons his radio earphones, leaving the greenhouse cover open in case he has to get out quickly in the event of accident. While the big-gun turrets swing to the ship's beam, so that the plane may be catapulted well clear of the warship, the pilot warms up his motor. Satisfied that the plane is ready, he fastens his safety belt and claps his hands over his head as a signal to the catapult officer. Then deck men hose the deck with salt water in case of fire.

The "go-ahead" signal comes from the bridge of the warship. The catapult officer starts his stopwatch and holds up five fingers for the pilot to watch. In just five minutes the charge of powder that starts the plane on its terrific rush into the air will be set off. The pilot opens his throttle half-way, and the observer in the rear pit
CURTISS SO3C-1 scout-observation may be fitted as a landplane as well as a seaplane. It is reported that this is the fastest catapult craft in the world.

—having no present duties to perform—puts his head down between his knees and hooks his arms under his thighs. This is the best protection against a snapped neck during acceleration.

But the pilot’s eyes never leave the upraised hand of the deck officer—the catapulting must not catch him unprepared. Four fingers: four minutes to go; three fingers: three minutes; and so on, until the deck officer crosses his index fingers. This is the action signal, indicating that in just thirty seconds the charge of powder will be detonated in the driving cylinder. The catapult officer rotates his right arm and the pilot obeys the order to rev up his motor. He braces his elbow on his knee, pushes the throttle wide, then wraps his whole hand around the throttle quadrant to keep it from snapping closed when the plane is catapulted. The pilot shoves out his other arm in a clenched fist signal to indicate that his motor is full out. Then he gets the arm in quick to grasp the stick tightly, bracing the back of his head against the crash pad to tense his neck muscles.

The shock of the explosion is almost paralyzing as it comes on the uproll of the warship. Everything to either side of the suddenly rushing plane has become a blurred panorama. The pilot feels that his stomach has been left behind, that his skull is crushing against the now-flattened head rest. The saddle-car hits the bumper with a terrific thud and the plane is free in the air, the motor pulling hard to gain a safe margin of flying speed. The body pressure lessens as it begins to equalize with the plane’s speed, and the pilot starts climbing for altitude necessary to execute his mission successfully.

Delivered late in 1938, the CURTISS SOC-4 was the last biplane accepted by the Navy for catapult duties. Top speed, 165 m.p.h. with a 500-h.p. Wasp engine.

LET’S ASSUME that a scouting plane on a routine flight returned to the mothership with information that an enemy battleship—presumably a trầm Acting Cruiser—had been sighted. Confident that the enemy had not detected his plane’s presence in the sun, the pilot had avoided breaking radio silence and returned to deliver his information verbally. For the past three hours the warship had been stalking the enemy, according to the scout pilot’s report of estimated position, course, and speed. Unless the enemy changed course, the first warning it will have of hostile presence will be a salvo of 16-inch naval shells.

The pilot glances back at his machines and smiles with satisfaction. Three more planes are coming up to cover the observer, or to take over the observation if his plane is shot down.

At 4,500 feet, the enemy ship becomes visible, but the surprise element crucially is gone. At this range the enemy had not been sighted. The enemy is also sending up planes. Quickly estimating the range, the pilot radios, “Range, 20,000 yards ... Range, 20,000.” There is no answer—he expects none. Neither does he look back at the warship, nor does he see the big guns go off. He keeps his eyes glued to the enemy. The 12 splashes, 500 yards beyond the enemy warship and 400 yards to the right, were what he had been waiting to see.

“Down five. Down five. Left four. Left four.” He radios the correction, trying not to think of the enemy planes boring up to him. Then come 12 more splashes, just short of the enemy. Only luck would have provided a hit in the first two salvos—but they could give him a straddle, and that was exactly what had been attained from his directions.


The next salvo has the range but is off in deflection due to some expert zigzagging on the part of the enemy. “No change... No change. Right two. Right two.” Then his radio goes dead—enemy planes are attacking and machine gun bullets have apparently found the radio! The pilot zooms to cover the tail of a brother officer’s plane and signals to take over observations. A quick glance at the enemy warship gives him a great feeling of satisfaction, for his last observation has made possible a direct hit. The raider is down by the bow, all guns silent.

The enemy aircraft suddenly lose interest in the air duel; they no longer have a mothership to fight for, nor a place to return when their fuel runs out. And so the scout-observers herd them back to their own mothership.

“Well-done!” is flying from the bridge of the ship. The pilots grin happily as they slap the water with their pontoons to be lifted back aboard by crane.

Yes, it’s a dull and uneventful job, being a catapult pilot! THE END
1. A squadron of American Flying Tigers on March 24, 1942, left its Chinese base and rode the dawn into a Japanese-controlled Thailand airport. "Scarsdale Jack" Newkirk, the AVG’s ace of aces, was at point of the daring raid. Everything had been worked out perfectly to catch the Japs.

2. The attacked airport was at Chiangmai, and it was announced that the raid caught the Japs by surprise. Newkirk’s outfit, more than three months ago, had bagged 136 enemy craft, accounting for more than 300 trained Japanese pilots, gunners, bombardiers, and navigators.

3. Dropping down from the sky at 7 a.m., the U.S. airmen caught the Jap pilots as they were running to their cockpits and pumped 3,500 rounds of ammunition into both grounded planes and personnel. Several Japanese ships were seen bursting into flames, and the remainder were riddled.

4. The attack continued until the outfit was completely eliminated. By official count, 40 enemy planes were destroyed, along with numbers of men and huge supplies of essential war material. It is reported that the Japs were so startled that their defense was all but futile.

5. But even though this was one of the most successful missions undertaken against the Nipponese, the Flying Tigers returned to their base minus their leader. Newkirk was last seen in a crash dive, after being hit by machine gun bullets fired from a parked truck.

6. Earlier in March, Newkirk had been decorated with the British DSO; he had destroyed a full 26 Japanese aircraft before his untimely death. When Brig.-Gen. Claire L. Chennault, commander of the AVG, learned of Newkirk’s death, he stated: “It won’t be easy to find his equal.”
THE CAMERA GOES TO WAR!

by Ray Gill

Photographs courtesy of Fairchild Aviation Corp.

The use of gun cameras for training pilots in actual aerial gunnery dates back to the first World War, as does the use of machine guns. But just as the armament of heavy-caliber machine guns and aerial cannon now in use on our newest planes is far superior to the hand-operated guns of the first World War, so the new training equipment is far more efficient than the first gun cameras.

Today the Air Corps is putting into use its new gunsight aiming point camera, the GSAP, so named because of its optical system which shows in the finder not only the target of the gunner but also a picture of the sighting apparatus used; it records both of these on each frame of film taken. In addition, the new equipment has an overrun device, which keeps the camera going for a predetermined time, after the pilot ceases firing, to record what happens after he ceases to fire.

Earlier gun cameras were mounted on machine gun mounts, necessitating the removal of part of the armament, but today's cameras are fixed behind the gunsights, so that the plane may carry its full complement of guns in addition to its recording device. By this means the camera may be carried into actual combat and work simultaneously with the guns to provide a record of the combat. Here again the overrun device is an advantage, for the pilot may follow an enemy plane down to its crash—after it goes out of control—and the camera will continue taking pictures after he has ceased firing.

The new Air Corps GSAP camera is electrically driven and is equipped with a 50-foot film magazine using standard black-and-white 16mm. motion picture film. The pilot may vary the speed of the camera, by a reset knob, from 16 to 64 frames a second. The machine compensates for atmospheric conditions by aperture controls, which are accessible in flight, for bright, hazy, and dull weather. But the film latitude is sufficient for the camera to produce satisfactory results if the setting is within the equivalent of a stop and a half of the proper setting. Like most aerial cameras, the focus is at infinity and the camera is equipped with a footage indicator.

The device is so designed that the optical system showing the gunsight in each frame may be replaced by a straight lens arrangement to get ordinary pictures without the gunsight. Also, provision is made to heat the lens electrically against the cold of high altitudes.

Oddly enough, if the picture shows the sight directly on the target, the shot is usually a clean miss. It is clear indication to the instructor that the student has not taken sufficient "lead" in aiming ahead of the swift-moving adversary. Only when the attacker is directly on the tail of the target, or when the two planes are flying directly toward each other, is such aim good for a hit. In any other flight maneuver it is necessary for the gunner to lead his target, making allowances for the distance he has been traveling, the speed at which his ship is traveling, and the speed of the adversary. And it is in the measurement of the lead the gunner takes which gives the new equipment an important advantage.

Each frame of film has four index marks midway on the sides, the top, and the bottom. The camera is adjusted before take-off so that the sight, an electrically-lighted two-barred cross, coincides with these index marks on the first frame of film. By this arrangement, if the sight shows the aim to be a certain distance ahead of the nose of the target, the guns of the attacking plane would actually be pouring a stream of lead into the opponent.

The developed film is projected on a small viewer screen equipped with a mill scale of fine shadow lines around the edges, so that the instructor can view the frame critically, measuring the amount of lead taken by the gunner; and with the known facts of the speed of both planes, he
can determine whether the frame should be scored as a hit.

After the instructor scores each strip of film, he can point out errors to the individual pilots. Frequently the film is shown in a classroom to a group of pilots, so that the whole group can benefit from the discussion of hits and misses.

As a simple means of identifying each film with the pilot who shot it, the Wright Field armament technicians have suggested that each magazine be placed in a hand movie camera, with which a few pictures are taken of the pilot to use the film in his plane. The daylight-loading magazine is then taken out of the hand camera and fed into the GSAP camera for use.

Early in the use of gun cameras it was learned that a principal advantage to a cadet was to see the results of his training flight as quickly as possible after it was made. So Wright Field technicians and camera manufacturers have developed a very nearly automatic processing technique, which the armament mechanics can use without expert photographic knowledge. Without divulging the details of the processing, we may say that it develops the negative reversed as a positive so that it can be used in a projector immediately, and that it comes out of the process spoiled on a reel ready to go into the projector in a very short space of time. Thus the student is enabled to see his pictures the same day they are made.

One gun camera developed at Wright Field in the late '20's was made of very heavy materials, simulating as nearly as possible the weight as well as the size of an actual machine gun. The usual Air Corps search for lighter metals was abandoned, and parts were made of bronze and suggested light metals. The flexible gun cameras were operated by triggers on the spade grips and were provided with regulation machine gun sights.

Even after the adoption of motion picture film, the gun cameras were loaded by the old-fashioned spool method, having opaque strips of leader and trailer for daylight loading attached to the actual film. This method was discarded with the development of more modern magazine loading, which eliminated the laborious threading of the film through the camera.

With the improvement of electric motors for camera operation, gun cameras became electrically-operated, beginning in 1938. As photographic lens and films improved, the 16mm film was substituted for the bulkier and more costly 35mm film with little sacrifice in clarity of the pictures. This, too, was a factor in making possible the switch to the magazine form of camera loading.

About this time the fixed gun camera changed its shape, as the armament designers decided there was no point in making it look like a gun since, operated by remote control, the gun suggestion was valueless to the pilot. The new fixed gun camera, using the same mechanism as its flexible brother, was built into a long, cylindrical shape. This was the immediate predecessor of the GSAP camera, which was developed after a comprehensive survey of the problems of aerial gunnery instruction by Wright Field technicians.

First prepared for fixed mounting, the GSAP camera is now also being adapted for flexible gunnery practice. Here the Air Corps engineers are confronted with a new problem, since the manipulation of multi-gunned power turrets instead of the single, manually-operated machine gun of the past.

It is believed that the first gun cameras were employed by the British and French during the first World War, about 1915 or 1916. The first British gun camera had a film with six exposures, which could be divided in 12 frames, and each time the camera was fired a cocking mechanism was necessary. Developed in an effort to solve the training problem of judging the distance from the moving base of fire to the moving target, the idea was received very skeptically by the British army officials until the training showed results in greatly increased accuracy of fire.

The French camera was a large box type which took a picture about four by five inches. It also had to be cocked after every operation.

The first American gun cameras, produced by Eastman about 1918, were in many respects similar to more advanced British types. Built to resemble machine guns, they had long barrels and spade grips. They were powered by spring-wound motors and had regulation gun sights. They used 35mm movie film and were equipped with stopwatches. The stopwatches were so installed that every time a picture was fired the face of the watch showed, recording the time.

(Continued on page 80)
ON HAUNTED WINGS

Swashbuckling Eric Trent faces the strangest mystery of his career as he combats his own image and German Stukos over the heart of Washington!

by Donald E. Keyhoe

Illustrated by Alden McWilliams

CHAPTER I

THE HOODED ACE

ERIC TRENT was almost to the phone booths when he saw the three-striper. The Navy man had halted just inside the doorway of the Washington Airport terminal. As Trent turned, the man flung up one hand, hastily shielding his face. Still keeping his face hidden, he wheeled and hurried out.

"Now, what brought that on?" pondered Trent. He stepped out into the night. A mist was falling, and the lights at the entrance were dimmed. The three-striper had vanished in the gloom.

Trent's dark eyes lost their amused twinkle. This began to look more than odd. There had been something tantalizingly familiar about that Navy commander, despite the attempt to hide his identity. Trent thought for a moment. Several officers had been disgruntled at his special assignment in Naval Intelligence. Two or three, he knew, had resented the appointment of Eric Trent, ex-magician and soldier-of-luck, as senior air agent, with full commander's rank. That might explain cutting him cold—but it would hardly explain the man's precipitous flight or the guilty hiding of his face.

Trent gazed a moment longer into the murky night. A passing airline stewardess gave his tall, uniformed figure an appreciative glance. Trent had a dark, alert face and the smooth poise that comes with hours behind stage footlights. His mouth, under a close-clipped black mustache, had a look of whimsical humor—a look that could, on occasion, become a politely impudent grin.

As Trent turned to go inside, a taxi drove up. Two business men got out, went into the terminal, and the cab rolled off into the night. Trent started on, then stopped. Perhaps it was a faint sound from behind him, or perhaps some sixth sense, the feeling of hostile eyes fixed on his back. He moved from under the dim overhead light, casually took out his cigarette case.

Inside the lid a small curved mirror was secured. Trent extracted a cigarette, tilting the case to look behind him. The mysterious three-striper was stealing toward him on tiptoe. In his right hand was an automatic with a silencer. His features were still obscured in semi-darkness.

Trent idly dropped the cigarette case into his coat pocket. He bent his head as though about to light a cigarette, then spun around and dived in low. The other man jumped back with a stifled oath. Trent seized his wrist just as he pulled the trigger.

THE AUTOMATIC made a muffled grunt, but the bullet went into the air. Trent gave his assailant's wrist another hard twist. The three-striper dropped to his knees and Trent deftly flicked the gun from his loosened fingers.

"You don't mind, old chap?" he

Trent whipped into a tight bank, tripped his forward guns at the Stuka while Crabb drove off the Curtiss. The hooded pilot gave an agonized jump as the tracers pounded him!
said amiably. "Now, let's have a look at you."

The captive silently got to his feet. Trent pursed his lips in a soft whisper. "He was gazing on an exact duplicate of his own face!"

At first glance, he could hardly discern a flaw. The clipped mustache was the same, the set of the lips underneath. Hair and skin had the same almost Latin darkness. Except for slightly higher cheekbones, and the murderous light in the other man's eyes, Trent might have been facing a mirror.

"My compliments," he told his double. "That's really an excellent job of make-up. You almost fooled me for a moment."

The impostor stared at him. "I must say you take it rather coolly."

"Why not? I have the gun."

"I should have shot you at once," muttered the captive.

"Oh, I wouldn't blame myself too much," said Trent. "Some one might have come out. It would look a bit odd, Trent dragging off his own corpse. Probably spoil the impersonation act."

"Very funny," the impostor said bitterly.

"I wonder how long this has been going on," mused Trent. "Trent and I have been away for a month. By the way, you haven't anybody impersonating Mortimer Crabb? That would be something."

"You'll learn nothing from me," snapped the impostor. "Not even if—" He broke off as a blurred figure came toward the entrance of a car that had just stopped very close to them.

"Get back out of the light," ordered Trent. The impostor obeyed, and Trent turned toward the car. The door would not be visible. The approaching figure was a short but powerfully built man, with a close-cropped head that seemed to grow right out of his shoulders. He was wearing his uniform and hat when he saw Trent. He wheeled back, and his heavy, brutal features took on a quick relief.

"Von Zenden!" he said hoarsely. "I just got the message from the..."

"Hermann—it's Trent!" the impostor burst out. "Use your blackjack!"

Hermann's jaw dropped, then he leaped at Trent. With a quick sidestep, Trent landed a left to the stomach. Hermann doubled over and let go his blackjack, but the false three-stripe had seized his opportunity. Hurting against Trent, he knocked the pistol aside.

The silenced automatic grunted again, twice. Glass crashed from the nearest swinging door, as the bullets went wide. The impostor was clawing at the weapon when a clamor of voices arose from inside. An armed airport guard charged out into the vestibule. The tall masquerader instantly fled, with Hermann at his heels, wheezing for breath. Trent started after them, the gun shining faintly under the light.

"Hello, you!" bawled the airport guard. Trent stopped, but Hermann lurched around, and a snub-nosed revolver blasted. As the guard fell, Trent pitched a shot at Hermann, now only a shadow in the night. The German's gun blasted again, and a bullet smacked the stone wall behind Trent. The next instant he was hidden behind the car he had driven up.

The impostor was already at the wheel. Trent sent a bullet after the machine, heard the slug ricochet from metal. The car was swallowed up in the darkness before he could aim again. There was no sign of Hermann. Evidently he had jumped onto the running-board and escaped.

Three or four frightened porters were bending over the wounded guard. Trent hesitated, out in the screening mist, then he saw a crowd forming in the baggage room. He made his way swiftly around to the north door, near the luggage room. The guard would be given full attention without him; and to appear there now would only delay action.

Trent put the gun in his belt, so his uniform bloused it. Then he straightened his cap and went into the terminal. Everyone was running toward the south entrance. He trudled along until he saw the mournful visage of Lieut. Mortimer Crabb, the engineering expert of Naval Intelligence. Crabb, a New England inventor, had been his reluctant partner in numerous tricks against the Axis before the war. After Pearl Harbor, Trent had stumped with Navy, and Crabb, though still dolefully complaining, had followed him in the Service.

Mortimer Crabb was about forty years old. Even in a two-stripe's uniform, he was still a gawky figure, though it made him more interesting. He had been trained to follow in his footsteps and serve Hitler. "What's that to do with tonight?"

"Quite a lot. I met the gentleman back there. We had a little argument. He was using my face, and I'm a bit particular about those things." He was what?" sputtered Crabb. "You mean he was made up as you?"

"Right. And a good job, too." As Trent swung into the airport road leading toward Washington and Arlinton, he gave the general a brief summary of the encounter.

"This is terrible," moaned Crabb. "Lord knows what he's done, posing as you. You'll probably—"

Heumped, and Trent put on the
brakes as the rising howl of air-raid sirens filled the air. The airport lights began to go out. Ahead, the misty glow from the Memorial Highway faded into blackness. Across the Potomac, where the wall of Washington’s super-sirens was now audible, street and house lights hastily went dark. Trent cut off his headlight and ignition, climbed out.

He had stopped on the crest at the west side of the airport. Below and back nearer the terminal he could see Army mechanics starting three Airacobras, by the faint glow of shielded lanterns. Just beyond, two Navy ships were briefly illuminated by the flitting lights. One was the Brewster SB2A-1 dive-bomber in which Crabb and he had flown from the West Coast. The other was a Curtiss SB2C-1. Apparently it was not kept there for defense, like the Airacobras, for it was not being manned.

“I’d give a month’s pay to get into this,” said Trent. “That is, if it’s a real raid.”

“You’d get your pants shot off,” Crabb said sourly. “Those Army guys will be firing at everything but their own ships.”

The Airacobras soared down a darkened runway, swept up into the murk. From across the Potomac came the thunder of other interceptors taking off from Bolling Field.

“Probably just a test,” grunted Crabb. “Bombers couldn’t see to hit anything, a night like this.”

THE DRONE of engines diminished, as the Army fighters climbed on up to get on top of the overcast. Trent took three small hollow steel balls from his coin pocket, began to juggle them in the darkness. It was one of his habits when thinking out a problem—juggling powder cartridges, palm coins, while his brain kept pace with his fingers. He looked back at the terminal, remembering Hermann’s tense expression and his reference to a message.

“Mort, I’ve a hunch this isn’t a test. That gorilla of von Zenzen’s acted as though something were about to pop.”

“Maybe so,” Crabb said, staring up into the night. “Sounds like something right now.”

The drone of an unseen plane had changed to a snarly snarl, as it suddenly picked up speed. Trent thought he heard a muffled puff of guns. The snarling roar abruptly died out. A few moments later ground guns hammer, somewhere across the river. A searchlight angled through the dusk, jerked back.

“What’s that?” ejaculated Crabb, as the beam caught something in the mists.

“It’s a Stuka!” said Trent. Even as he spoke, the ground guns cut loose with a furious barrage. Tracers from four directions flamed toward the Nazi dive-bombers. But the Stuka never swerved. Slowly, almost majestically, it glided over the Highway Bridge. But no bombs fell. One wing tilted under a machine gun blast, then, with a sharp dip, the Stuka plunged into the river.

Searchlights were focused on the spot before the seething waters had time to settle. The Stuka’s tail was visible for a moment in the glare, then it slowly went under.

“The pilot must’ve been dead or out cold, the way it came in,” muttered Crabb.

“Notice anything odd about that ship?” said Trent.

“Only the way it came down.”

“It didn’t have a landing gear. Either they dropped the wheels or—” Trent swiftly put the steel balls in his pocket, turned to the car.

“What’s up?” erupted Crabb.

Trent pointed up into the gloom. The faint glow reflected from the searchlights on the water revealed a descending parachute, with a figure dangling beneath it.

“He’s going to land near the edge of the field.” Trent started the engine.

“If we move fast we’ll nab him before he can run.”

He sent the coupé racing toward the junction of the airport road and the boulevard. The searchlight from the terminal, probing toward the Stuka, was barely enough to guide him.

“Slow down, you lunatic!” howled Crabb. “We’ll hit something.”

Trent gazed up through the windshield-wiper arc. The man in the chute was a hundred feet from the ground. He was going to land near a boundary light standard, about ninety yards from the boulevard.

“Hang on, Mort.” Trent skidded off the road, up onto the flat earthen dyke which formed the airport boundary. The descending figure struck the ground, and the chute suddenly collapsed over him. Trent braked the car, jumped out with the silenced gun in his hand. Crabb helped him pull aside the folds of silk.

“Well, burn my breeches!” Crabb said in amazement.

The Nazi airman’s head was almost (Continued on page 62)
ONE OF the most famous of all German aircraft manufacturers, Heinkel Flugzeug-und Motorenwerke builds all types of war craft from fighters to bombers. The He. 112 is probably the most famous ship the concern has turned out, but the most destructive is the He. 111K bomber, the production of which is portrayed on these pages. The plane is well built, regardless to contrary reports, and has proved conclusively that it is a well-bred bird of war comparable to similar types in service with the United Nations. The Heinkel plant, located at Rostock, has recently been bombed heavily by the RAF.

With service squadrons, the He. 111K is classed as a medium bomber. Adaptations have also been made for carrying a torpedo for use against Allied merchantmen.

The last stroke, and she's finished. Production at Heinkel is so rushed that jobs such as painting are left until the very last. The main thing is to get 'em done.

Above: Mass production. To supply needs of the German war machine, three shifts are used by aircraft companies. Planes are turned out in a minimum of time.

Below: As with other countries, Germany is constantly seeking to improve designs. Here, Prof. Ernst Heinkel confers with one of his engineers in a wind-tunnel.

Last-minute adjustments. Before a test flight, Dzu-type fasteners are twisted and metal cowls are locked in place. Note large exhaust ports on Daimler-Benz.
For the first time, oil is poured into the tanks of a newly-completed machine. Just off the production line, no time is lost in preparing it for flight and early delivery to a service squadron. The Germans are very proud—and rightly—of their highly efficient production system.

Professor Heinkel inspects the new ship before its maiden flight. With him are Chief Engineer and test pilot. Note generous panelling of the gunner-bombardier's station in the ship's nose.

Ernst Heinkel rewards employees who perform faithful service, such as turning in ideas to help speed up production. Awards are made monthly. Below: Herr Heinkel, though aging, keeps fit by daily mile run. It is reported he can out-race many younger employees in anything over half a mile.

"Wunderlich!" exclaims the test pilot after a shake-down flight. With his Otay on the ship, the Luftwaffe ferry pilot climbs up and takes it to the front—ready to go on a bombing trip.
FAIRCHILD CORNELL

IDENTICAL to the Army Air Corps PT-26, which was developed from the earlier PT-19A, the Fairchild Cornell is being delivered in large numbers to Canada where it is to be used as the standard RCAF primary trainer. The machine is being manufactured not only by Fairchild but also in Canada under license.

The Cornell has been completely equipped for night and instrument flying and thus offers the combined advantages of a primary and basic trainer. The ship has a quickly-removable blind flying hood in the rear cockpit, generator for electrical equipment, and complete blind flying instruments and equipment.

The fuselage is a simple welded steel tube structure with fabric covering on the sides and bottom; the engine is faced with removable metal panels, and the turtle deck consists of a metal structure which may be removed. Stowage space is provided under the forward section of the turtle deck. A truss-type crash protector is located between the cockpits, to protect the crew in case of accidental turn-over while landing.

The cantilever wing is placed in the low position and is faired smoothly to the fuselage. Covering is plywood, and two spars are used in construction. The ailerons are welded steel tube structures and are faced with fabric.

Power is supplied by an air-cooled in-line Ranger 6-440C-5 engine of 200 h.p., which is an increase of 25 h.p. over the PT-19A. Performance figures have not been released, but it is believed that the top speed is about 150 m.p.h.

Other data: Span, 35 feet 11 inches; length, 27 feet 8 inches; height, 7 feet 9 inches; wing area, 200 square feet; range, about 500 miles; ceiling, approximately 17,000 feet.

JUNKERS JU. 160

ORIGINALLY DESIGNED as an express transport, the Ju. 160 is now used by the German Air Force for communications and military transport purposes. The ship is very similar to the Vultee V-1A of several years ago.

The oval-section fuselage is a metal monocoque structure consisting of four longerons and transverse frames; covering is smooth metal sheet. A crew of two and six passengers are accommodated, entrance and exit being through a swinging door on the left side of the body aft of the wing trailing edge. The horizontal stabilizer is braced externally by inverted "V"-struts. Note how the vertical fin and rudder have been chopped off almost straight on top. This undoubtedly makes for poor airflow around the tail.

The all-metal cantilever wing is attached in the low position and is covered with corrugated metal sheet. Construction consists of two girder spars and main and auxiliary ribs. The entire trailing edge is hinged, in the usual Junkers fashion, the outer portions acting as ailerons and the inner sections as flaps. The landing gear legs are fully retractable folding up and in to the wing center section. Retraction is by hydraulic pressure, but a manual system is installed for use in the event of damage to the automatic method. The tail wheel is fixed and streamlined.

Power is supplied by an air-cooled radial B.M.W. 132A engine of 670 h.p. at 2,050 r.p.m. at 2,950 feet, giving a top speed of 211 m.p.h. at 3,000 feet. Cruising speed is 180 m.p.h. at 6,232 feet, and landing speed is approximately 68 m.p.h.

Other data: Span, 46 feet 9 inches; length, 39 feet 4 inches; height, 13 feet 2 inches; wing area, 377 square feet; empty weight, 6,105 pounds; loaded weight, 7,810 pounds; rate of climb, 885 feet per minute; cruising range, 745 miles.
GERMAN INGENUITY is certainly apparent in the design of this machine. For while the hull is of somewhat orthodox lines, the power plant arrangement is unique. Two tractor and two pusher engines are installed; the tractors are set in the wing leading edge, at the apex of the gull, and the pusher plants are immediately behind and streamlined with the tractors. These pusher engines are not faired or braced to the wing to their full length, as in usual arrangements, but are mounted free aft and may be raised 10 degrees to avoid water spray on take-off. From a head-on view, the Do. 26 may easily be mistaken for a twin-engine flying boat. Like many other German seaplanes, it may be catapulted from a mother ship. The military conversion is called the Do. 26K.

The hull is a two-step affair and is of all-metal construction with eight water-tight compartments. A crew of six is normally accommodated in the military model. The front gunner is in a covered turret and is provided with a single 23mm. cannon on a swivel mount. The control cabin is directly to the rear, with provisions for pilot and co-pilot. The radio operator and navigator are aft of the control cabin, and on a line with the pusher engines are two machine gun blisters, one on either side of the hull sides. As far as can be determined, no channel guns are mounted to protect the bottom of the plane. Complete living quarters are provided for the crew.

The wing is attached in the high position and is fully cantilevered. The center section, which is integral with the hull, has two spars, with the engines mounted at their extremities. The leading edge of the outer panels is tapered and the trailing edge straight. Lateral stability when the plane is at rest on the water is provided by retractable floats. The vertical fin is balanced and the horizontal stabilizers are braced by inverted "V"-struts. The tail group is covered with metal and fabric.

Power is supplied by four liquid-cooled in-line Junkers 206C engines of 600 h.p. each, giving a top speed of 210 m.p.h. Cruising speed is 140 m.p.h., and landing speed is 68 m.p.h.

Other data: Span, 98 feet 6 inches; length, 80 feet 6 inches; height, 22 feet 6 inches; wing area, 1,290 square feet; empty weight, 22,490 pounds; loaded weight, 44,100 pounds; cruising range, 5,600 miles; service ceiling, more than 25,000 feet.

LIKE the Dornier Do. 26, the Heinkel He. 116 was originally designed as a commercial plane. It was built by Ernst Heinkel Flugzeugwerke G.m.b.H. and was sold to Japan and Russia in large numbers. As a commercial plane, it carries a crew of two and eight passengers. Employed as a communications machine by the Luftwaffe, it is said that both Japan and Russia are using the type for bombardment purposes.

The oval-section fuselage is of all-metal construction and is built-up on the usual transverse frames and longitudinal stringers; covering is smooth metal sheet. The nose is well streamlined, and the pilots’ windscreen fairs smoothly with the fuselage. Night flying instruments and two-way radio are installed. The tail group is cantilevered on some models and externally braced on others. The rudder and elevators are balanced and are faced with fabric.

The elliptical wing is attached in the low position and is of metal construction. A cantilevered unit, the wing uses two spars and main and auxiliary ribs; covering is smooth metal sheet. The center section is integral with the fuselage and carries the engines and undercarriage, and the outer panels are bolted on at a point slightly outboard of the engine nacelles. The entire trailing edge is hinged, the inner portions acting as flaps and the outer sections as ailerons. The landing gear legs retract by hydraulic pressure.

Power is supplied by four in-line Hirth HM. 508G engines of 270 h.p. each at best operating altitude, giving a top speed of 233 m.p.h. at 9,840 feet. Cruising speed is 198 m.p.h., and landing speed is near 70 m.p.h. Other data: Span, 72 feet 2 inches; length, 44 feet 11 inches; height, 12 feet 5½ inches; wing area, 677 square feet; empty weight, 9,592 pounds; loaded weight, 15,686 pounds; rate of climb, 820 feet per minute; cruising range, 2,795 miles.
In the Slipstream

That Yank-Jap Ratio

Seems that our air service experts differ when it comes to rating Mr. Yank's aerial capability. One has shown himself to be the match of any three Jap airmen, another says any five, and still another any six. For us, this is a disagreement where we all win—because it's poison to the Jap. Hiro no matter how he slices it.

New Aero Curricula

We're especially pleased to report that the ATCA—Air Training Corps of America—is really revvin' up a top-flight aero program for you lads. Fully 500,000 high school juniors and seniors in the East will start these technical aviation studies in September, and a national program is to follow. Looks great! What's more, another plan is under way to teach aero fundamentals in all grade and high schools. Yes, it took a war to wake up the "powers that be." But give 'em a hand. They're now going to see to it that you fellows get solid aviation schooling.

"They're Wrong" Department

Military Writer Fletcher Pratt says: "In the last war, A-A fire shot down one plane to every five flown by fighters." It's wrong. Actually, it was a rarity when A-A's knocked off any aircraft in World War I. Columnist Sid Skolinsky writes: "Nevil Shute designed the R-101 dirigibles in the last war, when England was trying to compete with Germany's Graf Zeppelin. He's mistaken, loco. The R-100, R-101, and G.Z. were all products of the late '20's, not of the last war. . . . Joseph Rubin, of New York, suggests that main power station switches be pulled to douse lights and cut and control air raids. He's right. He's way off. Even if it could be done (which is doubtful) too many electrical services needed at such a time would be gummed up, for the lights aren't the only things on power circuits. And what if a raid came when home people had no lights on?

Salient Slants

It now comes out that Jap planes flew over the Philippines several nights before December 7, were picked up by detectors, and on one occasion were chased by Yank pursuits—which makes the doze of our A.A. Navy chiefs at Pearl Harbor more screwy than ever. . . . Have there been other Acc-in-a-day men besides O'Hare? Telling of initial successful action with new H-17 tail-stingers (twins 50-cal. guns), Lieut. R. Meyer says: "One of our Fortresses alone got five and perhaps six Zeros within a few minutes." And the implication is that a single tail-gunner did this job. So if, that man, whoever he is, should quickly be given top public honors. . . . Of one Yank bombing show, a war correspondent said: "Our flyers were in formation and determined to keep it even if it meant going through more anti-aircraft fire, though all except the leader had dropped their bomb loads. Comment: Formation flying is swell—but this seems like one case where the risk wasn't worth it. Planes and pilots are too precious. . . . We like Secretary Hinkley's pointed new slogan for Victory in the air. Cold, but effective, it's just three words: "Fly or die!"

Lighter Bits

Some New York lads who were practicing "bombing" by dropping loaded paper bags off the Brooklyn Bridge have, sad to say, met the "enemy." We mean cops snapped 'em. . . . Special American Eagle Squadron citation is the "Order of Frang" (Eagle logo for France). It's a large wooden cross, which must be worn on a week for any flyer who damages a plane as a result of a plane-head tactic. . . . "I was never nervous, up there flyin' and fightin'," said an R.A.F. pilot the other day, "until after I saw the movie 'Yank in the R.A.F.' . . . Workers at North American of Texas are admonished not to be "Ferdinand Fuddlebrains." Perdy, they say, is the sort of guy who'd bring a plane off the line with two left wings. . . . New York stores now have air raid placards reading, "Illumination is required to be extinguished, etc." My gosh, some places may be wrecked before the owners have time to trans late that. They should've used plain English, like "Lights must be turned off."

About Aces

Rye School Cadet to Lieut. Colonel in three years! That's the record of Ox Peterson, Eagle Squadron Ace now joining up with our AAF. . . . Bob Seewell, of Boston, 9-victory man with the RAF in World War I, is now an AAF captain. . . . John J. Yilmor, French ace of the RFC, was brought out by that Royce flight and will have more cracks at the Japs. . . . Reported earlier as killed in action, Helmut Wagner, Nazi Ace with 47 victories and the man said to have bombed Buckingham Palace, is now alive and unhurt. . . . Nazi Aces reported killed on the Eastern Front: Lieutenant Rieder and Squadron Leader Hegen, both 50-victory men, and Lieut. Edouard Meyer, who held the Knight's Cross of the Iron Cross.

On the Fighting Fronts

As of April 3, the AVG "Flying Tigers" were credited with more than 200 Nip planes with a loss of but 20. . . . Those red discs at the center of the star insignia on U.S. warplanes are being removed—so there'll be no confusion with the Japs' red-ball carde. . . . Russia claims a toll of 251 Nails planes for the two days, April 4-5. . . . More than 18,000 Indian students responded to a recent call for 350 Indian Air Force volunteers. . . . The RAF now drops 2-ton bombs containing 30 times as much explosive as 15-in., shells. . . . Malta's defenders are waiting for the A-A record. It's said they've "frequently shot down entire formations of dive bombers!" According to Nazi prisoners, Adolf's airmen are now getting but three to six months of training. There are said to be 74 German pilot cadets in the A-A records. It's said the German attack is reported to have been used in that memorable February 20 engagement in which fighters from one of our carriers accounted for 19 Jap bombers. The technique is a secret.

The Home Front

Several coastal sub sinkings are now confirmed by the British. By patrolling CAP flyers. . . . U.S. paratrooping, gliding, and the rest, are now combined in a single Air-Borne Command. Top man is Col. Bill Lee. Our major Pacific Coast plane makers have banded together in a special Production Council, Cooperation for Victory! Flying Fortress production has been doubled since Pearl Harbor. . . . Men who should know say we'll really build more than 60,000-military planes this year. Production was put at 352 planes, 750 per month as of April 1. It'll soon be well over 5,000. . . . Nearly 90 of the country's 350 airlines have been given over to the War Department to carry military cargoes and personnel. If you get to fly on one of the remainder, you can't certainly pull down when passing strategic areas. . . . To save valued metals, Curtiss will turn out wooden war transports and North American a trainer (the AT-6) needing less than 2 percent of scarce alloys. And Timon's plastic equipment is "Aeronomical" trainer seems a good bet to get the Navy's okay.

Personal Patter

Major General Fechet, Army aero veteran and second chief of our Air Corps, was recalled to duty. . . . Wpring-Way Corporation is order ing planes for the Army, and," says he, "I'm flyin' 'em the right way." . . . Tyrone Power, who recently tried to get into our Navy sky service, was mighty surprised when he learned his being married would keep him out. He said he had started out to be a Yank in the R.A.F. . . . Fritz von Opel, pioneer German rocket-plane builder, has been nabbed in Palm Beach, Fla., by the G-Men. . . . Major von Parseval, dirigible inventor, who built those "Zeppelins," was ordered "killed" by the Kaiser in World War I, died the other day at the age of 81. In peace times, he sold his motor-driven nonrigids all over the world. . . . Dead (Continued on page 70)
Penetrating the years following this war, our author visualizes gigantic air attacks of the next great World War!

by CHARLES YERKOW

Although effective in the present conflict, dive-bombers will in the future be outmoded. Emphasis will undoubtedly be on heavy machines.

Nothing but Airwars in the Future

No weapon exists which is actually effective against mass air raids. Properly carried out, initial air attacks clear the path for the next wave of bombers which can at will destroy communication and transportation centers. The next wave can blast at supply depots, personnel training grounds, and sectors of mobilization. Official accounts prove that airpower has been the most devastating weapon in this second World War, and the supremacy of the warplanes over surface weapons has also been definitely established.

The role of airpower is all-important because of the nature of modern warfare. The enemy must be overcome swiftly. This role has not evolved through humanitarian instincts of military strategists but is merely a necessity caused by the many changes in war equipment. Today an army must reckon against mobile units possessing heavy fire-power, making trench warfare almost entirely obsolete.

The importance of overcoming the enemy as swiftly as possible was demonstrated in the very early part of the war between Germany and France. German motorized divisions cut through France in a matter of a few days, then proceeded to hammer against poorly supported and poorly equipped British divisions at Dunkirk. Throughout these German thrusts the responsibility for ultimate victory rested on the shoulders of the German Luftwaffe. If the planned moves and attacks of the ground forces had suddenly found themselves without support and cooperation of the air force, it is doubtful whether Germany would have ever found the time and manpower to open her eastern front.

Airpower alone will not win wars. In order to hold a newly won position it is necessary to use surface forces—infantry. However, airpower is the one weapon which can facilitate invasions of the enemy territory and which can drop parachute troops and which can see to it that air-borne troops arrive in time as reinforcements.

In a talk a few months ago a U.S. Army officer maintained that airpower is over-rated, and he proceeded to outline the importance of foot troops in time of war. Recently this same officer again spoke, and again he maintained that airpower is over-rated—again stressing the importance of infantry. Whether his opinion was a biased one is difficult to determine; he was an officer in the first World War, serving in the infantry, and at present commands an infantry division. He might be talking, then, to instill confidence into his men—yet who can deny that every major successful offensive in the war has been carried out under full or part support of air forces?

Airpower has the farthest short-time reach of any military weapon. The only effective counter-weapon is a greater or more effective air force. Such being the theorem, it is but natural for every conquest-minded nation in the future to exert every effort toward building up vast resources, training centers, manufacturing plants, maintenance and repair depots, laboratories—all for the ultimate goal in out-doing all other nations in creating and maintaining vast and powerful air fleets.

Airplanes in the present war are known to reach speeds of four and five hundred miles per hour; a war twenty years from now might unveil long-range heavy bombers with speeds of eight hundred miles per hour in lever flight. Imagine the type of interceptor needed to fight against such a bomber, and, better yet—imagine the forms and methods of air raid warning necessary under such war conditions!

Characteristically, air fleets will be the first to open offensive wars of the future; two-thousand-pound bombs might rain down on cities as the two-hundred-pounders rain today.

The picture truly takes on gigantic proportions the longer one mulls over it. Perhaps a man with a fiction mind could paint a ghastly or an inspiring canvas, perhaps he could write an intriguing story or article as to how the wars of the future will be fought and won and lost. But whatever he paints or writes would include some form of powerful air weapon streaking across the skies in units probably numbering thousands.

The airplane has jumped a long way from the days of Kitty Hawk, and it will jump a longer way in another ten or twenty years—when the third World War shatters everything we were capable of imagining in the first and second World Wars! The end
Maltese Double-Cross
Phineas Gets Hunk as a Hunchback!
by Joe Archibald

"A FLIGHT, Ninth Pursuit Squadron, United States Air Corps, patrolled high over Thiaucourt. Phineas Pinkham, half asleep in his Spad, wondered if it happened to be some kind of Kraut holiday, for there were no competing battlewagons visible to the naked eye. "Maybe it is groundhog day in Germany," Phineas grinned. "The mechs won't come out if they can't see their shadow. The sun wasn't out very good until ten minutes ago."

The flying wonder from Boone-
town, Iowa, forgot about the war for a moment and thought of his financial worries. Babette was having a birthday in just a few days, and here he was as flat as the proverbial flounder—and as far as he could see there was no immediate opportunity in which to promote some coin of the realm.

"It is a disgrace the pay we get," Phineas groaned and followed Captain Howell back toward Bar-Le-Duc. "For riskin' our lives we get a bar on our shoulder and a ribbon clerk's pay. They make us buy our own chow and our clothes. We should write our congressmen. Huh!"

Phineas suddenly saw Howell waggle his wings. He brooked the sky with his big optics and saw a couple of enemy crates diving on a balloon that rocked on its moorings near Le-rouville. "A" Flight sailed in and Howell popped a Jerry that tried to climb after pulling out of his dive, and the Teuton found out that the Law of Gravity threw the look at a citizen who had a dead engine in his lap. Bump Gillis and Phineas teamed up and rede another Heinnie over the Meuse, knocked enough parts off the Kraut's bus to build a model plane, and the Jerry went down to make a fair catch at real estate and missed getting an early grave by the width of a fairy's wand.

The Kraut's noggins was barely three inches from a big boulder when Phineas got to him. The Boonetown wonder lifted the pilot and propped him up against the rock. He looked dead to Phineas. The Bam reached inside the man's tunics and pulled out a big wallet. In it was a picture of a blonde and a little wad of Heinnie curren-

"I'll make sure if his skull is frac-
tured," Phineas said and unstrapped the Kraut's leather casque. "This is another scalp I will hang up in my hut as a souvenir, anyway."

The Potsdam pilot stirred, opened his eyes when Phineas took the helm off his little square head.

"Wee gates, mine hair," Phineas grinned. "One guy has to lose, huh?" Wass is lost except your memory?"

"Ach," the hostile pilot gulped out. "You need not stay far from me, Amerikanischer I haif not der Luger undt if I did I would not haff der strength to pull der drigger."

"Why, I am right beside of you," Phineas looked at the Heinnie's peepers. "Haw-w-w-w, that descendu crossed your lamps and stigmatized them, didn't it? Well, if you do not git cured, you can get a tin-cup and some pencils and find a good corner near the Wilhelmsstrasser, huh?"

Several Yank troops came down a hillside and hurried to the wreck of the Halberstadt.

"Take Fritz to the nearest healing haphurda," Phineas chirped.

"Hmmer, I am lucky yedt," the lit-
tle pilot said as he pulled something from the pocket of his leather flying coat. "They did nott break, mine spectacles."

They must be short of Krauts over there," Phineas opined. "As long as they have a seat to put in a crate's office, and two arms and two legs—well, I must be gettin' home. I'll see you in the next war, little chump."

You will never lift until der next one, meine freund," the Kraut spat at Phineas. "Yo, I am nott at the bunylo, hein? I tell by der funny face mit der teeth like der keys off der piano. Der Baron von Heinzhund will kill you when he fights you. Only for your death does he lift. So far you run efery time you see him, now."

Phineas felt a tingling in his pate. He looked at the wrecked Halb and made out the insignia on the crum-
piled fuselage—a three-pronged pitch-
fork jabbed through Uncle Sam's hat.

The Halberstadt Hellions from Homb-
berg, the Allied pilots called the Bar-
on Von Heinzhund's Circus. Up to June, 1918, the Baron had personally accounted for 60 Allied planes. With-
in the next three months, it was progn-
osticated by pilots who had been lucky enough to duck his bullets that he would kick the late von Richtho-
fen's record into the allum. Hein?"

"Your tricks, meine freund," the Kraut pilot said. "Bah! More than so many times ist der pitcher carried to der vell before it comes dry, undt once too many times a bummer like you cries der volf when there ist no volf. Ha! Der Baron he is ready for all der tricks."

"Take him away," Phineas yipped at the doughs. "Say, Sarge, could you lend me ten franes?"

"If you can't live on a loosey's pay," the big non-com sniffed, "how have I got dough to lend you? Look up the insult I get every month."

"I only asked and you don't have to git sore," Phineas mumbled and trudged through the goat pasture to his Spad. Half-way across, he stopped and stroked what little chin he had. He eyed the white horse in the field. A full-grown idea walked up to him, rolled up its sleeves, and hit him squarely between the eyes.

"Napoleon had a white plug," Phine-
as mused. "Huh, I wonder if— I saw that new ackemma combing out a rabbi's foot last night. Casey al-
ways throws dirt over his right shoul-
der before we go out on patrol. Well—"

Lieutenant Pinkham climbed a
fence and approached the dobbin. It was docile enough as Phineas stroked its nose. Having struck up an acquaintance with the Frog equine, he took out a jackknife and went around to the rear of the horse. He cut off some of the tail and put it in his pocket.

"MAYBE BABETTE will get that string of pearls now," Phineas said later as he flew to the drome. "I ought to raise the argent awright."

Lieutenant Phineas Pinkham cached his latest Boche scalp in his hut; then stuck up for mess. When he arrived, Major Rufus Garrity was discussing the Homburg Hellions. He was reminding the pilots that the Boche Circus had just about hogged the spotlight in the sector, that the Baron was a serious threat to flying morale, that even the pilots training at Issoudon were feeling the effects of his deprivations.

"There isn't one man alive—I'll say two men—who can beat that guy in a dogfight," Garrity said, banging his fist down on the table. "He can do more with a crate than a cat can do with a chunk of liver. He's got to be stopped, understand? You got to get him in a pocket; gang up on him."

"Nobody is invincible," Phineas sniffed as he sat down. "Once the Waterloo High School had a fullback who couldn't be stopped. Me and another guy trapped him in the big game and put him out in the first quarter. If we knew ahead of time what was goin' to happen—"

"Huh?" Howell grunted.

"Oh, I was just thinkin'," Phineas said. "Babette told me of an old doll who can see in the future and tell what will happen to you long before it happens. She sells luck charms, too. They are guaranteed to work."

"Nuts!" the C.O. said. "That is all so much bushwah."

"Yeah? Wouldn't you want to know where you were going to die?" Phineas countered.

"So what?" Garrity howled. "Would that save me?"

"Sure. You wouldn't have to go near the place," Phineas grinned. "Haw-w-w-w-w-w-w-w! I just mentioned it, is all. I'd like to see the old dame, anyway. Every little bit helps when you are losin'."

So Phineas sowed the seed, for he knew that there is a grain of superstition in every human being. That night he rode into Bar-Le-Duc on a bicycle and called on Babette.

"Bon saw," Phineas greeted his torch. "I need help, mon cherry."

"So they try you in ze courts encore, oui?" the French girl said, shaking her head. "Who you keel or rob now?"

"It is only some clothes I would like to borrow," Phineas said. "I am going to have ze fun with my pals out on the drome. Here is what you have to do, as I am supposed to be your aunt. Comprenny?"

"Non. It sounds vary stupered. Some day you get Babette in ze basstle," the girl said.

Phineas put on an act that softened Babette's heart. He told her he was sure he was getting the air, that she had given her affections to another. He would end it all. Babette was a pushover for Phineas when he put on the Barrymore stuff, and in a few moments she was in his arms and assuring him that she would stab the mayor in his bathtub if Phineas asked her to.

"That is like my Babette," Phineas said, and he got down to brass tacks.

Three nights later, Lieutenant Bump Gillis entered a little empty house a block away from Babette's flat and nodded to a little old French woman who had taken over for a while. There was a sign on the wall that said:

MADAM APOLINAISE
Palmist, Chironancer, Mystic and Medium
I Read Your Mind, Your Palm, Your Head
Prices Reasonable

"Yeah, I don't believe all this mullarkey," Bump said. "I just am curious. Will I live through the guerre?"

"You are of Scotch descent," Phineas, alias Madam Apolinaire, said in a falsetto voice. "So you are stinky with your life, it will be a miracle if you give it up."

"Say, I am Scotch," Bump grinned. "You are no fake, I bet, I heard you got luck charms to sell that—"

"Oui, mon ami. Little tufts of hair from ze horse of Napoleon," Phineas chirped. "Just two or three, but ze
price ees so reasonable, yes, no?"

"But he didn't have no luck," Bump said. "He got licked and was sent to Elba."

"Oh, Phineas replied, thinking fast. "But ze horse didn't, now?"

"Uh huh," Bump said. "How much is ze horse's hair?"

"Peefy frants, Phineas said and pulled his hood closer over his head. "Ah, eet ees cheap."

"Okay, it's the deal. A guy's got to make sure in a war."

"Nothoong weed harm you now, mon brave soldat," Phineas said and consummated the deal. "But you got to keep eet ze secret. Show eet to anyone an' ze charm dies.

"I will remember, Madam-mey," Bump said and made his exit.

"Phew!" Phineas tossed out. "What a sucker. That von Heinzhuhnd has them gaga. I wish I knew what would save me from him."

TWO OTHER customers came to see Madam Appolinaise that night, Captain Howell and Major Rufus Garrity. Then Phineas closed up for the evening, returned the clothes to Babette, and walked out of Bar-le-Duc with 180 francs in his pocket.

Two hours after the dawn patrol, in which the Ninth Pursuit had taken a pounding from the Halbs, "A" Flight got ready to carry on. Bump Gillis and Captain Howell grinned expansively as they walked to their Spadas. The C.O. stood in the doorway of the farmhouse, pounding his chest with his fists.

"Ah, so they lick us the first time," the Old Man exclaimed. "So does that mean they'll keep winning? No! Let's not be downhearted! We can't lose!"

"Gits me," Sergeant Casey told a man behind the plate and smashed his pipe into little bitty pieces. Sergeant Casey helped pick him up and take him to a medico. The Old Man was a little delirious when he submitted to first-aid. How the iodine burned!

"I'll see the authorities in Barley Duck! It is a disgrace that fakirs are allowed to rob the A.E.F. I will expose that old rip! Eighty francs—oh!"

Lieutenant Gillis was brought in for repairs ten minutes later. A coil of horsehair hung from around his neck and the Yank first-aid expert eyed it curiously.

"A lock of a dame's hair, huh?" he said. "This guy must be goin' to marry a grandmother of a daughter of the revolution when he gets back. Oh, I am sorry. Maybe it is his mother's, or grandmother's, hair."

"No jury will convict me," Bump yelled. "Where would you get clothes to dress up in like a dame? Only one place, you crook! Captain, you go into Bar-Le-Duc after mess and hunt through that French trick's flat for a stripped skirt and a red and blue shawl. That'll convict him. This time he gets a transfer to Lavalworth."

"By-y-y cripes, I'll—Oh, if the whole outfit fell for that! Give me some aspirin, quick!"

"No jury will convict me," Bump yelled. "Where would you get clothes to dress up in like a dame? Only one place, you crook! Captain, you go into Bar-Le-Duc after mess and hunt through that French trick's flat for a stripped skirt and a red and blue shawl. That'll convict him. This time he gets a transfer to Lavalworth."

"There you are!" the Old Man yelled when they had dragged Phineas to his feet and threw him into a corner. "Grand larceny! Swindling! Impersonating a fortune teller without a license! This cooks you!"

"It is a circumstantial!" Phineas protested. "No jury will convict me. His tongue banged against the sides of his mouth, tripped over his wisdom teeth, and couldn't get up for a few moments. Then: "It is like a boy passin' a secret around the corner. He knows the groceries he went after and spills part of a sack of rice. Does that mean a weddin' took place at the church the night before? That is my defense!"

"One place!" the C.O. yelled. "One place! Where would you get clothes to dress up in like a dame? Only one place, you crook! Captain, you go into Bar-Le-Duc after mess and hunt through that French trick's flat for a stripped skirt and a red and blue shawl. That'll convict him. This time he gets a transfer to Lavalworth."

The scream of the siren cut in on the preliminary court martial. Everybody ducked for cover when the roar of alien props filled the sky over the drome. The heat had turned the pit began to stuffer. Phineas thought it was a good idea to escape during the confusion until he realized that Bump Gillis and Howell had each grabbed a leg that belonged to him.

"Give a guy a chance to run," Phineas yelled. "I was goin' to give you the dough back."

"Sure," Bump said. "And them planes overhead belong to Switzeland. You would steal sheep."

The Halbes strafed the drome, set a hangar on fire, and shot the hell off Casey's leg. The Nissena looked like the drome of the Ninth Pursuit had gone through an invasion of termites. The Homberg Hellions had struck again!

It was Sergeant Casey who
brought the old Kraut army boot into headquarters. It was filled with little rocks, and after these were dumped out a roll of paper fell out. It was a letter from Baron von Heinzhund and he wanted to know if Leutnant Phineas Pinkham would care to settle a little difference of opinion high over Triaucourt on Friday afternoon at 5:30.

"Too bad you have to disappoint him," the C.O. said. "Lucky you are going to get busted, as this saves your face and also your life."

"It will make me seem like a coward, and that will lift the German morale," Phineas argued. "They will not know their own strength and will wash you all up. This is psychology and Chaumont won't stand for it."

"You are a lousy lawyer," Garrity bit out. "Oh, don't try to crawl out. We will drop an answer for Heinzhund. We will say you was shot down and are no more."

"And he will take credit for me," Phineas choked out. "That is an outrage!"

"Why, you would think nobody could fly but him," Bump Gillis yelled, caressing his 50 francs. "I'll fight that Baron and will use a Spad with your insignia on it, you big swindler! We will take one of our morale without anybody knowing you got disgraced and went up the river."

"Nobody but me could get him," Phineas howled. "After every game, who had his name in big letters in the box-score? It was me. Oh, I was downed, but I was the hero. My dame had a birthday coming. Give me one more chance. Sniff-sniiff."

"I am touched," the C.O. said. "I feel as sorry for you as a wolf does for a lamb it caught A.W.O.L. from the flock. Boy, I am going to sink my teeth into you this time."

"Awrighit," Phineas said. "I have tried everything to see if you have got a heart. Haw-w-w-w-w-ww! I will be safe in a nice jail while you are gettin' knocked off by the Homberg Hellions, by the C.O." The C.O. made sure that Phineas could not get loose from the drome. He took away his flying coat, helmet and goggles, and boots. "Let him try and get into a Spad, if he happens to be able to steal one," he said. "I bet even a hillbilly hasn't got bare feet tough enough to pilot a Spad. You are under arrest, Lieutenant Pinkham!"

Phineas went to his Nissen to think things over. Everything looked jaily, all right. And just when he had begun to formulate a plan of attack against the Homberg Hellions!

There had been a dry spell throughout the continent. A couple of wells had dried up not far from the drome. Frogs were stranded on the banks of little streams and were gasping for breath. You could hear them croaking at night. Phineas thought of a certain landmark not far from Metz. When you yank a limb off a tree, it dies and gets brown, especially when Jupete Pluvius is on a prolonged strike.

**Know the Enemy’s Planes**

**NUMBER TWO**

**LITTLE** is known of the performance of the Kawasaki 97 light bomber. A low-wing monoplan with fixed and streamlined landing gear, this machine appears no larger than the U.S. Air Corps’ North American AT-6A advanced trainer, which has a wingspan of 42 feet 8 3/4 inches, weighs 5,248 pounds, and has a maximum speed of more than 200 m.p.h.

**Externally**, the ship appears to be just a modification of the Mitsubishi Karigane, the main difference being the substitution of an in-line liquid-cooled engine for the air-cooled radial A.14 used in the former type and half-pants instead of full wheel streamlines. Also, it is generally conceded that the plane is really nothing more than a relatively good copy of the old Air Corps Northrop A-17 attack-bomber. A crew of two is carried under transparent canopies.

The Kawasaki 97 has been used in large numbers by Japanese forces operating against the United Nations, and it is said that the type has acquitted itself quite well, regardless of its somewhat ancient vintage. No details are available concerning its armament.

**PHINEAS** sauntered over to “A” Flight’s hangar and a sentry kept an eagle eye on him. He went into the hangar and Sergeant Casey jumped up quick. Four ack-akms froze on their haunches and then let out pent-up breaths.

"Whew," Casey said. "I thought it was the C.O. He threatened to bust anybody who played with dice, after that last argument in the groundmen’s barracks, I thought for a minute I was goin’ to lose this 50 bucks I just won."

"You can trust me, old pal," Phineas said. "Maybe I’ll try a practice shot. Leave them lay there, Sarge, as I pick them up myself. It is bad luck to have anybody hand you the dice."

Phineas picked up the cubes of iniquity and started to shake them in his hand. "You groundhogs beat it, as if the Old Man ever sees you—anyway you have no argent left."

When the mechs had gone, Casey said: "I’ll bet you a sawbuck you can’t toss a seven."

"Faded," Phineas said. He threw the dice. It was a seven. He threw another seven, and another.

"Eighty bucks, huh?" Phineas said and examined the dice. "Okay, Casey, you crook! Fleein’ poor airplane mechs, I’m goin’ to take these loaded dice over to the C.O. right now. I don’t mind games that are on the level but cheatin’ is somethin’ I won’t stand for. You are a disgrace to the air corps. Sorry, Sarge, but—"

Flight Sergeant Casey was indignant. He knew very well the dice were on the level. Yet he had sense enough to know that he could not prove it to the C.O. Phineas had switched ivories and he knew it, but he would never be able to prove it.

"Have a heart, Lootenant. I got a chance to try for my wings at Issoudon," Casey pleaded. "Look, I’ll do anythin’ you want."

"Awrighit," Phineas said. "You will find somethin’ wrong with a Spad in about two hours. You will wheel it out and poke into it. You will lend me a pair of them clothopppers you wear. You have the prop turned in, and don’t forget. I am desperate, Casey! I will stop at nothing. I promise to throw you these crooked dice just as I take-off."

"It’s a deal," Casey groaned. "Oh, (Continued on page 74)
WAR PLANES OF THE AXIS

A condensation of the most recent book by F.A.'s editor, a companion volume to "War Wings."
by David C. Cooke

A 243-page book, "War Planes of the Axis" contains 50,000 words and 172 photographs.

Right: Now obsolete, the Japanese Kawasaki 88 is still used in China. The wing span is 49' 10" and the length is 36' 11".

THE GERMAN AIR FORCE

GERMANY'S AIR FORCE was not officially constituted until February 26, 1935. And while it was then composed of only a few formations consisting of units trained in secret and in a most elementary manner during the period of de-mobilization, it became in the span of just four short years a powerful instrument of attack—more powerful, in fact, than the combined strength of France, England, and Poland at the outbreak of the second World War.

This expansion of German airpower was not, however, undertaken in any haphazard fashion, utilizing any planes of any make or design. Rather, it was realized in a methodical and highly efficient fashion after the Luftwaffe was at last officially organized by Hitler on March 1, 1935.

While the German Air Force was in the formative state, it is true that civil aircraft were converted to military types, and the first war pilots were drawn from the Deutsche Luft Hansa airline company and from pilot and ex-pilot organizations whose members had been trained for transport flying by Luft Hansa or had been given regular refresher courses. At the same time, hundreds of sport and sailplane clubs, with memberships of several hundred thousand, formed a tremendous reservoir from which future air crews and ground personnel could be drawn. From this, then, it is apparent that the so-called "mushroom" growth of German airpower was not, as far as pilots were concerned, a military miracle but actually a well-planned scheme whereby flyers were trained to some extent for Luftwaffe duties. From this, then, it is apparent that the so-called "mushroom" growth of German airpower was not, as far as pilots were concerned, a military miracle but actually a well-planned scheme whereby flyers were trained to some extent for Luftwaffe duties. From this, then, it is apparent that the so-called "mushroom" growth of German airpower was not, as far as pilots were concerned, a military miracle but actually a well-planned scheme whereby flyers were trained to some extent for Luftwaffe duties.

By the same token, the aircraft situation is by no means a miracle as far as numbers are concerned. While this country was building a possible 53 machines of a certain design, the German experimental models were given thorough testing and, if found suitable, their designs were "locked." The ships were then put into production on a mass scale, with several factories in some cases building the same type.

Because of the Nazi conception of state government, Field-Marshall Hermann Goering had an almost free hand in developing and expanding the German Air Force. Huge sums of money were expended, completely without interference, for the mighty air armada that had been envisioned. Therein is probably the main reason for the amazing growth of the Luftwaffe into the most powerful air arm the world has ever seen. Indeed, when Churchill said, "People of England, think of the forces that lie behind Germany," he was thinking of the Air Force.

The new planes were introduced in the Battle of France is well known by all who have followed newspaper accounts of the war. Aircraft were sent in droves to bomb, strafe, and total airpower, into combat against some 800 Polish machines. With perfect cooperation between the Luftwaffe and other units of the Wehrmacht, Germany was able to dominate Poland in four weeks. Dive-bombing was specialized to a greater degree than before, and it was discovered that attacks against fleeing civilians were highly effective.

The part German aviation played in the Battle of France is well known by all who have followed newspaper accounts of the war. Aircraft were sent in droves to bomb, strafe, and
destroy all military objectives, even though they left the majority of villages and towns untouched. And it is usually said that airpower was a major factor in the defeat of France.

As even Prime Minister Winston Churchill admitted, the biggest mistake that Hitler made in prosecuting a final end to the war was the lapse of time between the fall of France and the aerial offensive against England, for the first large-scale attacks against Britain were not made for nearly two months after the defeat of France. In that period, after the evacuation at Dunkirk, the British had reorganized their beaten forces and were thus able to offer effective resistance. Too, it is admitted by the British that, had the Nazi attacks continued, despite heavy losses, the Germans would have been able to beat the English to their knees because of the overwhelming quantity of aircraft at the disposal of the Luftwaffe. Such, however, was not the case, and the British were able, through American help, to reequip their almost-depleted Royal Air Force and turn defense into offense. Further, the British strength grew to such an extent that they were able to ship 9,000 military airplanes abroad in 1941.

The German Luftwaffe, at this writing, is made up of some 1,500,000 men, and, according to T. P. Wright of the War Production Board, more than 40,000 airplanes. (In a German-language short-wave radio broadcast of recent date, the Nazis stated that they have more than 60,000 airplanes in service and that new machines are being built at the rate of 2,500 per week. While this production rate may sound too incredibly high to be plausible, it must be remembered that even at the beginning of the war German factories were only able to have been turning out between 2,000 and 2,500 planes per month. With factories now operating in all occupied countries, it seems logical, if this earlier figure was correct, that production could have been stepped-up to 2,500 machines per week. Germany has been geared for war production much longer than the United States, and this country’s plan calls for 60,000 planes in 1942 and 125,000 in 1943, meaning a ship every eight minutes during 1942 and one every four minutes during 1943. If we are able to do this, it is entirely possible and even probable that the Germans can complete a plane every four minutes to make the 2,500-per-week figure a reality. Also remember that at the end of the last war Germany turned over to the Allies approximately 16,000 aircraft and was building at the rate of 2,100 per month. And that was before the days of prefabrication, mass production, or machine-made parts.)

In most countries aluminum and aluminum alloys are used to a great extent in the fabrication of airplanes, but in Germany that metal is very scarce. Because of this fact, many people could not understand how the Nazis were and are able to build so many airplanes. The answer is magnesium. While metallurgists in other countries had been experimenting with magnesium, but only sparingly because of its highly corrosive properties, the Germans developed a magnesium alloy that was highly successful for aircraft use. Magnesium salts are plentiful in Germany, and, under the German system, their utilization is very simple. This metal is only about two-thirds the weight of aluminum, so it was only logical that the Germans turned to its use for aircraft production, where weight is a premium. After France was defeated, of course, that country’s aluminum deposits were exploited by the conquerors, because magnesium has its drawbacks and is not as adaptable as aluminum for many installations.

Finally, another secret of the astounding German successes in operations against France and other countries is the first law of military strategy: decentralization. There are more than 1,000 military air fields and landing areas within the boundaries of pre-war Germany alone, and this figure has been greatly increased by existing or newly built fields in occupied countries, especially in Holland, Belgium, Denmark, France, Norway, and Poland. Squadrons change their bases frequently in order to make enemy reconnaissance and attack more difficult. Because of this, it is not surprising that many of the German pilots in England were found to be carrying suitcases; they had received orders to land at new bases instead of returning to the old ones.

Under no circumstances should we in this country underestimate the strength of the German Air Force or the ability of Nazi pilots. While it is true that the Germans lost very heavily in operations against Britain, that was only because they were on the offensive. Now that the Royal Air Force has taken to offensive missions over Germany, the list of English casualties has been almost double the losses of the defending Germans, as revealed by British Air Ministry figures. Combat records prove that German men and machines are good, and we must constantly remember that now that we are in this war to the end.

The Italian AIR Force

Some observers have estimated that the total air strength of the Regia Aeronautica at the beginning of the war was approximately 4,500, and still others have put the figure as high as 10,000. It is apparent from events that have occurred since that time, however, that the Italians had no more than pos-
sibly 3,500 aircraft, of which only about 900 to 1,000 were first-line combat types.

But even though the Italian airpower proved under the test of action to be almost nonexistent—or ineffective, in any event—the threat of that airpower in 1935 won for Signor Mussolini the first victory over the heretofore unchallenged British navy when the English tried to frighten Il Duce out of his Ethiopian policy with the greatest concentration of seapower since the first World War. In reference to this international chess game, Maj.-Gen. James E. Fechet in 1938 wrote the following: "Italy began to move into Ethiopia. England disapproved. First she threatened, then she started the parade of her fleet into the Mediterranean, an old trick which had worked so well so often. The mistress of the seas had for generations a magic wand which she could wave at any peace table. She could arrange a parade of her proud fleet past the window where the diplomats sat at council at the psychological moment, and she could be sure that things would be decided her way.

"So, when Mussolini proved recalcitrant, England decided to give him the old medicine: she steamed up with the water wagons and rowed them down past Gibraltar on a leisurely cruise toward Malta and the Eastern end of the Mediterranean, with serene confidence that soon all would be well, truant Italy would be properly impressed.

"But Mussolini had a counter trick. He paraded, too. He ordered out his submarines, light torpedo sleds, and bombing planes to pass in review. What was the result of these competing parades on the same street on the same afternoon?

"England decided instantly that the cruising was much better in the Western end of the Mediterranean. The water seemed much smoother up Alexandria way.

"Try this experiment. Take the range of an Italian bombing plane as the length of a piece of string; put one end of this string down on a map at a point indicating the westernmost Italian airrome; with that string as a radius, strike off an arc across the Mediterranean. Now you will know where the British fleet went—just outside that circle."

"But why were the British so dreadfully defeated in this bloodless battle? Why didn't they steam right up the Mediterranean and blast the Italian forces to bits? The answer is, largely, airpower.

The English, apparently, had not correctly estimated the importance of the Italian Air Force. Many British officers still thought of war in terms of infantry divisions, tanks, machine guns, and seapower. But then, suddenly, the realization dawned upon them that there was still another aspect to be considered—airpower. And that threat of $40,000 worth of airplanes against a $60,000,000 surface vessel sent the English fleet scurrying to harbor for protection.

When the British made known their plan to bluff the Italians into submission, it is reported that Mussolini ordered his Air Force chiefs to call for 70 volunteers to pilot an equal number of bombing planes, each to be loaded to capacity with high explosives. The Italian Air Force commanders assigned each of the 70 chosen pilots—70 are said to have volunteered, incidentally—to a particular English battle vessel. Each flyer was to stand his bomber on its nose, dive from 25,000 feet, and crash squarely down the smokestack of a British battleship. This group later became known as the Desperata Squadrons, and is still in existence.

The true story of the Ethiopian campaign was never actually told outside of the council rooms of the Italian Air Ministry, but it has been learned that there was plenty wrong with the sky service as a military organization. Although it was adequate to bomb helpless tribemen and run supplies across Ethiopia, this experience did not prove that the same machines and men could stand up against air fighters with equal training and equipment.

It was in Spain, not Ethiopia, that the Italian Air Force learned its real lesson. The fighter planes did not prove satisfactory; the bombers, on the other hand, were splendid, but they did not have real bomb sights. What was more, the Italian Air Service was let down by its engineers, although the planes themselves were excellent and the training the crews received was as good as that offered elsewhere. But because of this early power plant difficulty, today many of the newer Italian aircraft are fitted with engines of foreign design.

A study of the Italian Air Force discloses that it was not designed for home defense as much as territorial expansion. And because the Alps in the north form a natural barrier against invasion by land there were in service virtually as many seaplanes and flying boats as landplanes.

The general structure of the Italian Air Force is interesting. The elementary tactical unit is the squadron. Two or more squadrons, depending upon their location and duties, make up a Wing. There are two or more Wings to a Group and two or more Groups to an Aerial Brigade. Next come the Aerial Divisions, which are composed of two Brigades, and, finally, the Air Fleet, which is
composed of two or more Aerial Divisions.

The squadrons of the Italian Air Service are classified as follows: Stormi da Caccia — Pursuit and Fighting; Stormi da Riconoscimento — Reconnaissance; Stormi da Bombardamento Diurno — Day Bombing; Stormi da Bombardamento Notturno — Night Bombing.

To compute the air strength of present-day Italy requires more than simple addition, for there are other important factors to consider. In the first place, it cannot be ignored that Mussolini is a great personal power in Italian aeronautics. He is a flying man himself — a real flying man who can personally take the controls of a modern bomber and fly it with more than average ability. The Italian air arm, too, is a unified and independent service and is entirely free of the Army or Navy.

Italy has no aircraft carriers of the flight-deck type—which is probably the main reason for England’s great success against the Italian fleet—but they do have the Giuseppe M iraglia, a seaplane carrier which accommodates about 20 aircraft. At the beginning of the war Italy had 19 cruisers and 10 battleships equipped with catapults. In addition, the submarine Ettore Fieramosca, a vessel of 1,788 tons, carried a folding-wing seaplane in a hangar aft of the conning tower.

At least half of the Regia Aeronautica is made up of seaplanes. It is estimated that about a third of the landplanes are fighters, with the balance of combat types being bombers. In all of Italy there are only 29 airfields open to civilian planes, and 15 of these are of a semi-military nature.

As to the number of pilots available for military service, estimates range from 10,000 to 20,000, with the former generally considered more accurate. At least 75 percent of all Italian military flyers are said to be on active duty.

THE JAPANESE AIR FORCE

DIFFERENT TACTICS certainly could not have been expected of Japan at the outbreak of hostilities. The Japanese army is patterned directly on the German system and uses fundamentally the same methods, because it was in the first place organized and schooled by German officers. The Japanese are known to be exceptionally good at following, but they have always been notoriously short on leadership in military endeavors. So their offensive against the totally unprepared American and British forces was directly in keeping with the policies advocated by the senior Axis partner in their blitzkrieg tactics, even to striking on Sunday.

Japan is often called the “Volcanic Isle.” Geological characteristics aside, this is true not only because the country can literally “erupt” with war enthusiasm, but also because the island Empire, if attacked effectually, would in some sections literally burn to the ground because of the highly inflammable materials used for construction—that is, paper and wood. The relative smallness of the islands, the density of population, and the concentration of war factories within range of heavy bombers operating from Wake and Guam leave the nerve centers of the Mikado’s military productive capacity open to attack. This is undoubtedly the main reason for Japan’s early concentrated assaults upon Wake and Guam—to eliminate them as possible bases of operation for the U.S. Air Forces.

According to reliable information, Japan has some 16 army aviation regiments, of four squadrons each. This total of 64 squadrons is probably made up of one-third fighter and two-thirds bomber and bomber-reconnaissance types. Eight Army squadrons are located in the immediate vicinity of Tokyo, in addition to four navy squadrons equipped with seaplanes.

(Continued on page 72)
WAR-WORTH OF CAP

FOR YEARS private flyers have gathered in bull sessions and talked of their potential value to the country's military establishment in event of war. With the declaration of hostilities and the prospect of suspended civilian flying this talk swelled to a shout heard throughout the nation. Every civilian flyer believed his experience could in some way render a service, and he just as firmly believed that not to utilize America's private flyers was to disregard a definite advantage in the important field of aviation.

Now, of course, the opportunity has arrived in the form of the Civil Air Patrol; the private pilot has a real chance to help win the war and prove to the skeptics that the experience, ability, and courage of America's 156,000 civilian pilots and student pilots can make a real contribution to the country's safety and ultimate victory.

But willingness alone won't prove that private flying has "got the stuff." The Army and Navy will judge by their own standards whether or not civilian pilots can make a worthwhile contribution to the war effort. They will judge the Civil Air Patrol by its ability to perform its missions in an efficient, coordinated, intelligent, and military manner. The CAP's desire to serve must be matched by an ability to serve.

The success of the CAP is predicated upon the devotion of its members to the studying, drilling, and schooling necessary to function in a military manner. This means hours must be spent on basic infantry drill, instruction in first-aid, protection against gas, study of air navigation, radio transmission, and numerous other subjects which contribute to the value of the services of the group as a whole.

The successful accomplishment of flight-missions will be dependent upon the advance preparation acquired in ground schooling. And the manner in which those missions are carried out will be the basis upon which the military will judge the CAP. If they are performed in a precise, military manner they will lead to more numerous and more important assignments. But if they reflect the haphazard, hit-or-miss flying which many Army officers associate with private aviation, it is entirely possible that the Civil Air Patrol will be relegated to the background insofar as its use for military or civilian emergency missions is concerned.

It up to the private flyers. The opportunity to prove themselves is at hand. It means study and hard work to do a good job. Civilian aviation can do it only so far as each individual is willing to do his part and make the sacrifices in time and effort to acquire the necessary ability.

CPT PLAN ENLARGED

ACCORDING to the Civil Aeronautics Journal, the entire training facilities of the CAA will be devoted to the war program, under a plan worked out in cooperation with the Army Air Forces. First priority in CAA training will now go to students who can meet the requirements of the Army Air Corps for appointments as Aviation Cadets and who are members of the Air Corps Section of the Enlisted Reserve.

All further flight training facilities of the CAA will be limited to students who, while unable to meet the requirements for appointment as Aviation Cadets, are qualified to train for CAA flying instructors' licenses. These must agree in writing to contribute their future effort to a field of aeronautics adapted to serve the national interest.

As part of the new plan, the facilities of the CAA will be greatly expanded. The present capacity of 26,000 students per year will be raised to 45,000. In addition, training will be provided for ground technicians—a new activity for the CAA. It is planned to provide this course for about 31,000 students annually. Applicants for training as ground technicians must be able to meet the requirements for entrance into the Air Corps Technical Schools and must be members of the Air Corps Section of the Enlisted Reserve.

The Civilian Pilot Training Program is being carried out at about 580 college centers and 235 non-college centers. Each center consists of a college or responsible civic body which conducts the ground school, and a nearby commercial flying school which conducts the ground school and are under Government contract and supervision and give controlled courses designed by the Civil Aeronautics Authority.

In 2 1/2 years the CAA program has taught 70,000 young Americans how to fly. To meet the needs of the armed services, it is bringing some 4,000 of these up to instructor and commercial pilot rating this fiscal year. The CAA has also given refresher courses which brought more than 5,000 flyers up to standard as instructors. Most of these men are now teaching for the Army.

About 15,000 of the CAA trainees have joined the Army and Naval air services, while 9,000 others are in other branches of the armed forces. In recent months the Army and Navy have been getting one-third of their Flying Cadets from CAA ranks. Army records show that only 11.8 per cent of Cadets with CAA background fail in the Army primary stage, whereas 43.4 per cent of other Cadets are "washed out."
NEW CAP COMMANDER

EARLE L. JOHNSON, one of the country's most outstanding leaders in civil aviation and executive officer of CAP for the last five months, has been named National Commander by James M. Landis, Director of the Office of Civilian Defense. Mr. Johnson succeeds Maj.-Gen. John F. Curry, who was called back to active duty with the Army Air Forces as Commanding General of the Fourth District, Air Force Technical Training Command, with headquarters at Denver, Colo.

Prior to the organization of the CAP last December, Mr. Johnson organized Ohio pilots preparatory to national mobilization. With the organization of the CAP, he was named Wing Commander. His home State is now second only to New York in the total number of Patrol enlistments. Shortly after the first of this year, Mr. Johnson was called to Washington, D. C., to assume the duties of executive officer.

Commenting on the change in leadership, Director Landis said, "The Office of Civilian Defense has been fortunate in having the leadership of so fine an officer as General Curry during the organization period. More than 37,000 citizens, 80 per cent of whom are civilian pilots, already have enlisted to fly their own or rented planes on a wide variety of assignments, primarily planned to relieve military planes and airmen for other duties. Now organized with a Wing Commander in every State, the CAP has proved itself a hard-hitting and effective organization, quick to carry out the missions which the Army and civilian defense units have entrusted to it."

AVIATION IN PUBLIC SCHOOLS

TO AID THE CAA program of training pilots in colleges and universities, the United States Office of Education and the CAA are joining forces to carry aviation into the elementary and high schools of the nation. The Army and Navy, through their respective Assistant Secretaries for Air, Robert Lovett and Artemus L. Gates, will work with the two agencies to form policies and draft plans of study.

Groundwork for the program was laid at a two-day meeting, March 24 and 25, at Newark, N. J., when educational and aviation leaders met with representatives of the Office of Education and CAA. Losing no time, the "emphasis-on-aviation" educational plan will be launched in many schools at the coming Summer session; others will follow suit next Fall.

A series of documents is now being prepared to acquaint educators with the importance of aviation in war and post-war eras. Basics of flying are outlined in an attempt to show how aviation material may be woven into existing curricula. Emphasis will be placed, starting in about the fifth grade, on model airplane building in crafts and manual arts classes. The Navy's project to secure 500,000 mod-
War Flyers in the Headlines

BEST BY TEST. Slow, weak on fire-power, hard to service—those are some of the reports made by the United Nations concerning American planes before we ourselves became engaged in the conflict. Now, however, Yank flyers have definitely proved, once and for all that our war craft are not second-line. And as to servicing, it depends upon the ground crew and their mechanical knowledge.

By the same token, American flyers have established the fact that they can fly—and fight—with the best. Remember Wake, Hawaii, the Philippines, the Strait of Macassar, Australia, China. In those territories, plus many others, U.S. airmen have hammered at the Japs harder than any other flyers. They have not only hammered, but they have stabbed and sliced and done literally cut the Nip forces to pieces. The little brown men continue to advance, true, but only because of overwhelming numerical superiority; at that, however, they plod forward only by sacrificing more than their powerful war machine can absorb. They are men like you and me—or they are at the command of fast fighting ships and have machine guns and the means to kill. Following are recounted some of the exploits of these men who are swarming and bleeding and dying to defeat the Axis aerial forces.

Lieut. Edward O'Hare

On patrol over an aircraft carrier with another plane, which had to go down because of difficulty with its guns, O'Hare was left alone to attack nine approaching twin-engine Jap bombers.

The enemy ships were flying straight for the carrier, apparently with orders to get it at all costs, when O'Hare contacted them. He quickly dropped from above and shot two Jap jobs out of the fight. They burst into flames as they fell toward the sea.

In Lieutenant O'Hare's own words: "Actually, I figured there wasn't much to do except to shoot at them. I would go for one, let him have it, then pull out quick so that the exploding, burning plane would not fall on top of me. Then I'd go for the next one like the first!"

O'Hare shot down five of the nine bombers and damaged one or two of the others. "The last Jap I went after," he related, "I could have downed except my guns stopped after ten rounds when I ran out of ammunition. My whole action took only three or four minutes. They tell me there were sometimes three falling planes in the air at once."

The lieutenant admitted that he was worried about the planes that got through. But by that time effective action had been taken. O'Hare was at the carrier and had chased the Japs away. Although bombs dropped within 50 yards of the vessel, they did no damage.

Late in May, O'Hare was ordered to report to the White House, in Washington, D.C. There, President Roosevelt told him that for "one of the most daring, if not the most daring, single action in the history of combat aviation," he was receiving the nation's highest military award, the Congressional Medal of Honor. O'Hare's bride of seven months placed their infant on his lap. In added recognition, he was promoted to the rank of lieutenant commander.

Lieut.-Comdr. John S. Thach

On February 20, while operating from the same aircraft carrier to which O'Hare was attached, Commander Thach saw a huge Jap patrol bomber. He immediately reported to the carrier, and then lost the bomber in the clouds.

Later, Thach again located the Jap machine and followed it through the rain and out into clear weather. When he was a mile out into the blue, the Navy fighter attacked. After two dives, the Jap's upper wing burst into flames. The ship nosed over and its jettisoned bombs crashed into the water with a huge explosion. The entire crew of the enemy craft was killed.

On the way back to the carrier, Thach intercepted another enemy at 6,000 feet and sent it crashing.

Later in the day, Thach's flight assisted in an attack on nine Japanese planes, "beautiful, fast, twin-engined jobs looking like B-26's," according to the commander. In seven to ten minutes of fighting, all the Jap planes were driven away and most of them were destroyed. No bombs hit the water even close to the carrier.

Maj.-Gen. Lewis H. Brereton

The pilot of General Brereton's flagship, Maj. Cecil Coombs, was checking the bombardier's calculations and had turned the controls over to the Gunner. A Japanese cruiser was spotted off the Andaman Islands. The big bomber roared in and scored a direct hit, setting the warship afire. The attack also resulted in damage to a troopship and possible damage to two other transports.

General Brereton said in his own account of the raid that the bombers did not catch the Japanese by surprise. They had an excellent spotting system in the Andamans and the American bombers obviously were detected as soon as they reached the northernmost tip of the islands. Japanese cruisers at Port Blair catapulted fighter planes into the air, but the interception effort resulted in only a few harmless bullet holes through one Fortress.

The Yank bombers continued straight on their course, Brereton said, apparently losing the Japanese fighters. The only subsequent opposition was from anti-aircraft guns aboard the ships under attack.

Lieut. Clarence Sanford

Chasing Japanese planes over the Pacific, Sanford's fighter ran out of fuel and he had to bail out. He landed in the water three miles from a small island and stripped off his clothes and swam ashore.

He collapsed from exhaustion when he reached the shore and was aroused some time later by three aborigines, one of whom held a spear to his chest and demanded: "You Jap?" The lieutenant said he was about to be im-paled, when the native spied a crucifix about his neck and exclaimed, "Jesus number one man!"

The natives then led the nude flyer 25 miles afoot to the Bremer Island mission, and a pearl lugger brought him back to Australia.

Capt. Edward C. Teats

Awarded the Distinguished Flying Cross, Captain Teats was one of four Army officers cited for flying skill in completing a bombing attack on Japanese concentrations in Lingayen Gulf off Luzon. The mission kept them out 32 hours without rest and in the air for 13 continuous hours.

Staff Sgt. Joseph L. Lockhard

For voluntarily remaining on duty in charge of an anti-aircraft detector on the island of Oahu, Dec. 7, and detecting the approach of unidentified aircraft, which proved to be Japanese nearing Pearl Harbor, Sergeant Lockhard was awarded the Distinguished Service Cross. He detected the planes at 7:20 A.M. approximately 132 miles off Oahu. After re-checking the distance and azimuth, he reported to the duty officer and furnished him with complete particulars of the flight paths.

Subsequent investigations have proved conclusively that the planes reported by Sergeant Lockhard were the large Japanese air force that attacked Oahu at approximately 7:55 A.M. The service of Lockhard was also noted in the report of the Board investigating the Pearl Harbor attack.

Sergeant Lockhard was promoted from a private in recognition of his services and is now attending an officer's training school in the United States.
JOIN THE FLYING ACES CLUB

Honorary Members
President and Mrs. Franklin D. Roosevelt ex-Vice Pres. John Manh Garver
Casey Jones
Walt Disney
Walt Disney
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Colonel W. A. Bishop
Col. Suren
Major G. A. Vaughn, Jr.
Major von Schleich
Willy Coppens
Liet. Col. Pinard
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Capt. B. Bishop
Zack Meyers
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Colonel Thomas T. Turner
Joeseph Volpe
Charles W. A. Scott
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Richard G. DeForest
Donald W. Douglas
Maj. A. W. Stevens
Major C. C. Hendley
Capt. O. A. Anderson
Clarence D. Chamberlain
Major Fred Lord
Mrs. Charles G. Dayles
Liet.-Col. Theodore Roosevelt

Advance Aviation

To advance the cause of aviation, over 50,000 men and women, boys and girls, have banded together to form the FLYING ACES CLUB. It is the easiest club in the world to join. Just clip the membership coupon, fill out, and mail it to GHQ with a stamped, self-addressed envelope. Your official card will then be forwarded to you. After joining, you can quickly win promotion and the right to wear the various insignia of the Club.

In the FLYING ACES CLUB there are two kinds of local organizations, known respectively as Squadrons and Flights. A Squadron must have eighteen members, including its leader. A Flight must have a total of six. You can start either of these groups in your own community by enrolling your friends in the Club, then applying for an official charter as detailed in the column at the left. Each member must hold an F.A.C. card.

Award and the Aces' Escadrille

After the membership card, and Cadet and Pilot's wings, comes the Ace's Star. This is awarded for enrolling five new members, using, of course, a separate coupon for each. As an Ace, you are then eligible for membership in the FLYING ACES ESCADRILLE. Then you may win truly handsome awards. Among these are the Distinguished Service Medal and the Medal of Honor, two of the finest decorations that have ever been designed.

Any member who has reached the rank of Ace is eligible for membership in the FLYING ACES ESCADRILLE, an advanced organization which replaces the old G-2 unit and opens the way for participation in a definite program contributing to the forward movement of aviation.

To enroll, an Ace must apply direct to Escadrille Headquarters, giving him his age, address, rank, and highest award already won in the Club, and enclosing a stamped, addressed return envelope. If he is approved for membership, his instructions will be forwarded. Membership in the Escadrille is limited to American and Canadian members only, at present.

Keepers of the Log

In order to keep in touch with GHQ, every squadron should appoint a member with a facility for writing as Keeper of the Log. It shall be the duty of the Keeper of the Log to send in regular reports of interesting doings of his squadron. This is an important job, because it is only by circulating squadron reports that life can be given to the Flying Acers Club News.

Photographs, too, are an important consideration for the Keeper of the Log. Either the Keeper himself, or any other member with a camera, should keep a photographic record of the squadron's activities, for reference purposes, to show prospective new members, and to allow a selection of pictures to be sent to GHQ for reproduction in our monthly GHQ News pages.

The cost of film, prints, etc., would be a legitimate charge against the squadron's own treasury, if it could be covered by members' contributions. A number of flights and squadrons, incidentally, send no prints which have been taken, and completely developed and printed by photo-fan members of the outfit.

Correspondence

In all correspondence with GHQ where a reply is desired, enclose a signed, self-addressed return envelope with your letter. GHQ receives thousands of letters weekly, and cannot answer those who do not heed this rule.

Distinguished Service Medal and Citation

The Distinguished Service Medal is a monthly award for the best photograph of a model plane built from plans appearing in the FLYING ACES MAGAZINE. If in the opinion of the judges, Wing Commander, Model Editor, and the National Aeronautic places high, it is also entitled to a D.S.M. In the event of a tie, to win a D.S.M. for a second time, he is awarded a PROPELLER which constitutes a citation in recognition thereof. The Provenience is designed with two prongs which enable it to be fastened securely to the ribbon of the D.S.M.

July Membership Application

I, the undersigned, hereby make application for membership in the FLYING ACES CLUB. I agree to live up to its rules and regulations; to foster the growth and development of aviation; and cooperate with all other members in the work of spreading interest in aviation and in flying for national defense and transportation. I will also be proud to wear the membership, and do my best to win the honors that the Flying Aces Club offers.

My name is

Age

Residence

City

State

Do you build airplane models?

Mail this application, envelope, self-addressed, stamped envelope. Canadian and overseas readers should apply as in the United States.

DISTINGUISHED SERVICE MEDAL

FLYING ACES CLUB, 67 W. 44th St., New York
FOR THE BENEFIT of new club members who do not quite understand the various ranks, privileges, and other matters concerning this world-wide organization, we will devote as much space as possible this trip to settle a little unfinished business. As you know, much mail arrives each day for the FLYING ACES CLUB and your N.A. is forced to keep from answering some of that mail because they do not contain a stamped self-addressed envelope. What space can be given to reply to those letters is done through these pages, but it is impossible to get around to all of them.

First off, we'll start with a query from John Breen, Jr., of Holliu, N.Y. John asks whether it is possible to obtain the Ace's Star by enrolling five new members who happen to be members of his family. The answer to this is that relationship to the enroller has no bearing on the subject. If a member can get five new enrollees and submits an application for each one, he is entitled to the award of the Ace's Star.

Francis Frye, of Lansing, Mich., wants to know if it is possible to win the Distinguished Service Medal or Medal of Honor right after receiving the membership card.

As soon as one receives his membership card he is entitled to the various awards offered by this Club. The time element will take care of itself.

Paul McDermott of Flushing, N.Y., wants to know how to go about getting a distinguished person to become an Honorary Member of the FLYING ACES CLUB.

The simplest way as well as the only way to go about this procedure is to write directly to the person and ask him whether or not they would grant you the honor of accepting an offer on behalf of the F.A.C. to join the Honorary Membership ranks. If that person accepts, will he please reply directly to you.

When the asker receives a reply accepting Honorary Membership, he is to forward that letter as well as a self-addressed stamped envelope direct to the National Adjutant, who will, in turn, list the new member's name on the ranks and return the original letter to the asker. For enlisting an Honorary Member, the asker's name will be filed away and awarded 250 points. When he achieves a total number of points amounting to 750 he is awarded a Distinguished Service Medal.

"Air Youth Today—Air Leaders of Tomorrow" is the caption of this photograph supplied by the Model Industry Association. This is one of the most famous striking posters to be used throughout the country in stimulating air interest.

Other ways to earn points are given in detail on a memorandum sent out by Escadrille Headquarters.

In short, after a new member receives his membership card, he sends in the required amount of coupons for his Cadet wings. After this, he sends for the Pilot wings. In order to earn the Ace's Star he submits the names of five new members each one on an individual application coupon. Upon receipt of the Star, the Clubster may apply in writing for membership in the Escadrille. His application is then taken up by the General Staff, and if accepted, the Clubster is notified by letter in which he is told how he may earn additional credits. Membership in the Escadrille is limited to American and Canadian members only, at present.

Jerry Troth, of Toronto, Canada, wants to know if a person can obtain his membership card, Cadet and Pilot wings all at once. The answer to this is that while it may be done, the unwritten rules of this Organization is that an applicant apply for his membership card first. After saving the required number of coupons for Cadet Wings he submits them with 10 cents. After Cadet, the next badge of
recognition is Pilot Wings which may be had for five coupons and 10 cents. Bear in mind, however, that with all requests for Wings, enclose a self-addressed stamped envelope.

Persons desiring to become affiliated with the FLYING ACES CLUB are requested to read the page titled “Join the Flying Aces Club” which appears in every issue of this magazine. In it you will find full instructions, and if followed, one will receive more prompt attention to his queries.

THE WINNER of this Month’s Distinguished Service Medal (that is the first choice of the judges) is a lad who failed to reveal his identity. Since he has been duly selected as the winner, he can claim his medal if he will be so kind as to write to the National Adjudant personally, and reveal some information on the construction of the model. We do have a bit of information on the Loening model, and by comparing, we can award the proper person.

Our second choice for this month goes to Augustus W. Sprinler of Stratford Avenue, Bridgeport, Conn. His excellently built craft was made from plans appearing in the January 1942 issue of F.A.

Congratulations Augustus. Your medal is being placed in the mail this evening, and by the time you read this announcement, your award should reach you, too.

As for the rest of you envious Clusters, you ought to know exactly what to do about getting in on this monthly handout. All you have to do is build any type of model whose plans and instructions appeared in the worthy pages of this magazine, and then take several good snapshots of the entry and send to D.S.M. Contest Committee, care of this magazine. The address is 67 West 44th Street, New York City. We’ll do the rest.

The judges, as you know are Dave Cooke, Wing Commander; Jesse Da-vidson, Model Editor; and last but not least, your ancient and honorable National Adjudant. Harrumph! When the proper time of the month rolls around, “We Three” haul out the

Aside to Stephen Tarbox, Collins City, N.Y.: The photo entry for D.S.M. consideration of your Russian 1-16 “Moscow” solid scale shows that the model itself is beautifully made. The photographic quality of the entry itself is poor. If you will send in better shots, we don’t mind telling you that your model stands an excellent chance to be picked as a winner. So why not try again?

David Parker, of No. 1 Cliff Street, Newcastle, N.S.W., Australia, finds it very difficult to get copies of FLYING ACES. The war, most naturally, has prevented us from making shipments to that far-off country and splendid fighting ally of ours. Dave would like to correspond with American aero enthusiasts, and would certainly appreciate anyone sending him more or less recent copies of the magazine.

Herbert L. Green of 7214 McGee Road, Merriam, Kansas, would like to contact young men in his vicinity in order to establish a FLYING ACES chapter. Through these columns, Herb has struck up a very close pen-pal friendship with Bob Zollo of 425 Ohio Street, Lawrence, Kansas. Herb is one of the many hundreds of enthusiasts who have written to your N.A. telling him that the presentation of the World War Three-View series is one of the best features of the magazine.

WE WERE RATHER short on space in last month’s column and so we couldn’t go into very much detail concerning that photograph of Freddie Lord, a favorite with the members of the FLYING ACES CLUB. Anyway, it sure does us good to see Fred back in uniform. Fred, as most of you know, is with the Air Transport Auxiliary Service of the Royal Air Force. For the same reason that membership regulations ground many a good pilot out of active combat because of age, so has been Freddie.

(Continued on page 79)
All Questions Answered

John Stedman, Bronx, N.Y.:—Sorry, but that was a typographical error in the June issue. Copies of the September, 1931, number are no longer available, nor any others of that early date; the year should have been 1941 instead of 1931. Your 2c has been returned, along with a letter explaining this error.

Bill Dales, Sudbury, Can.:—Frankly, I don't know whether the Republic P-47B will dive at 680 m.p.h., and I don't see how it makes any difference what the diving speed is. Even on dive-bombers, they have found it necessary to install diving brakes to slow the diving speed, and in some cases even reversible pitch propellers. The Kittyschmitt Me 109F2 has been released, but the Messerschmitt Me, 109F2 is rated at 375 m.p.h. at 22,000 feet.

Allen Hollinger, Butler, Ind.:—Gasoline does not flow from a carburetor to the engine. The purpose of a carburetor is to mix fuel with air. Some engines, of course, use direct injection instead of carburetion. Yes, Brown racers were used in the movie "International Squadron."

James Narey, Cleveland, Ohio:—Hollywood's average aviation picture is aeronautically poor probably because they are making pictures for the general public and because actual foreign-type warplanes are not available for picture purposes. To the aviation fan, this seems inexcusable, of course; but the average movie-goer doesn't know the difference between a Ryan PT-20A and a Focke-Wulf Flw. 198.

Robert Brothers, Quincy, Mass.:—Sorry, but we cannot supply you with photographs used in F.A. Most of the pictures published are purchased from regular agencies, and we must keep them in our files for reference or future use. I suggest that you write the companies advertising with F.A. for pictures you may desire.

Ralph P. Willet, Holyoke, Mass.:—The only sponsor-type gas model I know of that would suit your needs is Peter Bowers' Duck. There is true that the plans for which appeared in our August, 1939 issue. While the plans do not actually show sponsors on the model, Peter Bowers later redesigned the "Duck" with sponsors. If your model must have sponsors, I suggest that you work from the original "Duck" plans and add the sponsors yourself.

Charles Lamor, New York City:—There are several stores in New York City that sell aviation books. For instance, we might mention Brentano's, Macy's, Scribner's, G.P. Putnam, and Gimbel's.

Jack Corcoran, Ronan, Mont.:—We published plans of an autogiro in our March, 1940, issue, which may be obtained from our Accounting Department for 20c. You state that the Fairy Battle is now used only for training purposes. It was found that the ship was far outranked by modern German machines, and therefore it was no longer suited to combat work. The Curtiss Tomahawk, according to British sources, has a top speed of 560 m.p.h. at 18,000 feet.

Billy J. McKelvey, Clearfield, Iowa:—Your plans for converting the Martin B-26 into a fighter seem quite sound, but don't you believe that the Air Forces or the Martin Corporation has never been mentioned. But if they deemed them necessary or even advisable? And since the changes have not been made, as far as we know, it is apparent that our Army is quite satisfied with the results of our present fighting types.

Robert Reilly, Newark, N.J.:—I don't quite understand your problem. You say that you would like to obtain directions and materials for building model airplanes featured in FLYING ACES. Well, every month we give complete instructions for every model featured, and the supplies may be obtained from numerous model supply stores in your city.

Don Kohlhagen, Kenosha, Wis.:—Copies of the May, 1939, and April, 1940, issues are still available, but the other issues are out of stock. Back issues may be purchased from our Accounting Department for 20c each.

Ralph Stark, Minneapolis, Minn.:—I have no idea what Minneapolis schools feature Air Corp preparatory students. I suggest that you contact the Army Air Forces, War Department, Washington, D.C., for this information.

Peter Grosz, 202 Shore Rd., Doug- las, N.J.:—Sorry, but I believe you have about the entire list of companies dealing in first World War photographs. You might contact the War Department, however; I believe they have a few pictures for sale. We have absolutely no idea what happened to the Airspeed fighter. It just seemed to fade away. You say you would like to get in touch with book collecting fans, Well, perhaps some of our readers will contact you.

Errata

Public Relations of the Royal Canadian Air Force has informed us that the combat life expectancy of aerial gunners was misstated in our article "18-Minute Men of the Air" which appeared in the March issue. This figure was obtained by the Editor of Flying Acors from accounts written by a columnist who is generally considered accurate, and does not reflect upon the author of the article.

THE END
A mutual love for model building and flying brought Marian Weidele and Leon Shulman together. They were married recently in New Jersey. Shulman was formerly director of the Kresge Model Club.

Sometimes photographs come to the Model Editor’s desk without identification, as did this one. However, we’re publishing it because it is one of the finest shots we’ve seen of a gas job taking-off.

**With the Model Builders**

Another unidentified shot of a modeler who undoubtedly will recognize himself. His Ohio-powered polyhedral-flyer is also a good soarer. Note the absence of main rudder.

Jimmy Noonan, of Milwaukee, Wis., compares his rubber-powered Stinson 105 flying scale with another modeler who built a craft of similar design. Both ships are fine flyers.

Chester Lanzo, of New York, and his sensational Puss-Moth flying scale. This rubber-powered Deltavilland was consistently a high-time winner in every contest entered.

Kenneth Fisher, New York modeler, with his combination power plane-glider. Timer action retracts and extends landing gear wheel. Note polyhedral tail. Fuselage is planked and nose cowling removable.

Bob Batchelor with his Class "C" Carl Goldberg-designed "Sailplane" to which he added a wheel fairing instead of retracting gear. Note rudder skids. Bob Batchelor says the plane is more stable.
THE SHAPES OF THINGS TO COME

New and improved engine installations, wing forms, and propeller designs developed for military types, will be important factors in achieving speed and efficiency in the world race for super excellence in aircraft.

by Seton David, Jr.

Editor's Note: These photographs and sketches present a few of the trends explored by American design. European trends parallel these in many instances as trends—the design of each nation differing in technical details. The details and the technical means by which they are achieved, form the secrets guarded religiously by each nation in the universal competition for aerial superiority.

If American taxpayers want to know how some of their hard-earned cash is used to keep 'em flying, the Army Air Corps' Material Division is willing to give you a pretty good idea. They've allowed John Q. Public to have a look-see at some of the hottest ideas on the griddle.

This griddle is called, among other things, the "Jules Verne" or "Buck Rogers" department. For in this "idea hatchery" one can get glimpses of new aircraft designs which resemble fish, fowl, and rockets—or something that has never been seen before. The glimpses one gets serve to show the coming trend of aircraft design—planes with swelled wings, planes with knife-like wings, torpedo shaped bodies controlled by small rudders on their wingtips—noiseless perhaps, but swift, striking, and more deadly.

Yes, this year has presented one of the world's strangest paradoxes. On one hand we have the whole automotive industry in the U.S.—not only the world's largest and still expanding under the pressure of war, swinging into mass production of another type of vehicle—the airplane. On the other hand we have the Air Corps' Material Division design engineers vying with the world's air laboratories and drafting rooms for the purpose of accomplishing the greatest aircraft advancement possible in a constantly changing picture.

Mass production and experimental design! Paradox indeed! The tendency to first "freeze" upon an approved type fighter or bomber, and then, second, to flout these designs for the purpose of obtaining results beyond anything in the existing picture, are foremost Air Forces' objectives.

The production of airplanes upon which our nation's factories are concentrating at the rate of turning out an ever-increasing number each year rank with the world's best. Not "frozen" models, they are constantly under the study of engineers and technical experts for the incorporation of improvements which are planned and arranged for far in advance, "sneaked in" so to speak, so as not to interrupt the steady flow of the production line.

Nevertheless the United States dare not rest upon such laurels. For locked in laboratories of all leading nations, sc. utilizing production processes, their own and their neighbors', are groups of scientists who look upon the most successful of current aircraft as already obsolescent. Sound aero engineers, the whole field of modern design is to them finger-tip...
In the "Snipe" the single engine is completely submerged in the fuselage behind the pilot and drives oppositely rotating twin propellers. Vision characteristics are unexcelled for a pursuit ship of this type. Below: Another example of unobstructed vision for the pilot is shown in the "Cunard" machine. Conventional planes have a small wheel at the tail and while two large ones are up front. This type calls for reverse style.

knowledge. Their job is to conceive and create from the apex of present design achievement, the airplanes which are to fly higher, faster, farther, or more effectively, one, two, or five years hence.

These designers, in order to protect their own nations from surprise attack in equipment on the part of other nations, let no design trends go uninvestigated. As with mass production, theirs also is a field of titanic competition.

In their search for the new and the superior they often deviate sharply from standard flying craft, producing designs resembling things as have never yet been seen over land or sea. Some of these radical flying shapes are studies of trends which may never appear in flight or be developed beyond the drawing board stages. However, the information gained from the exploration of such trends are invaluable.

In some few cases, an entire radical design is adopted and may seem quite commonplace by the time it is ready to be manufactured in production quantities. All serious studies, based not on flights of the imagination, as might be supposed, but on known facts of past and present design and performance, tempered to a nicety with a knowledge of the limits in which it is safe to venture future possibilities on past progress.

The agency which forms this guard of the future for the U.S. Army Air Forces is composed of a group of Air Corps officers and civilian engineers well abreast of writers on his subject.

Based upon known facts of past and present aircraft performance, of strength of materials, of aerodynamic factors and their influence upon performance, the airplane he designs,
no matter how strange a freak it appears to be, is never the product of invention or rarely of an individual idea. It is rather an orderly and logical development. Individuals contribute ideas, but the result will become a pooling of individual ideas, and a compromise between technical and tactical possibilities, before the airplane flies. The time of flight is usually gauged at from three to five years from the start, because it is known from experience that to get a completely new and radical design sufficiently perfected for flight production, it cannot be hoped for in a shorter period of time.

Development of a new design follows a rather interesting procedure. The Design Development Unit may conceive from its knowledge of latest engine, propeller, and aerodynamic development, a bomber, pursuit, or other military type with definitely improved characteristics over the best current article. The performance curves and reports completed, the design is submitted through engineering channels to an Air Corps Board composed of experienced members of the tactical squadrons of the Combat Command. These are pilots who look upon an airplane as a practical flying weapon for use under highly specialized fighting conditions.

Perhaps in presenting the new design the engineers will have ready, with the curves, drawings, and technical data, a painting of the finished craft as it will appear ready for flight. This idea borrowed from the auto industry aids busy chiefs in gaining an immediate conception of how the new plane will look and operate, saving thousands of words of description. The assistant, in fact, who at present prepares these paintings for the Air Corps, formerly performed similar work for the Chrysler Corporation.

A second method of design development is that occasioned by the issuance of a directive by the Air Corps Board for a certain type of plane based completely upon tactical demands of the flying forces. The directive will specify one or more characteristics considered essential, such as range, speed, altitude, fire power, etc., all well in advance of those of current aircraft.

Where the design engineers submit an idea for an advanced plane, the Air Corps Board considers it from the point of view of tactical advantages; where the Air Corps Board issues a directive to the Design Unit for an advanced plane having definite high speed. The design engineers know, founding their knowledge on the current stage of advancement and an allowable expectancy of improvement, the latter based upon meticulous calculations, whether or not the combination can be achieved. If not, one or the other element must be sacrificed to a certain extent, the sacrifice depending upon the tactical purpose or type of weapon for which the airplane is intended. Each type of airplane, however, has its own set of compromises which cannot be evaded in the face of hard technical facts.

To the designers it is the obtaining of desired characteristics which is important, not the form of structure in (Continued on page 79)
AIRACOBRA!

A hard hittin', hard shootin', cannon snortin' Bell P-39 is this month's presentation in our solid scale line.

by Harry Appel

Even as a scale model, the unpretentious Airacobra has a deadly look.

At this writing the Bell P-39 Airacobra is in action with both the British and Red Air Forces. Up to a certain height, the Airacobra is faster than either the Spitfire or the Hurricane, two of Britain's best fighting planes. In Russia, the Red pilots have used these planes to blast enemy tanks to smithereens.

In the U.S. the Airacobra has undergone some minor changes which have increased its speed and cruising range. Latest models are equipped with a bomb-shaped gas container slung beneath the landing gear. After the gas has been consumed the container can be dropped—or if the ship has been engaged in a dog fight, dropped to lessen weight and fire hazard.

Now in mass production, the Airacobra has been tested at speeds of 400 miles an hour at 15,000 feet—the level at which its engine gives maximum performance. A short time ago, however, a P-39 was tested with a 1,376 horsepower Allison and it hit 415 m.p.h. at 20,000 feet.

The P-39 packs a wallop as no single seater has ever packed before. It is equipped with either eight .303-caliber machine guns—or six guns .303 and two .50 guns plus a 37 mm cannon which fires through a hollow shaft protruding through the propeller spinner cap. The shell hurled through the cannon muzzle is about an inch and a half in diameter laden with high explosive—which is big enough to knock out of the sky with a single hit, any airplane ever flown. Another advantage in the Bell is that for an interceptor-fighter it carries more gasoline than most any other type planes—which in this case is 147 gallons or enough to take it 965 miles if not flown at full throttle.

Specifications of the Airacobra is as follows: Span, 34 feet; length, 29 feet, 9 inches; height, 9 feet 3 inches; wing area, 213 square feet; ceiling, 36,000 feet.

FUSELAGE AND TAIL SURFACES

In tracing the outlines of the fuselage in order to make stiff paper templates, do not include the propeller spinner cap, air scoop (D-D) or the vertical fin. The section where the wing fits to the body as shown by the dotted lines, is to be scooped out. The portion of the curved windshield may be made integral with the fuselage or left off and worked to shape with celluloid.

Trace the side view of the template onto a piece of medium-hard balsa and trim to shape including the scooped-out portion underneath. Plates 1 and 2. The top view is next to be traced. Complete by tapering the fuselage surfaces as shown. If the cockpit is to be a part of the solid body, the window outlines should be marked and painted light gray or aluminum. If celluloid is used, the structure will have to be made in sections, bent and held with model pins and held so that clear cement will fuse with the joining sections.

The propeller spinner is carved to shape and blades added as shown in the front view on Plate 2. A small dowel is cemented in the center of the spinner cap to simulate the muzzle of the cannon. Vertical fin and rudder is made in one piece and cemented to the body. Plastic wood or other fillinging material is applied around the joints and then sanded to look integral with the surfaces surrounding it. It is best to mark the hinge outlines on both sides of the rudder before mounting.

The stabilizer and elevators are made in one piece and streamlined as shown by the profile view on Plate 2. When completed, it is cut in half and cemented to each side of the vertical fin. Filleting material is applied and shaped in the same manner as was done on the fin. If the modeler prefers, it is best to assemble the whole tail unit first and then apply the fillinging material. The air scoop is fabricated from a piece of scrap balsa.

WING, LANDING GEAR, ASSEMBLY

The wing may be made in two methods. The first is shaping right and left panels individually, and the other is making the wing in one piece. The latter method was the one used on the model shown in the photographs above. Since the author finds this the easiest method, it is here described.

Obtain a medium-hard piece of balsa whose dimensions will accommodate front and top views of the wing. From the top view drawing on plate three, the modeler can make half a template of the left wing and then by turning it over, retrace the lines in order to get the full wing shape. Transfer the outlines to a stiff paper template, cut out, and then trace the shape onto the wing block.

The wing is carved in the usual fashion employing both a small block plane and knife and alternately, the use of sandpaper for smooth finishing. From the wing sections designated F-F and G-G, the modeler can make wing templates for true checking purposes. When the wing is complete, mark out the alleron and wing flap outlines as shown on the plans.

The shaded area on the wing plan drawing indicates the filleting surfaces which is worked out in the same manner as was done in the tail section. Since this is an important feature of the model it should be made very carefully. Of course, this is done after the wing is attached in place. The wing step (shown in a criss-cross (Continued on page 72)

In take-off position, the Army Bell P-39 is a slick job for any admirer.
TAYLORCRAFT L-57A
(FORMERLY O-57A)

ARMY AIR FORCES LIASON PLANE
Powered by Continental 4-cylinder 65 hp engine

Two-seat tandem arrangement
Sending and receiving radio equipment

MILT KAHN
Although the 180 degree turn is a simple maneuver, it must be executed flawlessly—especially when done in the vicinity of Randolph Field, Texas, where there may be more than three-hundred planes in the air at a time. Embryo pilots and instructors find these solid models, counterparts of the types used in basic training, very helpful.

Life at Randolph is rigorous and vigorous and there's no time for stalling—except, aeronautically speaking—in the air. So before roaring upstairs in their sleek 450 h.p. BT-9's the instructor, right, shows them each movement of the plane when they pull its nose up and hold it there until the ship just loses all lift and swooshes down again.

Most spectacular of aerial acrobatics is the loop. Control positions and pressures are explained before going aloft for the "real thing." On left, model plane in instructor's hand dives to gain speed, then stick is eased back to lift nose, full throttle and up into a climb, over on your back, ease up on throttle, into a dive, finally levelling off.

Power diving begins with "peeling off." Next to the loop a plane in a dive is a fascinating thing to watch. Contrary to popular opinion a plane in a dive does not have its engine wide open. If it did the propeller would be turning so fast it would act as a brake. Engines are cracked slightly and nose down position does the rest.

Enframed by the nose, prop, and wing of a BT job, three future pilots of Uncle Sam's aerial forces learn various aspects of flying technique from their flight instructor. Proper gliding angle preparatory to landing is being demonstrated. Who said models are only for kids?

The "pylon eight" is a series of precision banks and turns during which time the Redgling pilot keeps his eye on the point of reference. Strings attached to each model plane represent the sighting line while the chalk figure marks path flown. Instructor is in the center.

**MODEL MANEUVERS**

THE problem of graphically illustrating aerial maneuvers while on the ground always puzzled the flying instructors at Randolph Field, Texas, giant basic flight training school of the Army Air Forces, until a young lieutenant who got tired of wiggling his hands all around to make doodas get the point, pounced on the idea of using models.

From a model builder's viewpoint, the "objects" used to emphasize a maneuver have little in common with contest type solids.

Instructors find that when primary and basic training students go through the maneuvers with these solids first and understand the "idea" thoroughly, they can aloft and execute them with more precision than they could ordinarily by just talking about it. 

THE END
It's easy when done with model planes but the chandelier, a variation of a climbing turn requires constantly varying pressures on the stick and rudder. Right to left, chandelier starts from level flight, swoops down in a dive to gain speed, up into a 180 degree climbing turn, until the stalling point is almost reached, then slight rudder and forward stick to get nose down and continue in level flight.

The "lazy eight" maneuver is composed of a series of dives and zooms. Here you see the instructor on the left with his model plane starting into a dive, the first step of this maneuver. Second figure shows the nose of the plane passing through a point on the horizon as the ship races earthward. Then comes the recovery, a steep 180 degree climbing turn to its peak and down again through the point.

You can't pick up a newspaper these days without reading about dive bombing. This precise method of dropping destructive explosives, developed in the U.S. is a familiar art to Yank pilots. Students above hold models in line-up preparatory to hurtling down at an enemy battleship—the white thread marks the line of sighting.

To get the enemy off your tail the pilot resorts to a famous trick used in World War I days which was invented by the German ace, Immelmann. This maneuver also has a dual purpose and that is in getting the enemy off your tail you reverse the situation—you hope, and get on his tail with extra altitude. It's a fine art if you know how.

Cadet breath taker-awayer is the spin. The first spin to a cadet, perhaps more forcefully than any other maneuver, brings home to the embryo pilot that he is indeed a flyer, a thing apart from his benighted brother sworn to more peaceful pursuits. Think you can take it?

After getting visual instruction which saves much gasoline and vocal exercise, students climb into their aerial classrooms and proceed to show their instructor just how well they absorbed their ground lesson. If you have a model at home, why not try some maneuvering?

"Hangar flying" between flights aloft. . . . So, I pulled the nose up, kicked right rudder and did two turns of a spin," declares a Flying Cadet at Randolph Field, and he proceeds to illustrate the maneuver for the ediification of his classmates using a model for emphasis.
FROM R.O.G. TO AT-6

A few months ago this young man was building model planes. Today, a commissioned officer in the Army Air Corps, he is now instructing among others, former modelers in the fine art of flying.

Leon Jerome Friedman, Lieutenant, Air Corps, United States Army.

It's a long way from warping the wings of a stick model to adjusting the trim tabs of a military training plane, but these days anything can happen. Take the case of Leon J. Friedman, a young model builder, of New York City. Just a few short months ago it was impossible for me to walk down a certain street every morning without seeing "Lee" nonchalantly ambling along with some packages under his arm. He was an errand boy and while he did his daily chores conscientiously enough, his heart and mind were up in the clear blue.

I caught up with him one morning and he excitedly told me that he had taken his first flight lesson in a Cub. "It was easy as pie," he said, "nothing to it. My instructor thinks I've got what it takes."

"Did he find that out all in one lesson?" I asked.

"Guess so," Lee chirped. "Model building does a lot to make a fellow familiar with theory of flight and control movements of a plane, you know." I agreed with the lad, for it had been my experience, too.

When I spoke with Lee again several weeks later he proudly told me he had piled up the high time of three hours and to him landings were just ho-hum.

"If I think nothing hard about them," he would tell me. I wondered whether the kid was getting over-confident or whether he really had that stuff they call "instinct."

At one of the local gas model meets I found Lee bent over a stubborn Class B engine trying to coax it into life.

"How's the hot pilot coming along?" I asked.

"Had to give it up," he said without even looking up. "Running short of money, I decided to take the Air Corps preparatory exam at an uptown school."

A short time later Lee dropped in on me and modestly told me that he passed the school test with one of the highest ratings and also went through the Air Corps' cadet entrance exams with flying colors. He was now standing by awaiting ship-
ment orders. "Ma was a good sport about it. She signed a waiver because I was a bit too young for the minimum age," he added.

On the day Lee was to board a train out of Penn Station bound for a primary flight training school he looked me up to say so long.

"I wonder whether the few hours flying time I've had will stand me in good stead," he murmured. "I heard they're pretty tough on the primary boys. Washouts come fast and often."

"I dunno, keed," I said, "I have a hunch you'll come through—I hope."

Time passes quickly. The other day a neatly wrapped package arrived in the mail. I opened it and pulled out a photo of a handsome young lad in the uniform of a flying officer.

"Lee!"

There was a letter, too. Listen—"The thrill of becoming a U.S. Army pilot-officer—a dream I've had ever since I built my first model airplane—at last has become a reality."

"After about 30 weeks of intensive flight and ground training, I recently received the silver wings and gold bars of a second lieutenant in the Air Corps Reserve and am temporarily assigned to Brooks Field, Texas, where I was commissioned."

"On completion of the course at the Advanced Flying School here, I was named as one of the pilots to fly student observers on their training missions at this, the nation's only Advanced Observation Flying School. From here, the trained 'Eyes of the Army' are sent to tactical observation squadrons to patrol our coastlines or perform reconnaissance and other missions on the far-flung battle fronts."

"As you know my flight training

Learning the art of soldiering is among the many other things a flying cadet must know. This photograph of Cadet Friedman was taken at Randolph Field, Texas.

Dressed in flying togs, parachute, radio phones, and sun glasses, Pilot-officer Friedman steps into his fast trainer for a X-country flight.
began at Pine Bluff, Arkansas, where I received primary training in one of the best training ships in the world, the Fairchild PT-19A. After ten weeks of intensive work, during which time I had that once-in-a-lifetime thrill—my first solo—I was sent to Randolph Field—the ‘West Point of the Air.’ Here the mysteries of formation, instrument, and night flying were unravelled for me. Quite a thrill in itself was flying the North American BT-14—the first high-powered ship I ever flew.

"THE INSTRUCTION I received at Randolph Field laid the groundwork for my training at the Advanced Flying School, and it was here that I received the training most conducive to my future success in the Air Corps.

"Formation flying, as you know is an exact science. Following the signals of our leader, we cadets were taught to execute echelons, V-type, and other formations in almost perfect harmony and unison. Towards the end of our period of training, signals from a leader were dispensed with, and we found that we could follow his ship without losing or breaking formation.

"You have doubtless heard the expression, ‘on the beam.’ Well, that expression is more than just a phrase to me. It represents many hours of completely blind flying under the hood with an instructor or another student in the other cockpit, and countless times orienting myself, ‘bracketing the beam’ into the cone of silence, and effecting a let-down onto the landing field. I regard this to be the most valuable training I ever received in the Air Corps, for some day I may be forced to fly blind and depend on the instruments alone in order to make a safe landing at my home base."

(Continued on page 79)

FLIP THE "FLIPSTICK"

Some glider, we'll say—and so will you!

by Louis Bucalo

THERE isn’t much I can say that will fully describe the performance and beauty of the “Flipstick.” Use of polyhedral and high wing-low tail give this glider a flat glide and a quick pull-out from bad throws. This ship is solidly built. Do not fear a little extra weight because it is weight plus “comp” technique that gets the glider up. The design and adjustments keep it there. You can best be convinced by getting to work and proving the efficiency of the “Flipstick” to yourself.

The wing is made from balsa 3/16” by 3”. Use a grade ranging between soft and medium. Because the wing has four panels instead of two, it is imperative that very strong cement joints be made. Sand each panel to an accurate rib section, coat the butt end with cement and allow to dry.

After each panel is cemented to the adjacent one, four additional coats of cement are applied with a brush. Silk is then glued over the joints insuring strength as shown in the plans. Brushing the cement on forms a smooth, neat-looking skin. Each coat should extend 3/4” over each panel and should be permitted to dry before the next is applied. For a slick finish, apply four coats of clear dope, sanding after each is dry, with wet-or-dry sandpaper.

Warp in a slight wash-in on the right wing (increase of angle of attack near tip) and slight wash-out on left wing. The right wing is seen in looking forward toward the nose of the ship from the rear.

The fuselage is made either from light 3/16” flat pine or rock-hard 1/4” balsa. In the original ship, pine was used. Shape fuselage as shown on the plans and use balsa for cross sections. Remember to enlarge the plans of the fuselage as it is shown half-scale. A “V” cut is put into the top of the body to hold the wing. Sand the fuselage well and repeat the finishing procedure used on the wing.

The stabilizer (shown full size) is cut from ¼” sheet and finished in the same manner as wing and fuselage.

The rudder is shown half-size so it must be enlarged. Using 3/32” flat follow same procedure as in stabilizer.

Cement wing and stabilizer to the fuselage as shown on the plans. Check perfect alignment. Cement the rudder in place and set it for a slight right turn. The wash-in of the right wing will prevent the ship from banking too steeply. Apply four coats of cement over the wing-fuselage joint.

The glider is thrown into a slight right bank and glides to the right. Pull-out is automatic, and because both climb and glide are to the right, no altitude is lost. In testing the glider, make four throws, gradually increasing the speed of each.

Better put your name and address on your “Flipstick” and “flip” your model success to its zenith.

THE END

TURN TO NEXT PAGE FOR WORKING DRAWINGS
News of the Modelers

All model clubs are urged to send us reports of activities for inclusion in this department—advance dope on contests, club activities, and results of meets. Such news should be sent to us as promptly as possible.

NACA Employment for Girls

Feminine model aircraft makers are wanted by the National Advisory Committee for Aeronautics. The Civil Service Commission has asked the Academy of Model Aeronautics to announce that NACA will hire immediately girls between the ages of 16 and 25 who are experienced model plane builders and flyers to work at the Government’s aviation laboratories at Langley Field, Va. Their work will be vital to the war effort and will consist of specialized duties, including work on aircraft instruments and the balancing and testing of airplane models in the NACA wind tunnels. Starting salary is $1,260 a year with full opportunities for advancement. Applicants who qualify will be hired immediately, pending the establishment of a Civil Service register.

Qualified girl aeromodelers should write to William R. Howell, Special Representative, Civil Service Board, Fort Monroe, Va. Ask for application No. 4-691 which Mr. Howell will send together with any other additional information that is desired.

Aviation Education

Plans for the immediate installation of junior aviation courses in public and private schools throughout the country was the keynote of the First Air Youth Aviation Education Conference called by NAA in Washington recently. The ground work also was laid for setting up educational courses for NAA’s Junior Air Reserve, patterned after ground school work given Army and Navy pilots. An outgrowth of NAA’s conference will be a series of meetings between aviation officials and educators in all parts of the country.

Joint Aviation Committee

The U. S. Office of Education and the Civil Aeronautics Administration announced recently that they are joining forces in an all-out drive to “air-condition” American youth by stimulating aviation education in elementary schools and high schools. The CAA has been training pilots in colleges and universities since 1939, and the proposed program is designed to round out this work by carrying aviation to secondary schools.

By turning over to schools responsibility for teaching preliminary units in basic air training, the move is intended to create in school youth a knowledge basic to a candidate for pilot training and to increase public interest by instilling a thorough knowledge of aeronautics beginning in the earliest grades.

The Army and Navy, through their respective Assistant Secretaries for Air, Robert Lovett and Artemus L. Gates, will work with the two agencies to form policies and draft plans, it was announced.

VFW to Start Model Program

The Sons of the Veterans of Foreign Wars of the United States, according to their official publication, “The Acorn,” are soon to embark on an extensive aeromodeling program. “The Acorn” recently announced that under the provisions of the mandates of the Forty-second National Encampment of the VFW, held in Philadelphia, a model airplane building program is soon to be inaugurated. The VFW’s National Department of Americanism is now working on all the details and expects soon to distribute a bulletin containing complete information for the units to be tied in with the NAA Air Youth program. Although the initial announcement was brief, the VFW reports excellent response to the idea.

Model Aviation Has Gone to War

If nothing else, airplane model building has served the useful purpose of educating its followers to the knowledge that air supremacy is necessary to win the war and maintain the peace.

But in addition, aeromodeling is an essential defense activity—for it can pre-train hundreds of thousands of (Continued on page 71)
FOKKER D-VII 1917-1918

Scale 1/8" = 1'

Twin Spandau machine guns
Powered by a six-cylinder in-line
Mercedes engine 160 horsepower
High speed approximately 120 m.p.h.

Span, upper wing: 29 ft. 3 1/2 in.
Chord, upper wing: 5 ft. 2 1/2 in.
Chord, lower wing: 3 ft. 11 1/2 in.
Span, lower wing: 23 ft. 8 1/2 in.
Cap: 4 ft. 2 1/2 in.
Overall length: 22 ft. 11 1/2 in.
Height: 9 ft. 2 1/2 in.
Landing gear tread: 7 ft.
HAVE YOU EVER sat home on the day of a contest with your models packed and ready to go and could not because the weather wouldn’t permit outdoor flying? In such a case, either of the models presented here will provide a “salve” to the builder’s feelings. To steal a phrase from the Post Office Dept., “neither rain, nor snow . . .” shall stop the modeler from flying one of these ships as long as he has a fair sized room.

The author has done 2 min, 10 secs., in his parlor, which is very small, with the “E-Z” model. The advanced model is slightly more critical in its adjustments and necessitates flying in a larger circle, and therefore is not perfectly suited for flying in a very small room.

No one can truthfully say he is an expert model builder unless he has tried his hand at building indoor models. The ships presented here are for the purpose of acquainting the builders with a very simple indoor model which is built fundamentally the same as any record job, yet which a builder may make as his first indoor ship. This job we have called the “E-Z”. We also present a real contest ship built along the same lines, which we call the “E-X”. The “E-X” should be capable of at least 12 mins. 30 secs.

Our “E-Z” ticked off a consistent 10½ minutes every flight. This time in flying is not so remarkable but one must take into consideration it was not built for contest work and the weights were not watched. The economy of construction is really amazing with these models as both of them won’t cost you more than thirty cents.

Well let’s get down to building it. The “E-Z” is suggested if you have never built an indoor model and the “E-X” if you have built one before, or if you want to build one after finishing the “E-Z” and acquaint your self with indoor construction.

**Propeller, Motorstick, and Wing**

**FIRST AND MOST IMPORTANT** Item in an indoor job is the propeller, for the basis of all high time and consistency is a light, well balanced, smooth, efficient prop. If desired, an 8” indoor machine carved and almost all models need these hard to obtain. The best idea is to carve it from a block of very light balsa 8” by ½” by ½”.

The block is marked out and cut down to an “X” blank. Carve the undercamber first on both blades and then carve the top. The prop is sandwiched with 6-0 sandpaper and then finished off with 10-0 sandpaper. The shaft is then glued on. Completed it should weigh about .004 oz.

For the “E-Z” model a solid stick ½” by 1/16” by 8” of very hard balsa is used. The ends are tapered and sanded so that the hook and bearing are cemented on firmly. A hollow motorstick made of 1/64” sheet sanded, 9/16” in width and wrapped around a piece of dowel is used on the “E-Z”. The ends are capped with 1/64” sheet with the bearing and hooks glued on. The addition of the “E-Z” is very important and is quite different from outdoor types. The “E-Z” spars are cut from 1/20” sheet and sanded until it tapers from 1/20” at 8” from the front to 1/32” at the end. When you take the ruler to cut the spars you will find that it tapers the same in the top view. This is the method that all tapering is done on indoor models.

Four spars are made this way for the “E-Z”, tapering from 1/20” square at the center to 1/32” square at the tip. There are four spars to be made for the “E-Z” but these are made a little differently. A center spar 3½” long is made by the same method with a width of 3/64” by 1/32” at the center to 1/32” square at the next rib. The wing tip spars are made by sanding 1/32” sheet to the center to 1/64” and taping to 1/32” at the ends. The cut is made to have a spar 1/64” square at the center and 1/32” square at the tip.

For the “E-X” a template must be made of the wing tip and the spar wrapped around it wet. The “E-Z” may be laid out without bothering with templates. The spars are laid directly on the plans and glued together. Ribs are made by cutting a template of cardboard or aluminum and placing it on a sheet of balsa; the size for the “E-Z” spars is 1/32” and for the “E-X”, 1/64”. By moving the template down either 1/32” or 1/64” and cutting along it again, a rib is cut out. The leading edge of the rib is glued to the spar and the trailing edge of the rib is cut to fit and then glued. The wing tips are glued on firmly and you may use wire or aluminum for the “E-Z” and aluminum only for the “E-X” to hold the wing to the motor stick.

**Tail and Landing Gear**

The construction of the tail is very simple and for the “E-X” much the same as building the wing, except the spars aren’t tapered but are made of 1/64” square which is made by cutting from 1/64” sheet balsa. The “E-Z” is just an outline of 1/32” square. The rudder on the “E-Z” may be made right on the tail boom which is made like the spars of the wing. The rudder is first covered (Continued on page 71)
MITSUBISHI 96

FUSELAGE CROSS SECTIONS

B-1
B-2
B-3
B-4
B-5

Technical Specifications:

- Length: 82 feet 6 inches
- Span: 12 feet 6 inches
- Height: 11 feet 6 inches

Engines:
- Twin engines
- 850 bhp each

Weights:
- Takeoff weight: 10,000 lbs
- Speed:
  - Cruising speed: 220 m.p.h.

Scale:
- 3/4 inch = 1 foot
FLYING ACES

July, 1942

You Said It!

Here’s your corner, buzzards, and it’s open to all readers who have a model argument they want to get off their respective chests. Make your comments short and snappy, and we’ll try to squeeze ‘em in.

Glad—He Said It!
Model Editor, FLYING ACES:
I would like to start the ball rolling in favor of more flying scale models. They’re tops!

DICK GLAD,
Sedro-Woolley,
Washington

All in Due Time
Model Editor, FLYING ACES:
How about putting in three views of the Ago flying boat, Roland Caproni, and Bierot planes in the World War I department?

M. E. DONNELLY, JR.,
Apponaug, R.I.

Model Editor, FLYING ACES:
That March issue was the best ever! When I saw that swell “Gloster Gauntlet” I fainted dead away. Let’s have more of those full-size solid scales by Harry Appel. And as for Jim Loveless, the guy that doesn’t like three-views of wartime planes—"1% &"!!

ROBERT NARRATH,
Grand Rapids, Minn.

Great Discovery
Model Editor, FLYING ACES:
I have just discovered a great magazine! The more I read, F.A. the better I like it. Here’s to more outdoor flying models like “DOC” (March 1941 F.A.).

KENTH F. HITE,
Earth, Texas

You Mean It?
Model Editor, FLYING ACES:
That March issue was a pip—but a pip! That’s the way F.A. ought to dish it out. From now on I’ll never let a single issue go by. Yes, I Said It!

ALFRED CRANWELL,
White Plains, N.Y.

Complaint Dept.
Model Editor, FLYING ACES:
I was glad to see the plans of the Sopwith Dolphin in the (January 1942 F.A.). But why did you leave out the cross section views? I’d also like to see the RE-8, FE-2b, and the Gotha bomber in the W.W. Three-View section.

Logging the Motor Market

1942 Marvin Engine
THE LATEST Marvin Class “A” engine embodies qualities of construction which make it one of the outstanding gas engines in its class. Before these engines are shipped out of the plant, they are given a twenty-minute test run and guaranteed against faulty operation. A special iron and steel alloy, recommended and used by all auto manufacturers is used for the cylinder and piston construction. Using the same material in both the aforementioned parts, it is claimed, makes for easier starting whether the engine is hot or cold as the coefficient of expansion of like materials is the same at like temperatures. The piston made with mirrorlike finish is lapped in the cylinder which has been diamond bored and honed to give .0001 running clearance. Compression ratio is 7 to 1 to give maximum horse power. The cylinder has ten cooling fins which give maximum cooling at all temperatures. The wrist pin is heat-treated tool steel, ground. It is full floating, allowing it to turn in the piston as well as connecting rod, giving it double bearing surface. The connecting rod is cast and machined of a special high tensional strength material. The crank shaft is heat-treated tool steel which is designed to withstand rough treatment. It can be straightened out without breaking if bent in a crash.

Left: Marvin Class “A” engine for 1942. Right: Three-view drawings and dimensions.
known jobs the better.
Other things I'd like to see are more stick jobs, outdoor commercials (yum yum), flying models of radical design, and endurance gliders.

EARL CHURCHILL, Cicero, Ill.

Glider Fan
Model Editor, FLYING ACES:
Although I've read F.A. for several years I've never written to you before. I've built several of your gliders and they're all tops. The smart Alec who said he had to make so many changes on the "Cue Ball" to get a good performance must have just come out of the funny factory. As for the World War plans, hash 'em up. But keep 'em coming.
HERBERT WILLIAMS, Bartow, Fla.

"Moth" Fans, Attention
Model Editor, FLYING ACES:
I figure this note is a penny wasted. But I have about twenty-five copies of the "Moth" plans around and will send a set to anyone, post paid, for 10 cents apiece. Also have plans of the "Kaydet" for the same deal.

MASON BOYATT, 202 Mountain View Ave., Maryville, Tenn.

He Likes Us
Model Editor, FLYING ACES:
I think you've got a swell aero mag. I've watched aviation publications come and go for the last ten years, and when I chanced on F. A. a year ago I decided on that one for keeps. Boy, what a mag!
Recently I redesigned the scale "Ercope" (December 1941 F.A.) into a gas model. With the exception of a few bugs, the ship is a beauty. You ought to see the landings and take-offs. Saves on props, too.

LAROY MICKELSON, Los Angeles, Calif.

Likes British Buzzards
Model Editor, FLYING ACES:
Have been reading your mag for the past three years, and a better aero book is yet to come out. The World War I three-views are great, keep 'em coming. I'd like to see flying scale models of several English planes such as the Fairey Feroces, Swordfish, Blackburn Shark, Westland Wapiti, Hawker Nimrod, Fury and Demon.

DEAN MAXWELL, Longmont, Colo.

Line Forms to the Right
Model Editor, FLYING ACES:
I am a collector. By that I mean I collect everything—including F.A.'s. I'd like to get plans of the "Moth" (August 1937 and August 1941 F.A.'s) and the "Hi-Climber" (August 1939 F.A.).
In return I will send any plan. Just name it. In fact, I shall go farther than that. Just tell me what plans you want (one to a cus-
ON HAUNTED WINGS  
(Continued from page 19)

completely covered by a black hood. It had been pulled sideways, twisting upward so that the goggle lenses sewed into it showed the man's forehead. On his neck, above the Luftwaffe uniform collar, was a scratch from the opened buckle of the strap which secured the hood.

Trent bent over, removed the hood. The German's head rolled back, his blue eyes staring glassily into the sky. His face was a mottled, unnatural color. There was no blood on it. He was dead, and death took him on his throat, where the strap had been pulled tight. There was no trace of a mortal wound, but he knew, even before he listened for a heartbeat, that the man was dead.

"Looks like he was strangled," Crabb said huskily. "But why was he wearing that hood in the first place?"

"Trent shook his head. "It reminds me of a hangman's hood, the kind the Germans used back in the sixteenth century." He stopped, bent for another look at the dead man. "Mort, do you know what that is?" "Wilhelm Grussen—"

"First von Zenden, and now Grussen! Eric, this thing's getting hot."

"Help me put him in the car," said Trent. "We'll take him back to the airport and search him.

"We unhooked the parachute harness, and Crabb helped carry the body back to the car. Trent unlocked the luggage compartment and they shoved the corpse inside, doubled up. Something made a metallic thud. He opened the German's flight jacket, saw a pistol in a shoulder harness. It was the Flammenwerfer pistol, which had been concealed underneath it. Flame jetted from the muzzle and Hermann swore. He turned back, dropped the Tommy-gun. Von Zenden leaped into the coupe, pumped a wild shot at Trent from his silenced pistol. Trent hurtled against the wall, with him. Trent was reaching back of the raised compartment—"

Von Zenden smiled sardonically. "A deal? Perhaps so. Now, the body—macht Schnell."

Trent pivoted, hands still raised to the level of his hat. Suddenly he flipped it aside and snatched out the pistol, which had concealed it. Flame jetted from the muzzle and Hermann turned back, dropped the Tommy-gun. Von Zenden leaped into the coupe, pumped a wild shot at Trent from his silenced pistol. Trent hurtled against the wall, with him. Trent was reaching back of the raised compartment—"

"Come on, Mort!" Trent sprinted to the spies' car and Crabb tumbled in after him. The airport searchlight whipped back from the Potomac, spotted the two cars. Trent sent the spy machine buzzing over the side of the coupe. Von Zenden now a hundred yards ahead.

The impersonator was making for the Curtiss SB2C-1. He stopped, his tires screeching, car and plane silhouetted in the glare. Trent pounded the horn button, but his attempted warning was drowned as the scout-bomber's engine started. Von Zenden climbed toward the rear pit. Grussen's body slung over his shoulder. He dumped it in, sprang up into the front cockpit. The Curtiss lurched ahead, its wing tip knocking a mechanic flat.

"That dirty Hun!" bawled Crabb. He sent a burst from the Tommy-gun after the fast-moving Curtiss. But the ship did not swerve. Trent brought the car to a violent halt beside the Brewster. Crabb jumped out and seized the inertia-starter crank, and the engine, still warm, caught at once. "Tell me where my sentries were running toward the Brewster, an airline pilot behind them."

"Pile in, Mort!" Trent said swiftly. "No time to explain now!"

A rifle bullet drilled the hatch-cover as he taxied out. He kicked around, crossed to the wing, and the Brewster thund ered away with rifles blazing behind him.

The Curtiss was a hundred feet in the air, climbing fast. Trent took off, zoomed the instant he had speed. A quick blast over the Curtiss brought him flying and three tracer streams shot back at the Brewster. Trent crouched as the Plexiglas shattered overhead. His own guns were pounding again. He lifted his tracers, saw them gouge near the tail and jerk forward. Von Zenden started toward the rear part of the bust. Grussen's body lurched, his arms hanging down from the rear pit. The spy hastily channeled, to keep the corpse from falling out. Trent was almost in line for another attack when a Boiling Field searchlight flashed across the Brewster. Von Zenden shot it again, the Curtiss had disappeared. He swung across the Potomac, barked to turn back from the pursuing searchlights. The tip of the Washington Monument showed through the misty sky ahead. He twisted to pass south of it.

"There's another Stuka!"

The Nazi ship came riding in with a searchlight at its back. Trent pulled up in a half-roll, barely in time. The Brewster quivered from the impact of bullets near the tail. Crabb cut back the Brewster's engine and the Stuka hurriedly reversed. Trent saw the pilot in the shifting light beams. The Nazi's head was covered with a black hood, just as Grussen's had been.

CRABB'S TRACERS abruptly shifted, and Trent saw the Curtiss reappear on his left. He whipped into a tight bank, tripped the forward guns at the Stuka while Crabb drove off the Curtiss. The hooded pilot gave an agonized jump, then Trent's blazing tracers stabbed on past and into the Stuka hurriedly reversed. Trent saw the pilot in the shifting light beams. The Nazi's head was covered with a black hood, just as Grussen's had been.

CHAPTER II

"FOR MURDER AND TREASON!"

"DON'T MOVE!" rasped the German. He sidestepped to cover them better. Back in the shadows Trent saw the dark shape of another car which had crept up silently. A uniformed figure circled around behind Crabb, and Trent recognized von Zenden, still made up as his double.

"Put up your hands, Commander," ordered von Zenden. As he spoke, he quickly ran his hands over Crabb in search of a weapon. Finding none, he strode over to Trent.

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tiss was only a blur, swiftly vanishing. He circled for a minute or two, waiting to see if there were any more Stukas. Then he turned back toward the airport. The burning plane had struck in the upper cut of Potomac Park, and its lurid glow lit up the low-drifting clouds.

“What do you make of it, Eric?” Crabb said, as Trent cut the throttle to land. “That hangman’s hood business, I mean.”

“You’re guess is as good as mine, old bean. Too bad we couldn’t hang onto Grussen’s body. Might have told us a lot.”

Trent flashed his recognition signal with the Brewer’s running lights, got an answer from the tower. He landed, taxied in on an approach runway. An Army sentry was talking with a civilian at the spot where the Brewer had been parked. The sentry started out as Trent stopped the ship, but the civilian motioned him back. Trent swung the Brewer around, pivoting on one wheel.

“You stay here, Mort, and leave the engine running. That looks like our old F.B.I. friend, Red McBride. He might have some cock-eyed idea—”

“Here we go again,” Crabb said unhappily.

Trent chuckled, opened bullet-torn greenhouse, and swung down. McBride waited, the sentry a few yards behind him. The light from the burning Stuka gleamed from the sentry’s fixed bayonet. The F.B.I. man stood with his hands in the pockets of his raincoat, a limp felt hat cocked over one ear, revealing a patch of bristling red hair. McBride was above medium height and a trifle on the thin side. He had dark-brown, unblinking eyes, and a deadpan face.

“I want to see you, Trent,” he said curtly.

“Delighted, Red, old top,” replied Trent.

“Don’t call me Red,” growled the F.B.I. man. “Come on inside.”

“I’m quite comfortable here,” Trent idly reached out, produced a lighted cigarette seemingly from behind McBride’s ear. “Thanks, don’t mind if I do. Would you care for one?”

“Lay off that magician stuff,” McBride said tartly, while the sentry gaped at the cigarette. “I want to know what’s going on out here.”

“Well, of course, you know planes go in and out. That’s the first thing. Then there’s the de luxe dinner in the main restaurant, short orders in the coffee shop.”

“Cut the comedy,” said McBride. “Just exactly where were you at ten o’clock—”

“On the night of January twenty-eighth? I know that one; I always have an alibi for that night. Very lovely one, too. Remind me to introduce you some time.”

“Look here, Commissioner,” McBride said coldly, “I’m the senior agent covering airports around Washington. So don’t try pulling rank on me.”

“My dear fellow, I’m completely at your service.” Trent took out the three little steel balls, began to juggle them. “You don’t mind if I practice a bit while you give me the third-degree?”

McBride scowled. “A guard was shot out here tonight. Know anything about it?”

“Certainly.” Trent juggled for a moment. “I was in the crowd when they brought him in—poor fellow,” McBride said something under his breath. “All right, let that go for a minute. When I got here somebody said you dragged a stiff into your ship and beat it.”

“I think Mort would resent that,” Trent grinned. “Though I’ll admit there’s a touch of rigor mortis about him at times—somewhat the same expression you have, now that I think of it.”

McBride lost his dead-pan look. “Say, are you trying to make a monkey out of me?”

“I never compete with Nature,” Trent said amiably. “She always does a better job.”

“I don’t like you, Trent,” the F.B.I. man said grimly.

TRENT sighed, juggled the balls around behind his back. “I was beginning to suspect that. I guess I just don’t know how to win friends and influence people.”

“According to the evidence,” McBride said doggedly, “you chauffe a stiff into your ship and then ran down an Army mechanic. Right after you hopped off a German plane came along to help you—”

“Oh, sure that’s what it was doing,” Trent cut in.

“Uh—beg pardon, sir,” the sentry said to McBride. “But it was the Curtiss, not this ship. That’s what the sergeant told me.”

“They told me the pilot was a Navy three-striper with a black mustache,” McBride asserted flatly. “If that isn’t Trent here, who is it?”

“Sure, I changed ships in mid-air,” said Trent. “And there’s the stolen corpse—or is it just a reasonable facsimile?”

McBride strode toward the Brewer. Mortimer Crabb looked mournfully over at him, and the F.B.I. man swore.

“All right, Trent, somebody got mixed up and saw you in this business. You knew we were chasing that other plane. Why—and what about the stiff? And who was the pilot?”

Trent kept the balls moving, but his glance shifted for a second. A hatless airport attendant was running toward McBride, with what looked like a message in his hand.

“It’s a Naval Intelligence job, but I’ll let you in on it,” he told the F.B.I. agent. He put the balls in his pocket, motioned McBride closer. But the messenger broke in: “Mr. Groves said to see that you got this right away. That guard came to, and he recognized—”

McBride snatched the envelope, ripped it open. Trent tried to get a glimpse at the scrawled message, but the light was too dim. McBride held it close to his eyes and his face went dead-pan again. He slowly folded the paper, reached inside his raincoat as though to put it in his pocket. Trent suddenly caught the upturned collar with both hands. A swift yank, and the coat was down, unbuttoning McBride’s arms to his sides.

“Sorry, old top!” Trent whirled, raced for the Brewer.

“Stop! You’re under arrest!” shouted McBride. “You fools, get this coat off!”

A pistol made a faint report as Trent shoved open the Brewer’s throttle. Mortimer Crabb ducked, and Trent saw his lips working soundlessly. The ship sluiced around, onto a cross-wind runway. Trent brought the Brewer up to flying speed and sent it hurtling out over the misty Potomac.

“You lunatic!” groaned Crabb. “Now we are in a mess.”

Trent slid the hatch closed. “Why, Mort,” he said reproachfully, “I couldn’t let McBride lock us up and leave that juicy mystery about von
“You’re just trying to be nice,” Trent grinned. “Come on. We’d better get over to the house. If I can reach Captain Blaine I’ll explain it. I’m taking P.B.I.1.”

“A fat chance,” Crabb morosely trudged after him. “That Army operator said ‘murder and treason.’ The guard must have died, after implicating you. Unless you can find von Zenden and make him confess, it’s going to be bad.”

Trent pushed through a turnstile in the fence. “You’re clear, old man, anyhow. The phone girl can testify you were in there when the shooting happened.”

“I don’t know,” Crabb said dizzily. “She might not remember me.”

“One look at that distinctive countenance and nobody could ever forget you,” said Trent.

“Never mind about my face,” snorted Crabb. “Open the gate, if you can remember the combination.”

The stone wall of the old Harrington estate loomed up darkly as they crossed the road. Trent and Crabb had leased the mansion and the adjoining meadow some months before Pearl Harbor. Crabb had fitted up the basement as a laboratory, where he developed his inventions for the Army and Navy. The meadow had proved usable as a landing field, even for the military planes which were sometimes loaned to Trent for semi-official missions before he signed up with the Navy. To safeguard his inventions, Crabb filled the basement with electric-charged barbed wire on top of the high wall. Inside the massive iron-studded gates were electric locks operated by secret buttons or from a radio-relay under the instrument board of Trent’s coupé.

Trent turned down the road, to be certain no one was approaching. He removed a small stone from the right-hand portal, felt for the two buttons recessed there. He pressed the left one twice, the other one four times, and the heavy gates began to draw closer. Then Trent threw the switch. The estate of the mansion came on automatically. Trent replaced the stone, followed Crabb inside.

“Better disconnect those lights, Mort, or we’ll have an air raid ward-en on our necks.”

“The lights are off when the gates shut,” said Crabb. “I’ll attend to that later.”

Trent glanced toward the gloomy old mansion. In the walled yard to the left he saw “Leaping Lena,” the autogyro which had come into their possession during a brush with Axis spies. Then the gates clicked shut and the lights went out.

They went on up the winding drive, to the porte-cochere entrance. Crabb produced the key, and they went into the dark hall. Heavy velvet drapes shut out all light, and for a few seconds they stood lost in darkness, until Trent switched on the chandelier.

“I’ll phone Blaine,” he told Crabb. He went into the drawing-room, dialed the Intelligence chief’s private number. In a moment he heard Blaine’s dry, precise voice say, “Hello.”

“Captain, this is Eric Trent. I’d like to report—”

“Are you devil are you?” rapped Blaine. “I’ve just had a cock-eyed telephone call from the F.B.I. about Crabb and you.”

“I’ll explain everything, Captain. But first, you’d better get a warning out about Kurt.”

“Trent was a sharp click. Trent rattled the cradle, then slowly replaced the phone.

“What’s the matter?” asked Crabb.

“The line’s gone dead,” said Trent.

CHAPTER III

THE MAN OF A THOUSAND FACES

“YOU MEAN somebody’s cut the wire?” Crabb said, alarmed.

“Sounded like it,” Blaine said. “Hardly have hung up.”

“The F.B.I. is already headed this way,” Crabb said hopelessly. “Our phone and light cables run underground and nobody could cut the wires. The G-men must’ve been tapped in at some exchange, and they cut you off.

“Trent grinned. “Don’t let it get you down, Mort. We’ve still got our transmitter downstairs. I’ll contact Blaine through Navy radio, and I’ll use code so F.B.I. won’t get it.”

The basement stairs opened off the rear hall, opposite from a large study which Trent had converted into a repository for his magician’s paraphernalia. Magic cabinets, trick tables, illusion mirrors, and scores of special effects all but filled the room.

Trent started on past, then he stopped abruptly. Only a dim light in a corner flickered. His eye caught something unfamiliar in the shadows. Taking out Grussen’s pistol, he motioned Crabb to keep back while he reached for a light switch.

The lights flashed on. Mortimer Crabb let out a croaking gasp, and Trent turned on the electric. He was gazing on the mottled, ghastly face of Wilhelm Grussen!

“Lord help us,” Crabb said hoarsely. “How did this body get in there?”

“Von Zenden must have carried him here; that’s the only answer,” Trent took a quick glance into the hall. A muffled sound came from somewhere behind him, and he wheeled with the gun poised. Crabb pointed at a tall red-and-gold illusion cabinet.

“Somebody’s in there, Eric!” he whispered.

“Get over to the side,” Trent said in an undertone. He touched a recessed catch, and the front of the cabinet came open.

Crabb’s eyes bulged as the half-dressed body of a man toppled out on the floor. “A minor crisis! I’m getting the hell out of here, Eric!”

“Hold on,” muttered Trent. “Let’s see who it is.”

He bent down, gingerly rolled the dead man over. Then something went up his spine like the touch of an icy
Aero Book Reviews

Any volume described in this department may be obtained, at the publisher's address, $3.50; No. 6—Aerodynamics by A. E. Puffer, Blakiston Company, Philadelphia, Pa., $3.75.

This volume gives a complete and detailed analysis of the economic and legal characteristics of the air transportation industry, together with a full account of the activities and decisions of the Civil Aeronautics Authority, Civil Aeronautics Board, Interstate Commerce Commission, and other governmental agencies affecting the industry. Last but not least, the book contains an analysis of the economic principles applicable to the regulation of discriminatory rates. A valuable reference for persons connected in the aviation business.

The History of Combat Airplanes, by Charles G. Grey, Norwich University, Northfield, Vt., $1.00.

The James Jackson Cabot Professorship of Air Traffic Regulation and Air Transportation of Norwich University was endowed in 1935 by Dr. Godfrey Lowell Cabot, of Boston, Mass., and named in memory of his son, James Jackson Cabot, an officer in the U. S. Flying Service during World War I.

Following its custom of producing and distributing publications irrespective of profit, development and trends, the James Jackson Cabot Professorship wrote Mr. Grey, inviting him to prepare a history of combat airplanes.

Space does not allow us to go into detail concerning the contents of this book, but from the title one can gather that, if Mr. Grey has written it, it must be authoritative in every respect. For more than twenty-eight years Mr. Grey was editor of The Aeroplane and recognized as one of the most informed writers on aviation developments around the world over.

This book is the seventh in a series of aviation publications and sells for $1.00. If you are a rabid aviation enthusiast, by all means make it a point to obtain this copy. As a reference work it is invaluable and very interesting to the end.

Other titles and prices are as follows: No. 1—International Aeronautical Organization and the Control of Air Navigation, by John Jay Ide, $1.50; No. 2—The Early History of Air Transportation, by Edward P. Warner, $1.50; No. 3—Technical Development and Its Effect on Air Transportation, by Edward P. Warner, $1.50; No. 4—Safety in the Operation of Air Transportation, by Jerome Lederer, $1.50; No. 5—The History of Air Transport on the Eve of War 1939, by Parker Van Zandt, $1.25; No. 6—The Measure of America's World War Aeronautical Effort, by Edgar S. Gorrel, $1.50.

Other publications on various aeronautical subjects are available.

ABC of Aviation, by Lieut.-Col. Victor W. Pagé, Norman W. Henley Publishing Co., 17 West 45th St., New York City, $2.50.

The 1942 edition of this book contains a simplified explanation of all types of aircraft with complete instructions in the basic principles of construction and operation. It also describes important recent developments in airframes, and engines, airliners, inspection, trouble-shooting, care and maintenance of instruments, etc. This book is excellent for an aero enthusiast who desires to secure a good basic knowledge. Fully illustrated.

Technidata Hand Book, by Edward L. Page, Norman W. Henley Publishing Co., 17 West 45th St., New York City, Spiral Binding, $1.00, Cloth Binding, $1.50.

As a student, the author found himself carrying around too many books and spending too much time in the library. He compiled this book which often proved to be scattered elsewhere. He compiled for his own use the data contained in this book which in its compactness contains nearly all the essential information needed on these subjects.

This unique book has been written for all who use their knowledge of mathematics, physics, chemistry, mechanics, or engineering. It contains the essentials of books on geometry, algebra, trigonometry, calculus, analytic geometry, mechanics and mechanical engineering, and is presented in a relatively few well-organized pages.

Facts, figures, theory, definitions, laws, formulas, simple calculations, diagrams and tables are illustrated with short explanations of terms have the units and common constants given. Unnecessary data and long explanations have been omitted. The information is basic and fundamental and will not go out of date. This book is undoubtedly valuable to the student aero engineer.

(Also see pages 67, 74, and 78 for other reviews)
secret and then somehow escape to warn them."

"That was the general idea," Trent smiled indolently, as he eyed himself in the full-length mirror in your head, or I'll finish you here and now! My impersonation was perfect. In three weeks, no one has suspected—not even your contacts in G-2 who have been so obliging."

"So that's it. You've not only been making this place your headquarters, but also doing a termites act over in town."

"Precisely," von Zenden smirked. "I planned the whole thing even before you left Washington. My agents watched this place every night for two weeks, until they learned about the plan."

Trent had been waiting for the flash. He jumped back through the smoke in front of the illusion mirrors. Six other Eric Trents instantly became visible.

"Halt!" shouted von Zenden. He jerked the trigger and a slug crashed through the glass. Trent laughed.

"Try again, Nazi!" he sprang toward the center panel, shoved the mixer, revolved, and he was through in a twinkling. Another bullet shattered glass back of him. He ducked, snatched up a nickel-plated prop revolver.

"Keep back, Crabb!" he heard von Zenden cry tautly. The Prussian's voice came from the middle of the room. Trent pressed at the back of the cabinet where Grussen's body had been hidden. The rear section swung in on silent hinges. Trent leaped through into the room, fired the prop pistol at the back of von Zenden's head.

The Prussian gave a wild leap as the revolver roared. Dropping his gun, he staggered sidewise, clasping both hands behind his head.

"I'm shot!" he groaned. "I'm dying!"

Trent picked up Grussen's automatic from the table where he had laid it. Mortimer Crabb had dived for von Zenden's silenced pistol.

"Well, I guess you saved me the job," Crabb said sepulchrally.

"Much as I hate to disappoint you two," said Trent, "that was only a blank."
Trent lay down his gun, quickly smudged a bit of flesh color along one cheek. Muttered voices became audible and he heard footsteps coming nearer. He took the pistol and stepped to the doorway.

"Wo ist es?" he rapped out, imitating von Zenden's voice.

"Von Zenden—Gott sie Dank!" came the mumbled answer. Trent hid a start as he saw Hermann's brutal features. The Nazi's coat sleeve was ripped open and a red-stained bandage showed on his forearm. Behind him were two men; both wore dark suits, although it was late Spring. They slid guns to their inside arm- pit holsters when they saw Trent's face. The first time a young man, with a big, hulking body. He had a low forehead and thick, protruding lips. The other was about thirty-two, small but wiry. He had little darning black eyes, so dark that the pupils were all but invisible.

"Excuse me, we thought you were killed," said the little Nazi. "Ludwig said the Curtiss was shot down in flames."

"I said it looked like it," the hulking youth said, sullenly. "Don't always try to blame me." "We have no time to waste in arguing," snapped Trent. "Are you sure you weren't followed here?"

Hermann shook his head. "The blackout's still on. It was all I could do to find Max and Ludwig. We drove without lights." His heavy features took on a resentful expression as he eyed Trent's immaculate uniform.

"You saved your hide without a scratch, I see. For all of you, I might have been killed back there."

"Don't be a fool," Trent said sharply. "I had to get Grussen's body away, didn't I? The cause is more important than anyone's life."

"You had better get out of that make-up," Hermann said in a gruff voice. "They're sending a description by radio to all Intelligence and police offices. We caught it on the short-wave in Munich."

"Did you learn anything else?" demanded Trent, stepping back into the doorway.

"We caught the U-boat flotilla's signal, Herr von Zenden," Max said eagerly. "The rest of the Stukas will take off on a mission, interception point at exactly twelve o'clock!"

CHAPTER IV
DOUBLE FOR DEATH

HELMANN NODDED. "This time there will be no mistake. Washington will be a mausoleum in twenty-four hours."

Trent felt a pricking at his scalp, but he managed a grating smile. "Get, but the time is short. You know what to do, while I change?"

"Then the Curtiss here?" returned Hermann. "The transmitter in the gyro is still not working, May says."

"The Curtiss is across the road," answered Trent. "I brought Grussen's down in a perfectly enjoyable style. She has captured all the eccentricities and mannerisms of the various people she met, and has cunningly set down all the minor thrills of aviation which accompany so much of the story. In the way these various happenings are explained, a reader can picture, more vividly than an actual passenger in a plane might, the difficulties encountered. Too, Miss Helfin's humor is really top-flight. A very good book book that is, for most people by Martha Powell Setchell's excellent line drawings depicting various scenes.


From beginning to end, this book is absolutely swell. According to the publisher, it is the only book on the market that covers all the essential material required for private and commercial pilots' licenses and, at the same time, presents this material in a manner conforming to the courses set up by the Civilian Pilot Training Programs.

Written in a non-technical style, with plenty of clear-cut photographs for illustration, Air Pilot Training is just the book for students studying at home in preparation for CAA written examinations. Moreover, it is also valuable for licensed pilots who wish to increase their general knowledge or just check on particular points with which they are not thoroughly familiar.


Although this book is neither new nor aviation, it should be in the library of all interested in military tactics as a whole. Published in 1921, Sea Power in the Pacific is still regarded as an authoritative book—probably the authoritative book—on Japanese sea power. It explains the formation and phenomenal growth of Japan naval forces as her forces could be employed in a battle against America. Too, the author goes into quite some detail on tactics and strategy which would probably be employed during such a war.

For military students, one of the most interesting features of the book is the table of types. Names of vessels, years they were completed, displacement, armament, and other pertinent data are given. It is really difficult to understand how the author was able to compile much of the information, because of Japanese secrecy.
body in it. A doctor's examination might have given everything away.

Max and Ludwig stared at the dead ace.

"I still don't understand how he got it, dodging," said Ludwig stupidly.

"Hermann said it was only a danger if they got in each other's slipstream. They couldn't have been releasing the dust, because the radio wasn't on to guide them."

"One of the Airacrobats must have punctured the tank, or maybe Grussenu was just looking for the pilot's cockpit," offered Max. "That's my guess. Grussenu probably had to make a sudden turn and he flew into the stuff before he could get his hood tight. Then he took to his chute, hoping to get into clear air."

"No, only it was too late," Hermann said stolidly. "Well, he was a fool. Anyone knows cyanide dust is not a child's toy."

"Maybe it killed some Americans down in the city," Ludwig said hopefully.

"No such luck," replied Max. "By the time it floated down it would be too much dispersed."

"Himmel!" Ludwig said suddenly.

"What happened here?"

He pointed at the shattered glass across the room.

"One of the mirrors in the dark," said Trent. He rubbed the paint spot on his cheek. "Forget about that—go down and turn on the transmitter."

Max and Ludwig started out. Hermann stared at a piece of mirror-glass on the floor, then with another glance at the客厅, walked followed the two Nazis. Trent waited until he heard them descend the basement stairs, then he quickly closed the door. As he turned back his eyes fell on the glass fragment Hermann had noticed.

A shadowy face was reflected there. In dismay, he realized it was a double reflection from one of the standing mirrors to von Zenden's made-up face, back of the screen. Before he could seize the gun he had put down to allay suspicion, the hall door burst open. Hermann charged in, pistol leveled, Max and Ludwig behind him with their guns ready.

"Get back!" Hermann rapped his gun against Trent's ribs. "Max, pull that screen away!"

IN ANOTHER SECTION the light shone down on von Zenden and Mortimer Crabb. The impersonator threw himself back, one hand knocking Crabb's gun toward the ceiling. Max and Ludwig leaped in, tore the weapon from Crabb's grasp.

"Why didn't you shoot when you had the chance?" said Trent, as Crabb was dragged to his feet.

"What good would it do?" crooked the inventor. "They'd have finished you; I could see they had you covered."

"At least, you'd have knocked off von Zenden. Now they'll kill us anyway."

Von Zenden gave him a savage look.

"Right, my smart Yankee. Hermann, that was good work."

"I almost gave it away, when I saw the glass," said Hermann. "Then when Max said the telephone fuses were pulled out, I knew it wasn't just some funny angle with the mirrors."

"I took out the 'bad' fuse. Von Zenden explained it in brief words how he had been captured. 'I had to catch them off guard; that's why I made up as Grussen when I heard them open the gates. But this Teufel, Trent, with his infernal magician tricks—'"

"But how did they get here, Excellenz?" exclaimed Max.

"They must have landed in that Brewster. Fortunately it was too dark for them to see the Curtiss unless they almost ran into it. Hermann, go over and set the radio in the Curtiss to the Stukas' wave-length. Ludwig, plug in the Stukas' talking set before the Max starts the transmitter downstairs. I want to make sure our men are ready to take over at—"

"What about weather reports?" interrupted Hermann.

"I got the latest Navy report an hour ago, too, on Stukas. 'We'll fly out on the beam from here and circle down low at the 'marker' location. It won't be as easy as landing there in the gyro would have been, but it will be enough to guide the Stukas."

"All this could have been avoided if the Teufel hadn't talked the Max into it for any changes," complained Hermann. "I called them for an hour after Max found the gyro transmitter wasn't working. By one o'clock we could have had it going, and there would have still been time."

"The boys take off only two Stukas before they caught our warning," von Zenden said brusquely. "But it's too late to wait for the gyro now. Go ahead with the Curtiss. Max, you wait here a minute—we have a little work to do."

Hermann went out and Trent heard the front door open. Ludwig had already gone down to put in the fuses. There was a moment's silence, while von Zenden smiled mirthlessly at Trent. He had picked up Grussen's pistol, and Max had his gun carefully trained on Mortimer Crabb.

"I should thank you for coming here, Commander," the impersonator said silkily. "Your Government—what there is left of it—after tonight will be looking for what you call the 'Master Mind.' Your unexpected reentry into Australia proves fortuitous, after all."

"So you're going to pin it on me?" said Trent.

"On you and your G是没有 comrade. Or may they think you fooled Herr Crabb and he tried to stop you at the moment, yet that would be better. Murder and suicide... and I'll leave this little map to show how you planned—"

The buzzer in the hall sounded as the gates started to open. Trent heard three pistol shots in rapid succession, then a man cried out hoarsely:

"Watch those two! von Zenden flung at Max. He ran toward the front door. Trent saw Ludwig out in the hall, his face taut with sudden panic.

There was a thud as though some one had fallen inside the vestibule. Then he heard Hermann's labored voice.

"Von Zenden... it's the F.B.I... they got me. But... bastards—over the wall!" shouted von Zenden. Ludwig dashed through the door of the magic room, the Prussian close behind. Von Zenden cast a hasty look at the prisoners.

"Shoot them, you Dummko!" he snarled at Max, and raced on by. Max jumped up from the hallway, and ran the gun.

"If you do, you'll get the chair!" said Trent.

A CLAMOR of voices sounded outside the vestibule. Max, deathly white, jerked a frantic glance up the hall. Trent dived behind Grussen's body, with a yell at Mortimer Crabb. Max whirled, fired twice. The bullets hit the corpse as Trent held it up before him. With an oath, Max swerved the gun toward Crabb. Trent dropped Grussen's body, seized the leg of a yellowing g-man.

He lurched the table at Max's shins, and the Nazi fell on one knee with a howl. Both Trent and Crabb lit on him at once. The pistol went off, searing Trent's sleeve. Mortimer Crabb snatched the gun out of his hand, buried it down hard behind the German's ear.

"Well, I guess that'll hold him a while," Crabb grunted. "What happened to von Zenden?"

"He must have escaped through the basement," said Trent. He ran into the vestibule.

"Stop where you are!" bawled a familiar voice. Trent wheeled. McBride strode in through the vestibule, three F.B.I. agents behind him.

"Get some men around back," clipped Trent. "Two Nazis just went through. Herr Hermann!

"It's no use, Trent, I've got you cold," barked McBride. "Take his gun, Williams."

A blond young G-Man obeyed. McBride stared into the magic room, where Mortimer Crabb sat astride the unconscious figure.

"What is Pete's name—" he blurted out. "So that's the stuff!"

"No, he's merely hors du combat," said Trent. "Your long-lost corpse is over in the corner. I had to use him as a barrier, but you can ignore the bullet.

Out in the walled garden an engine sputtered, went dead. Two of McBride's agents streaked outside, and in a few seconds Trent heard a muffled command, "Halt!" A pistol shot followed like a punctuation point. One of the agents came back panting.

"Big fellow; tried to get over the wall with an insulated ladder when he couldn't get the gyro started."

"Well?" snapped McBride.

"Sorry, but I had to shoot. He was about to drill Peterson."

"That," said Trent, "would be Herr Ludwig, one of the muscle-men. I suppose it wouldn't interest you that the leader is probably outside the wall and making a clean getaway."
McBride looked uncertainly at Max, then at Grussen's body. "Williams, scout outside the wall. With those floodlights on maybe you can spot him—if there is any leader," he added tartly, turning back to Trent.

"Suppose you listen for a minute," Trent said calmly. "It might also interest you to know there's a plot to use gas against Washington—tonight."

McBride started. "Gas? Talk—and talk fast!"

Trent crisply gave him the salient points. McBride sent an uneasy glance at Grussen's mottled face, then went behind the magic cabinet and brought out the Navy uniform von Zenden had worn.

"For Heaven's sake, man, make up your mind!" snorted Crabb. "Those devils are planning to strike within forty minutes! At least warn the Interceptor Command."

"There's only one way to be sure they don't reach their target—whatever it is," cut in Trent. "Leave the transmitter going downstairs, so they can ride in on the carrier beam. Have the Airacobras out there, waiting at that intersection point on the map."

McBride hesitated, staring at the map. "All right, where's the phone?"

Trent led the way into the hall. "It's in the drawing-room, through that arched doorway. Wait until I see if Ludwig put the fuse back."

"And to save time," Crabb said morose, "you'd better let me try that transmitter, to be sure it's on the right bearing."

"Williams, go down with them," ordered McBride. "Watch what goes on. I still wouldn't bet on that guy Trent, even if Captain Blaine did say..."

The rest was a mumble as McBride went on into the drawing-room.

THE BASEMENT was brightly lighted, the outside doorway wide open. Trent saw a ladder leaning against the wall, Ludwig's body at the bottom, doubled up.

"Anybody run, bumping those ships across the road?" he asked Williams. The young agent nodded.

"McBride left a man over there. He spotted the planes when the floodlights went on."

It finished checking the beam angle, and in a few seconds McBride hurried down the steps. "All right, Trent. They'll have the interceptors there. But I'm going with you—just in case you've got some trick up your sleeve."

"It's a pleasure, Red, old top," said Trent. "Of course, it's usually the chap in the rear seat who gets shot first."

McBride pulled his hat down with both hands, in a defiant gesture. "You can't scare me. Get going."

"I was only thinking of your weak stomach," Trent said maliciously. "You see, Red, Lieutenant Shafer told me about that bumpy trip you had with him last Fall."

McBride gave a sickly smile. "Don't worry about my stomach. Come on—I've got the map."

"Pardon me, sir, but aren't we going a bit too high for our bombing?"

"Just a second." Trent crossed the lab to Crabb's desk. He scribbled a note, came back, "Mort, give this to Captain Blaine when you see him," he said.

"Let me see that," snapped McBride. He read the words. "So! Ignore all charges by that fathead McBride! We'll see about that, Commander—when I get back!"

"You shouldn't read private notes," chuckled Trent. He patted Crabb on the shoulder. "So long, Mort, in case my guardian angel slips up."

"I'll help you get started," Crabb said gruffly.

Later, with McBride ensconced in the rear cockpit, Trent sent the Curtiss roaring up into the night. The floodlights, still on despite the blackout, enabled him to miss the trees, and he quickly swung onto the course the Nazis had mapped. He ran his eyes again over his instruments, cartridge-belt indicators, on down to the Pyrene fire-extinguisher and his flare releases.

"Turn on the radio!" McBride shouted, his voice barely audible over the engine. "How do you know we're heading right?"

Trent switched on the receiver. "Give me the map, while you check the beam." McBride shoved it over into the front cockpit, put on the rear-pit headset. Trent swiftly inspected the course-line, which he had already traced through downtown Washington. Oddly, it touched no important buildings. Then he saw it, an all but invisible dot on the line at the edge of the main reservoir.

The reservoir—Washington's water supply! It hit him like a blow. Cyanide powder dumped into the reservoir... von Zenden's hint of men taking over some point—undoubtedly the water testing-station—to prevent any warning... and in the morning, unsuspecting thousands drinking—and dying!

"Trent, we're off the beam!" McBride's shout broke in on Trent's tense thoughts. "You circled too far before you set your course."

Trent put on his headset, banked into a climbing turn until he had maximum volume. He straightened out, holding an altitude of four-thousand feet. The low clouds were thinner on top and he could see occasional stars.

"Switch on your transmitter," roared McBride. "Hurry up!"

Bending over, Trent flicked the switch. The Curtiss skidded as he lifted his foot from the left rudder pedal. He heard McBride yell for him to swing back and start the circle, at the marker-intersection point. But before he could start his turn, the red and green lights of a plane appeared, ahead and about five-hundred feet below. Trent jerked open the front cockpit enclosure, fired a red rocket into the sky.

"What are you doing?" screamed McBride.

A brilliant light burst overhead, and against the blinding glare Trent could dimly see the diving planes.

"It's a trap!" McBride cried wild-
"But you see—I brought him back."
He reached out, suddenly jerked off the agent's felt hat. A mass of red
hair, glued inside the band, came off with it, revealing the man's natural
hair, which stuck out like a new growth to the side of his head. A
strip of white skin, devoid of make-up,
showed at the hairline, where the
tight-drawn hat had concealed it.
"Gentlemen," said Eric Trent, "per-
mit me to present the Man of a Thou-
sand Faces. This is known as Face
Number 13, by courtesy of McBride."
For an instant von Zenden stood as
though turned to stone. Then he made
a fierce lunge at Trent.
"You fiend! I'll kill you for this."
The F.B.I. men hauled him back,
and Trent glanced toward the hall.
"Right now, you can come in now."
"Don't call me Red!" snarled
McBride as he stalked in, a comical
figure with half of his hair snipped off.
"Put the cuffs on that Nazi, Williams.
He'll pay for this night's business."
Von Zenden stared incredulously at
Trent. "You knew, even before we
took-off?"
"My dear Kurt, you gave yourself
away when you pulled that hat down,
in the basement. When I called you
'Red' it evidently reminded you of the
hair you had so hurriedly fastened in
there after — er — borrowing it from
me."
"Never mind about that," snapped
McBride. "And don't think I let him
do it. He got me in the dark when I
went to phone. Next thing I knew, I
was trussed up and gagged in that
closet where Crabb found me. If you
knew why you didn't grab him and
look for me?"
"I wasn't sure what else he'd done.
I made positive it wasn't you, by
inventing a bumpy ride with a non-ex-
istent mutual friend. Then I wrote
two notes, one for him to see; the
other one to you, telling him it was
von Zenden and to look for you, warn
the Interceptor Command, and bend
the beam so the Stukas wouldn't get
over Washington. I knew if I took
von Zenden along he'd make sure we
contacted the Stukas. Otherwise, they
might have left before the P-39's
could get them."
McBride glovered at the imperson-
ator. "I traced that call you did make,
my fine Nazi. We've rounded up the
mob that seized the Bryant pumping
station and the testing lab, and
that's the last they'll have to worry
about the lot of you."
"I shall never sit in the electric
chair," von Zenden said haughtily.
"Der Fuehrer will see to that."
"Damn if I'm going to have my own
face talking back to me!" roared Mc-
Bride. "Trent, can you get that stuff
off?"
"Sure, but I'd leave it on until you
photograph him over at the Bureau.
Then at least you'll have him for
impassionating an officer."
"Thank you," grumbled McBride.
He slammed the felt hat over his cropped
hair. "Take him out of here, Williams,
before I make another egg grow by
that one Trent gave him."

Tailwind Tips
First tests have now been made on
one of those new French flying boats
we were telling you about. Known as
the 19-1, it is a 4-tonner. New
York's bridges are to get camouflage
paint. . . . Lockheed's got bikes for
its employees, and so has Douglas in
efforts to ease worker transportation.
. . . Tests show that men between
the ages of 18 and 24 stand high altitude
flying best. . . . And eight hours of
war flying a week is about all a flyer
can put in and still retain top effi-
ciency, according to Wright Field
studies. . . . Douglas workers have
been selecting names for their com-
pany's A-24, A-26, B-23, B-18, and
other models which will be put into
War Bonds. . . . The R.A.F. dropped
two and a half times the weight of
bombs on the Renault fac-
tory in France as compared with the
load the Nazis loosed on Coventry.
That hat-in-the-ring carade used
by Rickenbacker's 94th Squadron
in the last war is again being sported
by our current 94th. . . . Capt. Bob
Northcutt flew in so low in one of his
B-17 raids on the Japs in Java that
fragments of his own bombs dam-
aged his plane.

THE END

how such materials might be used
against our forces and how protection
might be provided.
Without delving into the principal
weapons of the Service—consisting of
chemical mortars, Livens projec-
tors, and portable chemical cylinders,
which provide more than a passive
defense against any enemy who may
choose to perpetrate this kind
of combat—let the reader be assured
that neither we nor our British nor
Soviet allies will be caught unawares.
Our War Department, in its own
words, "is convinced that the best in-
surance against employment of
chemical munitions by a potential en-
emy is the knowledge that our Army
is fully prepared to defend itself
against the use of all types of chemi-
cal agents."
Thus, our troops in the field may
well anticipate such visitations. But
what of our civilians in the continen-
tal United States?
Well, air raids are always a possi-
bility. As likely as not, the enemy
may employ on these occasions poison gases as well as explosives and incendiaries. He is not likely to be rewarded with spectacular triumphs if our civilian and military defenses are on the alert. Many of the steps normally taken to protect ourselves against the more conventional air raids will work admirably, in addition to the special anti-chemical measures. In what directions could such possible attacks come? Japan's prospects are most unpromising in any present consideration of this subject because of the vast distances separating our West Coast from her bases. Germany is nearer across the Atlantic and also has aircraft of longer range than the Imperial Air Force. If the Luftwaffe attempts this operation, it will be taking a great risk which at best may be compensated by only slight damage. For it is generally believed by the experts that the main accomplishment of the operation may be demoralization of civilian centers. Needing all her air-planes on various far-flung fronts, facing on the Eastern Front what is undoubtedly the gravest crisis ever to confront a great modern air force, can the Luftwaffe afford frequent enough excursions to America merely on the chance that some people along our Atlantic seaboard may be depressed? Just the same, let us not overlook anything in this struggle to the finish. In case the Nazis are in the mood, what type of aircraft are our spotters to look for as a carrier of chemical gifts? I think that one of the likeliest visitors to operate directly from Europe is the new Heinkel He.177, which has a range of 7,040 miles at 180 m.p.h. In production at the Rostock plant of the firm, the craft is still believed to be suffering "teething troubles." However, the Ernst Heinkel Flugzeugwerke engineers were rather prompt in ironing out the kinks in their earlier types, and they undoubtedly will get the He.177 in production form in short order. This up-to-date craft has a top speed of 280 m.p.h. and a range of climb of 840 feet per minute.

Another Heinkel type that comes to mind is the He.116. This ship has a top speed of 233 m.p.h., a cruising speed of 198 m.p.h., a service ceiling of 21,650 feet, and a rate of climb of 820 feet per minute.

There is always a probability of either side in the war springing surprise weapons, especially if a deadlock is attained at the front. The Allies can afford to "sit out" any deadlock because they have superior resources for the war of attrition. The Axis powers favor the blitz way not always necessarily because it is the best way but because any appreciable prolongation of hostilities offers a fatal threat to them in the form of a drain on their none-too-plentiful aviation fuel and other vital supplies.

It was this drastic state of affairs in the last war that led the Germans to the use of chemical implements, rather a surprise weapon for a while. In this way they are probably seeking—they may have already found—some novel way of dealing death and destruction through chemistry. Whatever their chemical surprises may turn out to be, however, it is a safe bet that when they materialize they will be in an intimate alliance with aviation.

THE END

**Microfilm Job**

(Continued from page 57)

and glued to the tail boom and then both are glued to the side.

The landing gear struts are also made the same way as the wing spars for papered sheet balsa. The wheels for the "E-Z" are made of 1/64" sheet sanded to 1/100". A small piece of .010 wire is glued to the struts and a piece of tissue is wrapped around a pin, glued and cut in half and used as a tube through the center of the wheel.

Another type of wheel is made of a thin strip of celluloid about 1/32" wide glued in a circle with a center brace of 3/64" by 1/32". The paper tube may also be used here as an axle if desired. The landing gear is glued to the body about 1/4" from the front and about a 4" tread.

**Making Microfilm and Covering**

If you have never tried making microfilm don't be frightened at the thinness of the stuff as microfilm is really easier to cover with than tissue, or 1/8" aluminum wire which microfilm can be made from either dope or lacquer; made flexible with a few drops of castor oil. The amount of castor oil is determined by experiment; that is, add a few drops of castor oil to some dope or lacquer and paint the stuff around the edges; if it spreads out nicely and after awhile starts to crinkle around the edges, you will have to add more castor oil. If you add too much oil you will find either you can't pick the film up with a hoop of wire or that it becomes too tacky and sticks to everything it touches.

There are many commercial formulas for "mike" which will save all this bother. A hoop of wire is needed. It may be an old clothes hanger bent to shape or 1/16" galvanized iron wire which can be obtained anywhere. 1/4" aluminum is the best. About 3 inches of water should be run into either a bathtub, tank or wash basin top. For the beginner, it is best to use cold water as this produces heavy "mike" which is much easier to handle. The solution is poured on the water, and after about three to five minutes of drying, a hoop is placed over the "mike", the "mike" pushed to the edges of the hoop and lifted in a semi-circular motion away from you. A knack of lifting will be acquired with a little experience.

Probably the best way to cover is to lay the uncovered parts on an enameled surface and draw a wet finger around them, leaving them completely encircled by water. Then wet the frames with saliva and place back in position. If the hoop of "mike" is then placed over the parts in the hoop and to glue the wrinkles out a hot wire is passed beneath it.

If the ship is made to fly in a small room, it is advisable to glue the boom on at an angle to give the model left turn. Assemble the ship and put in about 10" to 12" loops more difficult to fly in a small place. Make sure the windows are closed.

**Model News**

(Continued from page 55)

youngsters in aviation, youngsters who may soon be called upon to fly America's dive bombers and service its fighting aircraft.

Educators, aviation leaders, and aeromodellers know that the building and flying of model airplanes provide basic training in aerodynamics, aircraft construction, and flight instruction. Knowing this, the officers of the Academy of Model Aeronautics and those who head up NAA's Air Youth division are doing their utmost to provide model aviation available to an ever-increasing army of enthusiasts—now 3,000,000 strong, according to CAA spokesmen.

Those who direct the headquarters activity of AMA and Air Youth have been working longer hours than usual these days. Model aviation has gone to war. And as the clearing house for aeromodeling in America, your organization is working day and night to do the job. But
headquarters merely coordinates the work of leaders and members throughout the country. The real task is in your hands.

It is apparent that some who are recognized as aeromodeling leaders have progressed backwards in their thinking, instead of staying abreast of aeronautical trends. These chaps decry some of the suggested wartime regulations for model flying which the AMA Contest Board and particularly its chairman, Everett N. Angus, have labored over so diligently. The rules represent not the Board's ideas alone, but the thoughts of modelers everywhere whose suggestions have been sampled in meetings, conferences, and surveys. Also consulted were aviation leaders who did not want to see aeromodeling shut down for the "duration."

To cite an example, take the proposal to eliminate fuselage cross-section requirements for gas models. Some advanced aeromodelers say they don't seem to realize that military craft without fuselages are already on the drawing boards and in the air.

The proposal to permit optional launching for gas models met general approval. But a few couldn't see this all right. For the clarification we mention here that the London Daily Mail has reported the Nazis utilizing rocket tots to assist their heavy bombers to get off the ground with an additional 1½ tons of bombs.

Miller and Robbins Appointed

The Academy of Model Aeronautics announces the appointment of Edward Miller of New York to its Education Committee. Mr. Miller has long been active in AMA activities and is currently drawing up a program of conservation and curtailment of essential materials for the airplane model industries. Mr. Miller replaces Mr. Russell Nichols, who is now associated with Headquarters and as such has resigned from the Education Committee. The Young Division of NAA announces the appointment of Richard Robbins of New York as Projects Consultant. Mr. Robbins is well known in the field of Hobby Activities, having organized the first Wisconsin Hobby Show.

National Headquarters also announces the appointment of E. F. Bergdof of Houston, Texas, as Air Youth's first Field Representative. Mr. Bergdof has been recently elected President of the Southern Gas Model Airplane Association. He has been long active in aeromodeling activities in the Lone Star State.

Modelers in Civil Defense

In recent discussions with officials of the Office of Civilian Defense, the Academy of Model Aeronautics has been informed that volunteers over six may be needed in most areas as observers.

The Academy pointed out to OCD officials that, because of their general knowledge of aircraft, the ranks of our American model builders offer one of the best sources of personnel for this vital defense service. OCD officials have informed the Academy that model builders who volunteer are expected to fulfill a twofold service: first, by giving their own time and service, and second, by releasing other volunteers whose time may be of value in connection with other activities related to National Defense.

Aeromodeling in War

What effect America's entry into the second World War will have on model aviation is difficult to predict at this time, and it would certainly be unwise to attempt to do so.

This much we know. Model builders, hundreds of thousands strong, through their understanding of aviation and ability to turn out craft products, offer a reservoir of aviation personnel and stand ready to be of tremendous value in the home defense activity. At this very moment the National Aeronautics Association and its Academy of Model Aeronautics are working together to have model aviation recognized as an essential defense activity.

Modelers Must AidProcurement

No one will deny that recreation and sport keep up the morale of the country. But aeromodeling already has passed beyond the casual competitive and sporting stage to the point where it is developing air-mindedness in the youth of the nation and pre-training devotion for a place in aviation.

Are you aware of the change? Is your modelplane club still building and flying model airplanes as a hobby?

How about helping America's war effort? There are, of course, the model airplane clubs in definite educational sequence to impart a thorough knowledge of aeronautics as an essential defense activity. This must be encouraged. You and your club must do the job.

Here's how you can start; Arrange a meeting with your superintendent of schools. Find out what phases of aviation (if any) are now being taught in the classrooms of your community. Convince the school leaders that aeronautics starting with air-mindedness will be much a part of the school program as English, physics, or algebra. Start junior aviation clubs and training classes in conjunction with local youth organizations. Ask for community sponsorship. Don't hide your efforts. The more publicity you can focus on aviation, the more important your work will be in America's "Air-conditioning" program.

Above all, act now!
tively, flight training, aerial fighting, tactics and reconnaissance, air defense, air pilotage, bombing, and bomb training.

An additional 40 to 50 squadrons are under the command of the navy, some of these being land-based and some stationed aboard aircraft carriers. The known carriers at the beginning of the year are: Kaga (60 aircraft), Akagi (50 aircraft), Soryu, Hiryu and Koryu (each of which carries 28 aircraft), Hosho (26 aircraft), and Ryujo (24 aircraft). Also, Japan has six specialized seaplane carriers of about 10,000 tons each, which can carry four or five seaplanes up to five or six seaplanes. All of these ships have been modernized since 1929 or 1930 and can therefore be classed as almost new ships. Further, all but five of Japan's 43 cruisers were built in one or two years.

Very little is known about the productive capacity of the Japanese aircraft factories or the number of military machines of which their air force is composed, so any figures given are necessarily hypothetical. However, Alfred Downes, on December 17, 1941, published a very interesting account of the Japanese air force in the London Daily Mail:

"Last year it was estimated that Japan had about 5,000 first-line airplanes and was turning out, annually, about 8,000 of all types. The goal for 1942 was 30,000 annually, but it is believed that Japan will never reach that figure because of shortage of materials, especially tools and aluminum. Japanese capacity this year is estimated by American engineers at 10,000 airplanes."

This 10,000 figure sounds very small to the 60,000 aircraft which are to be built in the United States during 1942, 55,000 of which are projected for 1943—but it must be remembered that mere quantity in an air force means absolutely nothing. It's just like trying to get on a bus with a ten-dollar bill, when it is a rule that no one can get on without paying one dollar. This is the old-fashioned method of change bills of larger denominations than two dollars. Not only can Japan lose her aircraft in the Pacific area; she can also lose replacements without undue difficulty. On both of these scores, the United Nations are sorely handicapped, whereas Japan's 10,000 rate is higher than any production rate, no matter how much higher, which cannot be put to effective use.

It seems that the weakest link in Japan's entire scheme of airpower is in the matter of personnel replacements. It is estimated that no more than 700 finished military pilots are commissioned by the army annually, after they have passed through an instruction period of two years. Further, it is said that Japan has a larger accident rate than any other air force in the world during the instruction period.

From all reliable reports, the Japanese are poor aeronautical engineers and have patterned many of their service types after machines in use with foreign air forces. On this point it is interesting to quote again from Mr. Downes' Daily Mail article:

"A Douglas engineer told me that they were informed that the Japanese cracked up the giant (Douglas) DC-4 transport airplane which the country purchased two years ago as a model for a heavy bomber superior to the American (Boeing B-17E) Flying Fortress. Efforts to reproduce the DC-4 failed, although the Douglas Company provided blueprints as well as the airplane itself."

Originally, the air arm of the army was influenced strongly by the French, Hessians, and Germans, and that early influence is still plainly noticeable in Japanese plane construction. Only in recent years has the American influence made itself felt to any marked degree.

("War Planes of the Axis" is published by the Robert M. McBride Publishing Company, 116 E. 16 St., New York City, and sells for $2.75. All copies ordered from the publisher by F.A. readers will be autographed by the author.)

THE END

R.O.G. TO AT-6
(Continued from page 53)

"I have flown over so much of the state of Texas on extensive cross-country flights, both day and night, that I often think of the state as my own backyard. Another thing about this training I'll never forget is the flight I made up to eighteen thousand feet—the flight which called for the use of my oxygen mask—an experience entirely new to me.

"Formation flying, cross country hops, instrument flying, an oxygen altitude of 16,000 feet and a short flight training I received at Brooks. The latter part of my work here consists of flying AT-6's and BC-1's, both high-powered ships with retractable landing gears, controllable pitch props, and landing flaps. Recently I was made an assistant instructor and spend much of my time flying the Curtiss O-52's.

"Being a flying officer in the War Corps is about the most enjoyable and interesting job a fellow could hope for. What do you think of all that ahead of us? I hope to be able to do my share in the large task that lies ahead of us."

While undergoing flight training Lee has had his share of "experiences," too. The story as we heard it is that Lee was on a practice flight in the vicinity of Randolph and around 5,000 feet up. Coming out of some fancy movements he leveled off to try some more. He moved the control stick forward—at least he tried. It wouldn't budge! He tried to hold it back, still no soap. Left and right pressure on the stick brought no response either. If he baled out right there and then he would have done the right thing. He tried adjusting the trim tabs of the stabilizer.

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Learn the FACTS about our enemies' aerial resources

WAR PLANES OF THE AXIS

by David C. Cooke
Editor of Flying Aces

What kinds of planes do the Axis partners have? What do they look like? What is our enemies' air potential?

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Aero Book Reviews

Any volume described in this department may be obtained, at the prices hereafter mentioned, from the publisher named and at the address given. When writing for a book, kindly mention that you saw it reviewed in FLYING ACES.

Hitler Cannot Conquer Russia, by Maurice Hindus, Doubleday, Doran. 14 West 49th St., New York City, $2.00.

"He may sweep over the Ukraine, up central and northern Russia. He may seize Kleve, Khar- kov, Rostov, Leningrad, Moscow. He may push eastwards to the Urals, but he will not win the war because he cannot hold the Russian earth and the Russian humanity."

The purpose of this book is to depict to American readers the cause for which the Russians are fighting, why they are fighting, and of the forces within them that make it impossible for the Hitler legions to subjugate them.


William Winter, long an expert model builder and designer, has placed at the disposal of the novice modeler the benefit of his many years' experience in this field. His new book, profusely illustrated with drawings covers every point of the modeling art, and he tells all the whys and wherefores on each subject. There's lots of excellent dope in this volume.

All Out on the Road to Smolensk, by Erskine Caldwell, Duell, Sloan & Pearce, Inc., 270 Madison Ave., New York City, $2.50.

This book, written by the famed author of Tobacco Road, and who as an impartial observer of the Soviet experiment gives a picture which reveals what Russia at war is really like. It is a close-up of the Soviet Union today ... of Moscow blackouts, the people's army, the fighting pilots of the Red Air Force, the best accounts of those months when the armored Nazi legions moved onwards to Moscow.

Convoy, by Quentin Reynolds, Random House, Inc., 20 East 57th St., New York City, $2.00.

If you like tales of adventure told by a real story teller, make it a point to read Quentin Reynolds' Convoy. This book was written while Reynolds was on his way to England just prior to his trip to Russia. He went over on a slow freighter, part of the large

est convoys that ever crossed the Atlantic Ocean.

Impatiently pacing the decks of the lumbering ship, Reynolds reviewed in his mind some of the most exciting assignments of his hectic newspaper career. Finally he decided to collect some and put them into book form.


The time of the story is 1940. Its scene, the great Libyan desert. Its minor characters, the solitary men and small bands whose exploits in the war seldom find their way into the front page dispatches, are told in an absorbingly interesting account. Good fiction stuff, about an RAF pilot.


This book has been written for students in trade and technical schools who intend to become aviation mechanics. The text has been planned to satisfy the demand on the part of the instructors and employers that mechanics engaged in precision work have a thorough knowledge of the fundamentals of arithmetic applied to their trade.

Each new topic is presented as a job, thus stressing the practical aspect of the text. Numerous photographs and drawings make this volume interesting for the student-mechanic.


It is easy to take for granted the immense strides being made in all branches of science that few people realize how rapid our rate of progress is proving. This book, dealing with science's rapid progress, is more than just a record of achievement in one year. It contains stories of wonder which have all the fascinating interests that a Jules Verne novel held for readers a generation ago. It is written in an enthusiastic and excited way as instructor; it offers entertainment and knowledge in equal proportions.

Corporal Cat, by Martin Flavin, Harper & Brothers, 49 East 33rd St., New York, $2.50.

Quite simply, this is a story of a Nazi parachute soldier who came down in Germany under the mistaken impression that he was in enemy territory. This adventure story is packed with excitement and at the same time is as deeply moving.

(Also see pages 65, 67, and 76 for other reviews.)

worked enough to give him a little longitudinal control.

He kept cruising around trying to work out things for himself and then decided to talk to the pilot of the tower. The Operations Officer ordered him to maintain his altitude while they'd send up one of the pilots to see what could be done.

Within a few minutes another BT job cruised up alongside the stricken ship and by means of sign language Lee, the lowered instructions put the expertly guided his ship down to a perfect landing. Upon inspection it was found that some mechanical failure had developed which prevented the full use of the control stick. Lee, hero of the day, was congratulated by all his buddies' good friends as the Field Commandant himself who was at the controls of the other ship.

THE END

DOUBLE-CROSS

(Continued from page 29)

you are poison. Scram you!"

In his hut, Phineas took helmet and goggles from his trunk; it was the sculptor who had carved his proud face one of Heinzhund's Halbmaschens. The night was going to be balmy and he would not need a big coat. He wrapped some of his cherished personal possessions in a chunk of tarpaulin and tied them up securely. While he worked, he heard the slow, rhythmic beating of the drome. Garrity and seven of his brood were going over to Commery to see a show put on by Elsie Janis and Company. With the Old Man away, the tension on the tarmac would ease up a bit and efficiency would drop a few per cent. Captain Howell was the officer in command until Garrity returned.

An hour or two later, a Spad began to turn over and Howell sauntered over and questioned the flight ser-
gnant. "It is Pinkham's crater," Casey said. "Lieutenant Gillis says he wants to know if it is okay, as he intends to fight von Heinzhund with it. He wants to be sure there is no buzzers, time-bombs, or scorpions in it. He is goin' to fly it in the farmhouse, feeling important, Phineas figured. Maybe he would be at the C.O.'s desk getting the feel of that, too. The Boonetoone miracle man walked briskly across the tarmac for several yards, then accelerated.

Phineas jumped into the Spad's office. A grease monkey got hold of one of his legs and held on. Casey hit the mech and then asked Phineas to hit him.

Five minutes later, Sergeant Casey
F LYING A C E S

"Oh, so I sent him to his death, ha?" the Old Man roared. "I take the rap, as usual. You have got me hysterical, and I hope you're satisfied. Look around you, even in my eyes is not belladonna. I got to keep discipline, don't I? Awright, I'm a ghoul, a martinet! Who wants my job? Speak up, and the first one who wants it can have it—even Goomer." "Oh, let's all pull ourselves together," Howell said. "We are up-set."

While the verbal wale was going on near Bar-Le-Duc, a mud bespattered figure, clad in a Kraut officer's greatcoat and a scall-cuette helmet, crept along the Alsatian countryside. Phineas had made a forced landing all right, but the Spad had shaken him loose before the Krupp capsule had made the bulb's eye. Phineas had skidded into a shell crater where four defunct Heinies were huddled together. They had been there for several days and the place did not smell very healthy.

"I don't git it," Phineas choked out as he continued to emulate a worm. "My eyes went bad on me and it was murderous. I could have sworn I wasn't within a mile of that pill box when I nudged it. Well, here I am with the enemy, and I got to do some-thin' or perish. If they catch me in a Heinie suit..."

Phineas arrived at a deserted Alsatian farm about two o'clock in the morning. He got into the farmhouse through a hole gouged out by a shell and foraged for anything that could be digested or worn. He found none of the former, but he had success with the latter. He resuscitated an old pair of trousers, a long black coat, and a battered wide-brimmed slouch hat. He peeled off the Boche officer's coat and tossed the tin skypiece away. In the bundle of stuff he had taken out of the hole he had found his smoke glasses, and he took them out and fitted them over his nose. Again an idea rolled up its sleeves, spit on its hands, and whacked him one.

Phineas donned a wig, pasted little pieces of gummed black paper over three of his front teeth, and smoked his mouth. He was glad he had not shaved in three days. He adjusted his pack in place and put on the old Peasant's coat. The pants and hat followed, and he wished he had a mirror. He was duty sure his own mother would not have recognized him at the moment. He was an old hunchbacked and blind war victim. He nearly forgot something and quickly corrected the slip of the mind. He had his gummed objects he had purchased several months ago. Then they fit over the eye-balls and in the center of each one was a little round hole. He sat down and wondered which way he should go to find the city of Metz.

"A" FLIGHT went over the lines at dawn. The Baron von Heinz-und's Halbs happened to be at work in the same sector, and Howell and his men, their hearts not altogether.

---THEY ADVERTISE—LET'S PATRONIZE---
in their work, were chased all the way back to the tarmac and given a going over right up to the second they hit the dirt with the Spads. The Halbs strafed the Barons again and nearly got the Old Man before he dived into a dugout.

"It is a wonder they didn't land and refuel," Garrity complained. "You guys could beat anybody in a race. Where's Lieutenant Gillis?"

Bump landed ten minutes later and the mechs counted 32 holes in his Spad. There was a little trench in the back of his flying coat and phosphorous was sizzling in his pocket.

"I dropped a note to the Krauts, and I hope they find it and send it to the Baron," Bump said, wiping dirt from his face. "I am going to make things right for my pal. I will paint his insignia on my Spad and go out tomorrow and fight von Heinzmann. He will not rest in his grave if I don't."

"You mean Phineas?" the C.O. snapped. "I'd like to see any grave keep him horizontal! Excuse me, as I am not myself. It is suicide, Gillis! I forbid you!"

"He don't, somebody else will," Howell said. "It is for Phineas. You can't stop us. We will hold you down while one of us gits aboard a crate tomorrow an'—"

"It is mutiny!" Garrity yelled.

"It will be murder if you don't look out, sir," Bump said.

"Go ahead, if you feel like that," the Old Man said in a voice as small as a cherub's.

The Homberg Hellions were in the little town of Snuzheim and were absorbing morale and moxy through the mediums of schnapps and laughing Frauleins. The Baron was deep in his cups and telling the world what he would do to Lieutenant Pinkham on the morrow. If the upstart dared to appear at the appointed time. When the binge was over, the Halb hearts crowded into a Mercedes boiler and rolled out of town. On the outskirts, a black cat sped across their line of flight and the Baron ordered the Mercedes to halt. He got out and picked up some dirt and threw it over his shoulder.

"Now," the Baron said, "der bad luck is kaput. Drife on, Otto."

The moon was as high as the Krauts when the brakes of the Mercedes squealed again. They were two miles from the drome when they overtook the ragged figure plodding along the highway. He carried an old canon that was no more than a cast-off tree limb. There was an ugly bump on his back. His face was smeared with dust, and when he grinned at the Junkers his teeth revealed three ugly gaps.

"Ach!" the Baron said when he got out of the car. "Der hump-back, mein friends, Himmel, to rub der hump gifts good luck, hein? Where ist you from, mein Herr?"

"Notra Dame," Phineas said. "Where was I going to hit, I had to go. How far is it to Vienna. I bet it is a long wait, hein?"

"As if I lift and breathe," the Baron chuckled. "Quasimodo come to life, mein brave chentlemen. Ho ho, make room for der bummer!"

"Ja. We make him what iisted called der mossot off der Circus, Herr Baron."

"Ja. Drife on Otto."

The Mercedes brushed against the branches of the trees that lined the narrow road leading to the camouflaged Halb hangar. The torn leaves made significant sounds that Phineas' astute brain absorbed. He hoped the Krauts were mulled enough so as not to hear the hammering of his pump.

Phineas' stomach fell when the Baron ordered the car up a hillside to an old peasant's cottage. They were not going to take him to the drome, he mused sourly. A few minutes later, the Baron introduced Quasimodo to a buxom old house frau and gave her orders in Kraut. The old dame brought food, and the Baron finally gave in. The Baron and his Junkers departed, after each had passed his palm over the hump on Phineas' back.

"Rubbing the Pinkham bag of tricks," Phineas told himself. "Boys, if they only knew!"

"Parlez vous Francais?" the old girl tossed at Phineas.

"Oui, Un per, J'avois not much of ze ecoci. Jay le poore homme et did not see ze troisime grade," Phineas sputtered and sat down in a chair. He nodded out of room from the Fraulein's broken French to tell him that the Baron and his Junkers had put him up there for good luck. He was not to go within a mile of the Heine drome or he would get punished.

"Oui, vous allez too close to the airdrome et it gifts der hump sawed off der back. Comprenez?"

"Oui, I mean no harm," Phineas said. "Any way, what could a poor blind man do?"

PHINEAS was up at dawn. The roof of Halbs filled the sky. He saw the men coming under the canopies that hid the runways from the prying eyes of Yank observation crates. The drome was about half a mile away from the hut. Phineas counted twelve Halbs, then yawned and looked about him. There were books in the room, on the shelf. The old doll's spouse was a book worm before he went away to the wars. The day promised to be another scorcher and the branches of the trees outside made dry, eerie sounds against the roof of the hut, like the shaking of a skeleton's fingers.

Phineas picked up a book and scanned the pages. He came to a chapter having to do with a big-brained old scientist named Archimedes. There was a rough diagram

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on one page showing how the ancient Einstein had burned the Roman fleet off Syracuse (not New York). He had done it with mirrors. Phineas tore out a page of the book and let him read. He looked on the furniture in the room. There was a mirror on the wall. He found another one in the drawer of an old commode. Quickly he made his plans.

Phineas heard the Halbs return, wondering if the termite cranes had been smarmed. Two hours later the Baron came to see Phineas.

"Gott! You are der mana from Himmell. Let me rub vunce der hump again, mein freund. I shud down three exhalances already and dor-tog is still young, hein? This afternoon, Quasimodo kamrad, I fight der grosses Pingham. He accepted der challenge to meet me of Triacourt. Twice I rub der hump on der back. Und here ist 50 marks, mein freund!"

Phineas choked off a surprised flow of verbiage. How could he accept the Baron's dare? He knew it was impossible. Here he was in sort of durance vile and he had been gone from the Himmell for a long time, and he was still a long way from Denmark. Bump Gills, Phineas thought. Or Howell. They thought he was scattered all over the landscape and they were going to uphold the honor of the Ninth Pursuit, oh crikey!

"I come to see you before I fly to meet das Pingham!" Heinzhound said. "Just to make sure. Dey feed you good, ja?"

"No spekken der Doitch," Phineas said and shook his apparently hoary head. "Gut luck, mein frieden."

The Baron left. Phineas hurried back to his mirrors. He set them up so that a ray of sun would cover one of them and hit the other. Down into the wriggling earth where the foliage was the rustiest, a gob of light struck and began to heat up.

"Boys, I hope de Heinzhound comes and sees me and does not forget," Phineas let the sun do the work and he took helmet and goggles from his pocket. He put them on and then uttered a surprised ejaculatoiy. He nodded and grinned widely.

"Is it like I thought," Phineas said. "I cracked up in the trenches because—He scribbled a little note on a scrap of paper. He put it inside the lining of the hostile leather casque. Then he put it back in his pocket.

The day waxed on. The sun got hotter. At four in the afternoon, the Baron visited his animated luck charm. He rubbed the hump on Phin- eases' back before he went out to fight whom he thought was going to be the Boonetown wonder. He gave Phineas 25 more marks. He wore his flying coat and his helmet was in his pocket. Phineas was Le-Dou—someone he met so he could give it the blessing of Notre Dame.

"Ja. Now how can I lose, hein?" the Baron said exultantly. "Tonight I be der hero of Berlin. Aufwieder-

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Aircraft Spotter, by Lester Ott, Harcourt, Brace & Co., 383 Madison Ave., New York City, $1.00. Produced in photo-offset, this book runs 64 pages and is magazine style. It includes photographs and silhouette drawings of many American, German, Italian, Japanese, and British planes, with photographs of Russian machines. Recognition points of various ships are detailed.

It is recommended for all aircraft spotters, air raid wardens, and others connected with civilian defense, as well as the average aviation fan.

The Lost Diary, by Sandham Graves, 170 Bushy St., Victoria, B.C., Canada. Price quoted upon request.

The Lost Diary is the personal narrative of a Canadian flyer of World War I, and an excellent story he has to tell, too. As a pilot officer in the R.A.F. he stood on the dock at Alexandria, Egypt, watching the loading of a vessel that was to take him back to England. Unable to prevent its happening, he packed a box with his own initials inscribed upon it slip from the loading-hammock and fall into the water, sinking beneath the waves. In this box were his log books, many photographs and notes of his experiences.

For twenty-three years, he set himself to the task of recapitulating from memory some of the items in the lost diary—not in any vain glory, not to record military history, but simply and humbly in the belief that the younger generation in Canada should know a little about the human circumstances under which Canada's magnificent tradition of arms was won and maintained.

The narrative is written as impersonal as possible, from the standpoint of a man who shared with many others the privilege of seeing Canada's airmen play their most heroic role in the war of 1914-1917. Good reading that you'll surely enjoy.

Pocket Reference

Aid To Pilots, by C. Earle Steele, 2227 West Washington Blvd., Los Angeles, Calif., $1.00.

Aid To Pilots was compiled to give the essentials of the Civil Air Regulations to the many students and pilots who have voiced a desire for a simple, easily understood version.

The contents of this little pocket manual are not confidential in any sense of the word, as the information in it is compiled from the latest available CAA regulations. It has been necessary to re-word and consolidate other paragraphs to eliminate cross-reference and non-essentials.

It covers every chapter of the CAA regulations as applied to all classes of pilot certificates, and includes the latest Amendments and changes. This little reference guide is rapidly becoming the accepted authority by thousands of airmen everywhere.

Metal Airplane Structures, by Major Flavius Earl Loury, Norman W. Henley Publishing Company, 17 West 45th St., New York City, $5.00.

Prepared by an expert designer of aircraft and airship structures, this book makes a practical and authoritative treatise on the design and construction of the major component parts of various airplanes. In its eleven chapters is a digest of types and designs by many experts in metal airplane construction. Chapters on materials, welded and riveted joints, stressed skin design, metal wing and beam, fuselage design, and boat design are all discussed and illustrated by photos and drawings. Replete with useful tables, formulas, and engineering drawings for the student designer and engineer.

Remember Pearl Harbor, by Blake Clark, Modern Age Publishing Co., 245 Fifth Ave., New York City, $1.25.

The author was in Pearl Harbor the day the Japanese attacked. He jumped in a car and set out to help evacuate women and children. From that moment on, he tirelessly went about collecting material for this book—the story he believed all Americans should know.


By the author of that grand book, Couriers of the Clouds, this is also excellent reference material for older readers. From Airport to Yankee Clipper, The New Alphabet of Aviation explains various objects associated with aviation in, as might be supposed, alphabetical order. There are many color drawings depicting the various objects explained.

Buy this as a present for your younger brother or friend.

(strain ran off his made-up countenance in drops as big as bantam eggs. He held the Baron’s helmet in his hand while he watched that gob of confetti slowly circle into a snow circle. Krauts began to scream. Three Halbs came in from a sortie over the front and landed in a field near the cottage. Phineas Pinkham knew that all the fire departments in Alsace could never stem that blaze. The Halbs were known as sure as there were horns on billy-goats. The Yank miracle man went out of the cottage, groping his way with his cane.

"Donnerwetter! Saure Bleu!" Phineas heard the regimental yelling. "Der feind brennt!"

Krauts left their Halbs and rushed to aid in the putting out of the fire.

Three minutes later, the buxom citizen of Alsace yelled for the Heinies to come back. The hunchback was taking off his disguise, waddling into a Halberstadt. "Catch der spy! He ist nodt blind! Look, der hump is only the knapsack!" the Frau screeched.

The woman ran back into the cottage and up to the room where Quasimodo was sipping his brandy. She found the page Phineas had torn out of a book, the arrangement of mirrors. On the plaster wall was a screwed message. It said: Archimedes B.C. and Pinkham A.D. Haw-w-w!

LIEUTENANT BUMP GILLIS was hailed as one of the heroes of the great war. Brass hats came to see him and to shake his hand. Phineas Pinkham was forgotten until he telephoned in from Revigny. His Halb had run out of gas and the A.E.F. had thrown him into a hoosegow.

"Oh, I am not dead," Phineas said to the Old Man, who was scared out of his shorts. "And I said to always look in the box-score when something big was done. You said Bump got hanged, huh? He's got his helmet for a souvenir? Well, tell him to rip out the lining, as I left a note in it. Send somebody to get me. I am blind and am humped back now. Haw-w-w-w-w!"

Major Rufus Garritty stumbled out of the Operations Office and he asked for the Baron's casque. Bump handed it to him and he fumbled with it until he discovered the Pinkham message. He opened his mouth four times and closed it again before he really became articulate.

"Major Garritty, gentlemen, in case anybody shoots down the Baron by proxy, I, Phineas Pinkham claim half of him. This is not his helmet but one belonging to a Kraut I shot down who tried to knock over balloons one
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THE END

THINGS TO COME

(Continued from page 44)

which they are embodied. In their eyes, the airplane is simply the solution of a problem in mechanics. It represents a series of forces which are or are not in equilibrium. The engineer must know the point along a certain path upon which these forces are to act. The form evolves from this knowledge. As one of the officers of the Unit nonchalantly expressed it, “To the impartial physicist, a propeller on the tail is no more odd than a propeller on the nose.”

Certain proved forms, however, can be counted upon for definite results, and when radical changes in these forms are made, it is at best a venture into the unknown which may or may not prove profitable.

The farther the known and tried forms are departed from, the greater will be the manufacturing and maintenance problems later encountered. Obviously these factors are of tremendous importance. Even with production procedures solved, the airplane will still not be as effective if grounded for long periods because of maintenance difficulties as a much inferior type of craft which can be depended upon to be in the air when needed.

AFTER CONFERENCES on the new design are completed, work on the design itself is begun. If a bombardment airplane, it will probably be among the largest heavy loaders in existence; if a pursuit type, it will be small but endowed with tremendous fire-power. These types represent two extremes of a tremendous field of coverage, and require each its specialized field of knowledge.

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