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THE COVER

The photograph of the aerial gunner on the cover of the October issue was made by Rudy Arnold, the well-known aerial photographer. Through an error, proper credit was not given Mr. Arnold in that issue. The oversight is regretted.

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THE BACK COVER

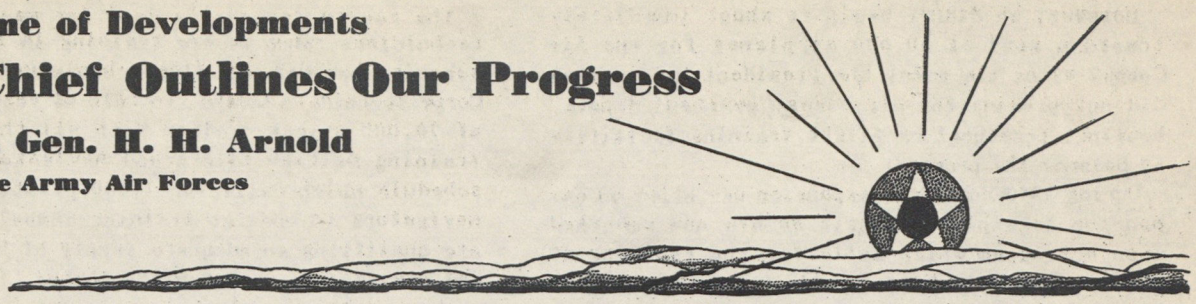
The pursuit plane on the back cover is the Bell P-39, known generally as the Airacobra. One of the most easily identified of our fighters, it is characterized by a decidedly long, pointed nose; slightly sweptback, tapered low wing and large, humped cockpit cover.

A Resume of Developments

The Chief Outlines Our Progress

By Maj. Gen. H. H. Arnold

Chief of the Army Air Forces



BEFORE the expansion the Air Corps had roughly 2,000 officers, including reserve officers and those detailed from other branches of the army, and 20,000 enlisted men, at a time when the German *Luftwaffe* was training an air giant of 1,000,000 officers and men.

We had one small-output training center, composed of Randolph and Kelly Fields at San Antonio, Texas, which graduated three classes a year--usually of less than 100 pilots in each class. Furthermore, the blight of too little funds over a period of too many years had reflected itself in all our combat airplanes.

In pursuit, we had an experimental order for 13 Curtiss P-40's, a first class fighter; however, most of our squadrons were flying obsolescent types whose fire-power of one .30 and one .50 caliber machine gun each was a pin-prick.

In bombardment, we had the first models of what has since proved to be the most outstanding bomber in the world--the B-17. Today, England and other countries are pleading with ever increasing fervor for any of that type they can get, from one up to 1,000. But we had only 13 of them.

B-18's Easy To Hit

The bulk of our bombardment squadrons were equipped with B-18's, a sitting target for even the slowest of our pursuit planes, and underpowered and slow. They were duds on every count except training, where they were a life-saver.

Frankly, pursuit had been allowed to drift in the doldrums, and in bombardment we had a 100 per cent. surplus of a type we could use only for training and a 99 per cent. shortage of the B-17 type we needed.

We had about 1,000 combat type airplanes, compared with thousands today---a total built up in spite of heavy diversion of planes abroad. We had a handful of planes outside the Continental United States as against many hundreds in foreign service units today.

We had less than 20,000 enlisted men as against more than 180,000 today. We had two or three hundred aviation cadets as against the 10,000 now in training. We had about 2,000 officers as against a present strength of nearly 17,000.

This article is a slightly condensed reprint of a speech which General Arnold made to the United States Military Academy last month. It is carried here because it should be of even more interest to The Army Air Forces, as a report by him on developments in the expansion program, than it was to the West Pointers. It is the most authoritative resume so far released.

We had practically no funds either for development or additional procurement, and there appeared to be no prospect of flesh and blood for the skeleton of our air strength. On the part of some of our leaders there was a sad reluctance to admit that the airplane was here to stay.

But the Commander-in-Chief in the White House was not one of these. His recognition of our aviation deficiencies and his vision, expressed to us during the fall of 1938, were well ahead of public opinion. In January, 1939, after consultations with the President, we outlined to Congress his proposals to raise our Air Corps objective from 2,320 planes, a dangerously deficient target which we had never been able to reach, to 5,500 airplanes and an objective of double our existing strength in officers and men.

That plan appeared to be adequate at that time. But after the invasion of Poland in September, in which it was demonstrated to the world that air power packed a Sunday punch, it was clear that the goal for the Air Corps must be revised sharply upward--at once.

Congress passed supplemental appropriations during the next few months to augment the program. Here is how rapidly ideas and plans can change. In January, 1940, our Air Corps made an estimate of 1,200 planes required for our needs. That was pared down by various agencies so that we appeared before Congress with a request for 496 planes. After arguing for two months, the House of Representatives reluctantly approved a total of 59. The Senate raised that number to 157.

Appropriation Increased

In May, the French Army broke in disorder, and we were given by Congress about $1,000,000,000 and over 4,000 planes.

Alarmed by the German smash through the Low Countries into a wingless France whose skies were bare of fighters, the President called a conference of defense leaders. The figure he dropped on us was a sashweight--50,000 airplanes a year. The Army had only 2,000 airplanes and here was the Chief Executive talking about building to an annual production of 25 times that number. We believe it can be reached.

(over)

However, we didn't begin to shoot immediately toward a goal of 50,000 airplanes for the Air Corps, since the money the President had in mind did not provide for air bases, overhaul depots, housing, personnel or flight training facilities to balance the program.

During 1940 and 1941, expansion was piled on expansion like plywood until we are now embarked upon a program which calls for the training of 30,000 pilots and 70,000 mechanics a year to man an organization which, if we meet our objective, will give us an ultimate strength of 41,000 officers and 600,000 enlisted men, including auxiliary personnel from other branches of the Service--or over four times the strength of the whole army a short time ago.

Pilot Training Success From Start

I am proud to be able to tell you that the pilot training program has been a bright spot from the beginning of the current effort, when we decided on a policy of letting contracts for elementary training to qualified civilian schools under Air Corps supervision. Since selection of the first nine in June, 1939, the plan has been a natural.

At present we have 26 civilian schools giving primary training and three giving basic training. By June, 1942, there will be 41 primary schools, 18 basic and 21 advanced schools turning out Air Corps pilots at the rate of 30,000 a year. In other words, we had two schools three years ago; next June we will have 80. But don't let that give you the idea that we've lowered the standard in order to turn out pilots like link sausages. The rate of elimination for failure to meet the standard of flying proficiency--around 50 per cent.--is about as high as before.

Although the course has been shortened from a year to 30 weeks' flight instruction, the new graduate receives better training than in the past. He climbs into our newest and hottest equipment and brings it back right side up. (Most of the time, anyway.) He reports directly from the advanced school into instructing or supervisory work at the civilian contract schools, and what he lacks in experience he is apparently making up in enthusiasm and hard work.

Accident Rate Falling

This has been reflected in the mean accident rate while the expansion has been under way, compared with the three years prior to the shortened training course. You would normally expect the rate to zoom. Exactly the reverse has occurred. The rate has gone down and the trend is still down. This year the accident rate in basic training has been half what it used to be and fatal accidents in advanced training have fallen off 50 per cent. This in spite of the pressure under which we have had to operate.

The record is equally good for mechanics and technicians, whom we are training in 14 civilian schools, besides the five schools under our Air Corps Technical Command, to help us reach the mark of 70,000 a year. Along with all this, we are training British pilots and navigators under a schedule which calls for 7,000 pilots and 1,000 navigators to undergo training annually, and we are qualifying an adequate supply of bombardiers and navigators, on non-pilot status, for our own combat crews.

No one denies that we were short on types with which to go into mass production when this war broke out. As I've pointed out, we had the Curtiss P-40, and the Boeing B-17 and we were well fixed for trainers.

Modifications were necessary in the P-40, and we have been incorporating them into our later pursuit models--armor plate, leak-proof tanks, more rugged landing gear for unprepared fields, and, especially--greater fire power. The British like eight or more machine guns, preferably of unmixed calibers. By that I mean they favor all .50 caliber or all cannon rather than, say, a combination of .50's and .30's. In fact .30 caliber machine guns for fighters are on the way out. They lack the necessary sting.

P-40 Rated As Trainer

Hundreds of P-40's have been built and delivered to pilots in our squadrons and to the British, who have found them superior to the *Hurricane*. They have given an excellent account of themselves against the *Luftwaffe* in Egypt and have been adopted as standard equipment in the Near East, although we no longer rate the P-40 as better than a good pursuit trainer, because of its limitations in speed, ceiling and fire power.

The B-17, even in its original form, represented a long head start over any of the heavy bombers of foreign nations. The Air Corps' championing of this type has been amply vindicated, and has enabled us to go into large production without drastic changes. The ceiling and speed have been well increased through the use of turbosuperchargers; armor, leak-proof tanks, power-driven turrets and tailguns have been added to make them an even better fighting machine than they were.

The first 20 B-17's operating with the R.A.F. have provided enlightening performance reports. Our performance data had been worked out only up to 25,000 feet, and within those limits the ship gave no trouble. But the British wanted to operate them at 35,000 feet with a full load, which created plenty of new problems. To meet these difficulties, which come under the head of pioneering, changes were made and the B-17's executed for some time successful day and night raids over Germany at 34,000 feet with virtual immunity from enemy fighters and ground fire. *(See page 4)*


RANDOLPH
FIELD

For the rest of our aircraft requirements, then, we had to embark on an extensive and hazardous program of buying airplanes on paper, without the usual service testing. Bugs cropped up in the new ships, but such difficulties are not going to stop us from procuring in ever increasing quantity the best fighting airplanes in existence. Make no mistake about that.

In the pursuit category, we have reached the large production stage on our single-engined Bell P-39, a type that has demonstrated it is a match for the Spitfire and Messerschmitt up to 16,000 feet, and on our Lockheed P-38. Eclipsing both of these, however, is the new single-engine Republic P-47B.

In various stages of development are pursuit types which will make all current types look obsolete.

The Douglas A-20 series, a splendid light bomber and night fighter, has been rolling off the assembly lines in shoals, and so has the Martin B-26, a medium bomber of outstanding speed and defensive armor and armament.

The R.A.F. already has many of our four-engine Consolidated B-24 bombers. The B-24 is so maneuverable, in spite of its size, that Coastal Command has stuck four cannon in the nose, equipped it with anti-submarine devices and depth charges and used it as a fighter. New versions of the Consolidated and Boeing will have really startling performance.

Materiel Division Producing

An airplane is designed around its engine, so it has fallen on Wright Field to develop power plants of higher and higher output. And the Materiel Division at Wright Field, true to its tradition, has not been sitting around with its thumb in its mouth. They are testing an engine out there now that develops well over 2,000 h.p. Still in the design stage at Wright Field are power plants that will turn up still higher power. Once you get up into horsepower brackets like that, you've got a headache finding a prop that will absorb the horses. The use of as many as eight blades and counter-rotating props will probably be the answer, since you can't put a 30-foot prop on a pursuit plane.

Reports on new airplanes and engines are very encouraging, because they mean that our Materiel Division is planning to provide our Air Forces with the best fighting planes the world has ever seen.

Out first aim, despite the diversion of a great part of our aircraft production to the nations fighting Hitler, has been to keep our squadrons "flying, shooting and bombing." The shortage of equipment has been acute and a very dangerous threat to pilot morale, but we can look forward to a steady increase in airplane strength. The continual process of activating new units and spreading experienced personnel ever thinner has placed a severe strain on us all. But we'll have to take it and like it. There's a war going on.

Ferry Command Functioning

Do you remember the difficulties encountered by the Air Corps when it carried the mail in 1934? We have been doing a somewhat similar job with our Air Corps Ferrying Command, but on a much vaster canvas and with much more success and efficiency. There were cogent reasons why the Air Forces undertook the project of transporting airplanes from the factories to their points of departure from our shores.

Obviously the British couldn't spare the pilots to do it. We could.

Ferrying meant training on latest types for pilots starved for equipment.

An Air Corps Ferrying pool was more flexible and less expensive than staffs of civilian pilots under contract to individual factories, any of which might have to throw their pilots into idleness through a plant shut-down.

Here is the record of the Air Corps Ferrying Command from June to October, 1941: in that initial period we moved over 900 planes from the West Coast to eastern terminals, with only two fatal accidents and at an average of two days en route as against eight days en route for the civilian ferry service. On a normal day, 40 planes were in transit, many of them piloted by boys fresh out of a twin-engine Advanced Flying School. To date, no plane ready to leave the factory has been delayed more than 24 hours, barring zero-zero weather. More than 300 ferry pilots have been absorbing excellent experience in concentrated doses. A pilot ordinarily makes five deliveries in a 35 day period, and he is permitted to make more if he wants to.

Around The World?

Except for our short range planes, the Air Corps Ferrying Command is capable of operating around the world. Its navigators are studying globes--not maps--and they would take a bomber to Tibet or Little America if you gave them 48 hours' notice.

In line with our hemisphere defense policy of forcing an enemy to run into our fist instead of our chin, we are guarding our Eastern approaches with Air Force stations from Iceland and Greenland to Labrador in the frozen North, to Georgetown, British Guiana on the tropical coast of South America: aerial sentinels guard our Western approaches from Alaska to the Philippines; and our Southern approaches, including the Panama Canal, are protected with a greatly augmented Caribbean defense system, with both air and ground troops under an Air Corps officer, Gen. Frank Andrews.

In the North Atlantic region, our most recent area of development, we are garrisoning eight large bases and four radio and weather stations

where 20 to 30 men will maintain emergency staging fields.

In Alaska, we have a composite squadron conducting experimental cold weather tests at Ladd Field, Fairbanks, and a composite group of pursuit and medium and heavy bombardment at Elmendorf Field, Anchorage. Bases are preparing at Metlakatla, Yakutat and Nome, while the Civil Aeronautics Board is constructing 10 fields at sites chosen by the Army along the Aleutian Islands aiming toward the defense of Dutch Harbor.

Shifting back to the Atlantic side, I could point out a few more places where Engineer troops are busy constructing fields: Bermuda, Jamaica, Antigua, Santa Lucia, Trinidad, Georgetown.

By this time you are probably getting some idea of the scope of the Army Air Force activities and an understanding of the desire that comes over us sometimes to go away and catch up on our sleep.

Observers On The Job

But there are many others besides those of us in the States who would like to catch up a few days' sleep--for instance the 78 Air Corps officers who are on duty as foreign observers. They are the eyes and ears of the Air Staff. Their reports come in from South America, Canada, Egypt, England, Germany, Russia, Morocco, Turkey, China, Singapore--almost any place you can name, and they bow to no adventurous foreign correspondent when it comes to the pursuit of new developments in Ankara or Karachi. From the information they furnish us, we are able to modify our present plans and set up future plans.

Our Air War Plans Section has a many-sided and never-ending task. It is continuously studying the economic set-up of possible enemy nations in order to determine what objectives are vital and vulnerable to air attack. The large objectives are broken down into smaller objectives--for example, a system of locks whose destruction would throw a whole water-way system out of operation. A large country may have 150 such targets requiring exhaustive study.

Suppose it is necessary to reinforce the Philippines immediately with several squadrons of heavy bombers. War Plans must figure out to the last detail how we can get them there safely and quickly.

I don't think it would be fair to conclude without giving you a glance at the lessons we have learned about military aviation during the conflict now entering its third year. Here are a few samples:

Lessons Being Learned

The Army and the Navy must have the whole-hearted cooperation of the Air Force. Air units needed for direct and intimate functioning with army and navy forces should be under the command of those forces.

The full weight of air power must be available either for purely air operations or for the support of the naval or land operations, whichever may be of decisive importance at the time. This is an expression of the one essential principle of air strategy, which is the concentration of the maximum force at the decisive time and place.

The single-engine fighter, with its superior maneuverability, appears to hold the edge over other fighter types. It should have every ounce of fire power it can carry without impairing necessary performance. The fighter during the day is more than a match for bombardment airplanes, but before long it must push its ceiling above 40,000 feet--some say 50,000 feet--if it is to maintain this supremacy.

Bombers Are The Winners

Fighters can prevent the *loss* of a war, but the heavy bombers are required to *win* it. The heavy bomber, in which type we lead the world by several laps, remains the backbone of air power. But since day bombers must expect savage treatment at the hands of hostile pursuit, and since night bombing, at present inaccurate and indiscriminate, cannot be decisive in itself, we must seek to build even greater speed, higher ceiling and stronger defensive armament into our forthcoming types. We are doing that.

Parachute troops and air-borne infantry can be highly effective. Our own army is letting no grass grow under its feet on this score. Glider-borne troops have proved their value in Crete and the Air Corps is keeping in step with this development by the procurement of gliders and by training selected pilots in gliding and soaring.

Dive bombers can achieve devastating results, although their use is often accompanied by heavy losses as compared with the horizontal bombing we have always stressed. The A-24 dive bombers with which we are equipping our squadrons will outperform those of any foreign nation.

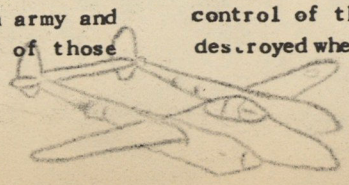
Enlisted Pilots Needed

Military pilots need not be officers. Accordingly we have created the grade of Aviation Student to train men who lack the educational requirements for graduation as officers. Eventually, 20 per cent. of our pilot strength will consist of enlisted men.

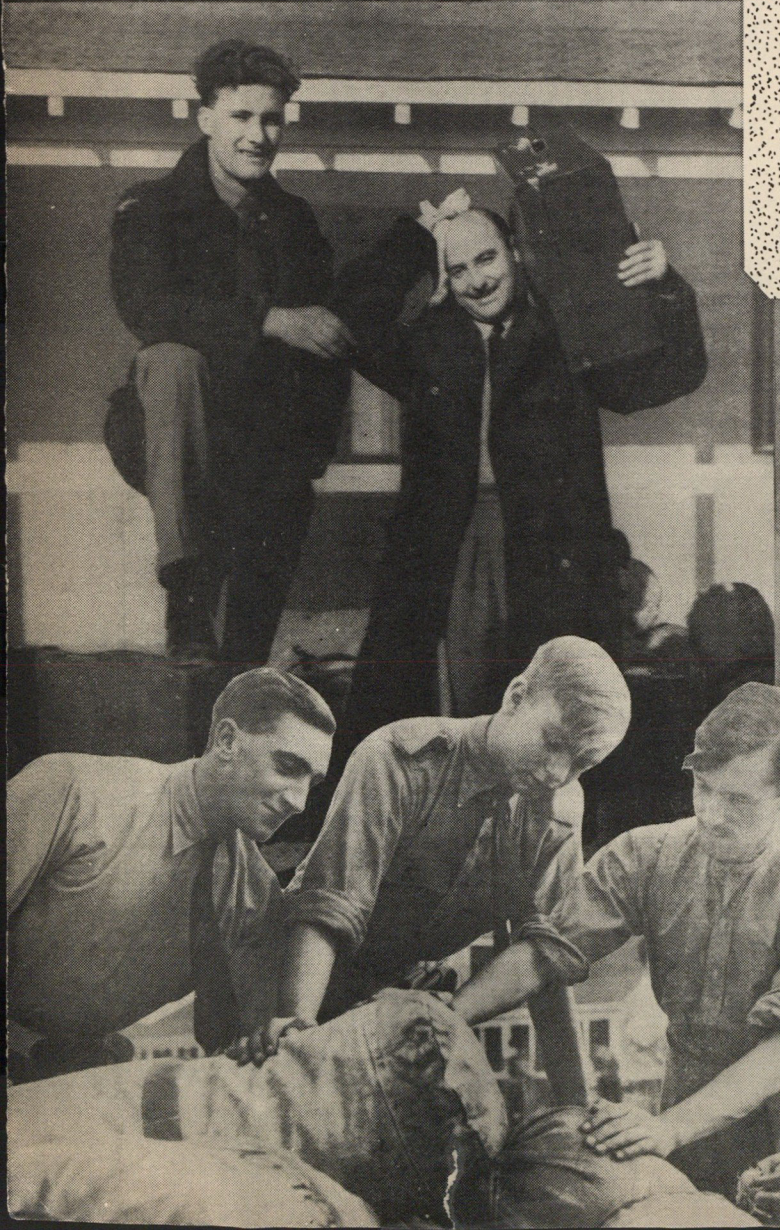
An aircraft warning net is indispensable to the operations of defensive fighters and anti-aircraft units, and it must be backed up by a huge force of trained civilian volunteers. Our first Air Defense Command, established at Mitchel Field, is leading the way in this field.

Land and sea operations cannot succeed when the enemy has control of the air. In order to gain control of the air, the enemy's aircraft are best destroyed when actually in the air or in the factory,

(Continued on page 14)



BUNDLES FROM BRITAIN (F.O.B. RAF)



Bundles From Britain

British Cadet Training Program

By Oliver Townsend

DOWN among the palm trees and orange groves of America's deep South, far from the reach of the *Luftwaffe*, more than 2,500 Royal Air Force cadets are learning to spread their wings under the careful guidance of the Air Corps. And, to use their own expression, don't think they aren't "keen" about it

The "leading aircraftsmen"--as British flying cadets are called--have been sent to this country from all parts of the British Isles, and from all walks of British life, to achieve through American instruction the common objective of "doing their bit" for Britain in the air.

The 2,500 who are here now are part of a training program designed to turn out British pilots at a rate of well over 4,000 per year from Air Corps flying schools in the Southeast Training Center. Also in training here are approximately 900 British cadets who receive an R.A.F. course of instruction at six civil contract schools supervised by the British Air Ministry, and about 200 navigators, located at the Pan American navigation school at Coral Gables, Florida.

Get U.S. Course

The British who train in Air Corps schools receive almost exactly the same course of instruction as that given United States aviation cadets. It consists of a five weeks' "reception course" at the Maxwell Field Replacement Center, 10 weeks in primary school, 10 in basic, and 10 more in advanced. The only variation from the standard Air Corps program comes in the ground school, where courses in R.A.F. procedure, aircraft recognition, radio code practice and current events are substituted for some of the work usually included in navigation, meteorology and mathematics. These latter subjects are included in an eight-week preliminary training course, known as the Initial Training Wing, given the cadets before they leave England.

Enthusiasm for the American training course is general among the cadets. Particularly impressive to them is the high grade of U.S. flying, the high training standards maintained and the quality of Air Corps equipment. Most feel the planes they use and the instructors who teach them are "all that could be desired."

No less enthusiastic has been their reaction to the American world outside of the training fields. They describe the American people as unusually friendly and much more sympathetic toward Great Britain than they had expected.

From a social standpoint the cadets are a big success. Invitations to dinners, parties, picnics and dances come in constantly--at a rate which greatly exceeds the number of cadets available. Weekends almost invariably find the barracks deserted by two o'clock Saturday afternoon--unless midweek bad weather has made weekend flying necessary.

Interesting as the British have found the "extra-curricular" phases of their training, it is the time spent learning to fly that really counts. And in this department they seem to be taking to the American program of instruction--somewhat different from the R.A.F. program--much better than had been expected. British liaison officers stationed at the schools say the cadets are progressing "extremely well". American instructors generally agree with this view, and say the British are doing excellent work considering their strange environment and the slight differences in language.

Flight instructors at the schools, who perhaps come into closest contact with the British, find them to be on the whole an intelligent, interested and conscientious group, looking forward to the day when they can match their skill in the air with that of "Jerry".

Instructors have found British reactions in the air to be approximately the same as those of Americans, and have experienced less difficulty in teaching the "aircraftsmen" than they thought they would. What trouble was encountered at first is gradually being eliminated as both instructors and cadets add to their experience. Some of the cadets have demonstrated unusual proficiency for flying, and have shown themselves capable of becoming real aces after their return to England.

Want To Fly

Ground school instructors find that, like American cadets, the R.A.F. trainees are more interested in the flying phase of their training than they are in the ground school. They are however, impressed by the "I.Q." of the average Briton, and by his general knowledge and information. Some of them--especially engineering instructors--though, wish the British could have played with "Model T's" and small gasoline engines when they were younger, like most American boys do. Americans coming into engineering courses usually have a me-

chanical background which aids them immeasurably in grasping the fundamentals of the subject. The British, in many instances have had very little mechanical experience, and find the whole field new and strange.

Cadets failing to qualify as pilots are sent to Canada where they are turned back over to the R.A.F. for navigation training or whatever disposition the British care to make.

The R.A.F. cadets vary greatly in age, and in educational and vocational background. Ages range all the way from 18 to 33 with the average closer to the lower figure. A few are public school boys, and about five percent are college graduates. By far the most are products of the free British school system, many having graduated from what corresponds to American high school. A number were continuing their higher education when they enlisted in the Air Force.

Cross-Section Of Britain

A few of the cadets are from titled families, but by far the most are clerks, farmers, machinists, and students who decided to do their bit for Britain in the air. They come from all parts of England, Scotland, Wales, and North Ireland. There are even a few volunteers from South Ireland. Surprising is the large number of former "bobbies" (British for "cop") who are taking flight training. A sizeable contingent of these are present at almost every school.

Some, but not many, of the cadets have wives back in England. In some of the earlier classes the percentage of married trainees ran as high as 20 percent. but in later classes this has dropped considerably, in some instances to below five percent. The average age of cadets has also dropped as additional classes have been sent over. Instructors react favorably toward this, saying that in general younger men learn more quickly.

About six percent of the aircraftsmen, although simply cadets over here, maintain noncommissioned officer ranks in the R.A.F. and other branches of the British Army. Some of these are sergeants, and quite a few are corporals. Some saw service with the British Expeditionary Force in France, and came through the ordeal of Dunkirk. Those who did say they were greatly impressed with the force of the *Luftwaffe*, and it is partially due to this experience that they are now taking pilot training. They regard air superiority as essential.

Organized Like U.S. Cadets

Organization of the R.A.F. cadets is along the same lines as the organization of American cadets. In other words, there are cadet captains, adjutants, and other cadet officers. Also, the upperclassmen, like American upperclassmen, are given disciplinary jurisdiction over the lower classes.

Pay of the Britishers in training here runs around $55 to $60 per month. They also receive their food, living quarters, uniforms, laundry, shoe repairs and hair-cuts. Much like American cadets, however, they are usually broke.

The cadets, like their American counterparts, rise early and work late. Depending upon the school, they either get up at 5 or 5:20 a.m. and are busy in the air, in ground school, on the athletic field or on the drill area almost constantly until 4:30 in the afternoon. Evenings are spent studying. Under this schedule weekends are the cadets' only free time, and these too are sometimes forfeited when rain has interfered with flight training during the preceding week.

In such spare moments as they do have, sightseeing is one of their favorite pastimes. Many have said they'd like to return some day when they have enough time to "sight-see" properly. In order to make a permanent record of their experiences here. a large number have taken up photography. PX's and camera stores in the vicinity of schools have all reported a run on photographic supplies since the arrival of the British.

"Pop" Fans

One of the things which amazes American officers most about the British cadets is their liking, and capacity for, good old American "pop". Orange pop seems to hold first place in popularity, with the various types of cola beverages running a close second. One Britisher quaffed 30 of these in one day. Flight instructors are constantly amazed at the cadets' ability to fly after enthusiastic pop-drinking sessions at the canteen.

At all of the schools R.A.F. trainees are being taught American games. Most like these games after they learn how to play them, especially softball, volleyball and basketball. All maintain, however, that none quite compares with soccer. Soccer, cricket and some rugby are played at many of the schools, although these are not on the regular program. Most of the British are glad of the opportunity to learn American sports, "because it widens their athletic background ".

Athletic programs at the schools also contain calisthenics, which are designed to develop the physical coordination so necessary to the successful pilot.

Some of the instructors have noticed that the British do not have the fierce competitive approach to group athletics which Americans have come to associate with their sports. The British seem to play for the sake of playing rather than to win. Athletic directors are, however, very much impressed with the stamina of the British, and with their ability in such individual sports such as swimming and tennis.

One of the habits of the R.A.F. trainees which has impressed civilians in nearby towns is their church attendance. Most of them, members of the

Church of England back home, rarely miss attending the Episcopal Church in this country. In the smaller towns the number of cadets in church sometimes exceeds the number of townspeople who are present.

Mustaches Allowed

Air Corps rules and regulations, upheld to the letter in most instances, have been relaxed by Maj. Gen. Walter R. Weaver, Commanding General of the Southeast Training Center, to the extent that the British cadets may retain their mustaches. The sight of mustaches of varying shades and density on the upper lips of cadets is a source of constant surprise to Air Corps instructors, who just can't get used to the idea.

Also relaxed by General Weaver are the Air Corps rules applying to drill, saluting and commands. Under these relaxed rulings the British are permitted to march with the long jaunty stride and shoulder-high, full length arm-swing typical of Empire troops all over the world, and to salute their superior officers with the snappy British salute in which the soldier leans backward and brings the back of his right hand flat against his forehead. In coming to attention, they continue in the old style of bringing one foot high, then slamming it down beside the other.

The British cadets are no exception to the universal rule that women are of special interest to military men the world over. American girls they find to be unusually well-groomed and well-dressed. They also believe they have more poise, are more natural, and have more vitality than do their British "cousins". On the question of comparable beauty, though, there is "no comment".

Food here, according to the cadets, is excellent--and there's all they can eat, and more. A number miss their favorite English dishes, and some of the primary schools have varied menus in order to include the most popular. Two of considerable popularity are lamb stew and kidney pie. Cooking they say is good, but "doesn't compare with that back home."

Many Will Receive Commissions

Of the cadets taking American courses at this time, approximately 25 to 30 percent will receive commissions upon graduation. The remainder will become Sergeant Pilots. Commissioning is entirely in the hands of the Royal Air Force, but it is usually done largely on the basis of the record the cadet has made in training.

Sergeant Pilots, although noncoms, receive almost the same amount of pay as do commissioned pilots. and have virtually the same responsibilities of command. A Sergeant Pilot is completely in charge of his plane, and exercises authority over any commissioned personnel serving under him in a bombardier or navigator capacity.

Last month a special inspection party composed of high-ranking U.S. and British officers visited schools giving flight training to the R.A.F. It was the general consensus of this group that the training program was progressing in a very satisfactory manner, and individual members of the party expressed personal gratification with the results.

Air Marshall A. T. Harris, chief of the Royal Air Force Mission to the United States, said that in his opinion the cadets were doing "exceptionally well". Air Marshall A.G.R. Garrod, Director of Training for the R.A.F., was also pleased, and stated that he was very glad British cadets had been given the opportunity to train in this country, where so much more time and attention could be given them than was possible in Great Britain at this time.

Training Program "Magnificent"

Group Captain Lord G.N. Douglas Hamilton, special aide to Air Marshall Garrod, said the Air Corps training being given R.A.F. cadets was "magnificent". Other members of the party were impressed by the living quarters, mess halls, and recreational facilities of many of the schools. They also reacted very favorably to the American physical development program, which they said was working wonders in equipping cadets for the strain of combat flying.

Brig. Gen. George E. Stratemeyer, Chief of the Air Corps Training and Operations Division, was a member of the party. He concurred in the British reactions to the training program, and stated that he thought it was progressing better than had been expected.

Newest of the Air Corps primary schools being used by the British is Carlstrom Field, located at Arcadia, Florida. It is a civil contract school operated by the Riddle Aeronautical Institute, a subsidiary of the Embry-Riddle Company. Located 95 miles southeast of Tampa, it has facilities for approximately 440 cadets.

Latest Improvements

Laid out in the general circular plan of Randolph Field, it is equipped with all the latest improvements. The barracks, mess hall, canteen, and classroom buildings are especially attractive. These are all constructed of solid concrete block in a modified Spanish style. The court in the center of the building area contains a swimming pool, tennis, basketball and volleyball courts, and a patio which can be used for dancing. The barracks are divided into rooms, four men to a room. These run completely through the 30-foot wide buildings, and have windows on each end.

Other schools giving primary training to the British are the Lakeland School of Aeronautics, located at Lakeland, Florida; the Alabama Institute

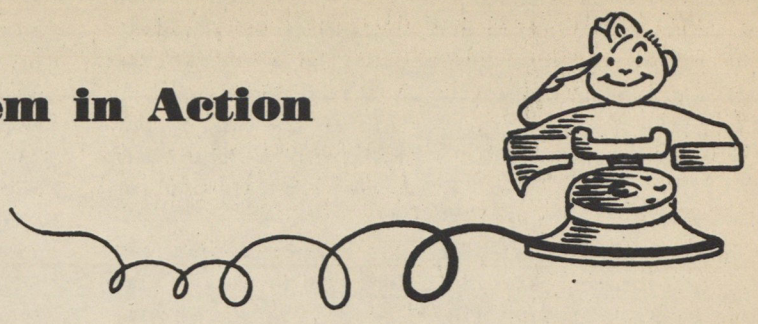
(Continued on Page 24)

O-52's at Brooks Field, Texas

Stopping the Enemy

The Air Defense System in Action

By Capt. Oliver F. Holden



THE air defense test of the First Interceptor Command, conducted along the Atlantic Coast during October, was a revelation not only to civilians but to Army and Air Forces personnel of all ranks.

Outside the small group which has been working for years in development of the system, belief is widespread that it has been borrowed outright from the British. Actually the two systems were developed along parallel lines and while there have been interchanges of information, the American system of aircraft warning in the continental United States has no duplicate in the world and cannot have.

The reason is that the United States has more telephones than all the rest of the world put together, which means a greater diffusion of commercial telephones, a greater coverage of territory. The American aircraft warning system is built upon a framework provided by the existence in this country of a single company, the American Telephone and Telegraph Company, which with its subsidiaries operates a unified system of communications covering most of the continent, with few blind spots outside of such areas as the Southwestern desert.

Officers Amazed

The system itself amazed those who saw it for the first time. High-ranking officers from Washington and important officials of the civilian defense organization were heard to murmur that it was like something Orson Welles might have concocted. There was an important difference, a difference which Maj. Gen. Herbert A. Dargue, commanding general of the First Air Force, put into two words in a comment to Brig. Gen. John C. McDonnell, commanding the First Interceptor Command. They were: "It works."

Here's how it works:

Forty thousand observers, civilian volunteers, took part in the test at 1,600 observation posts-distributed five to eight miles apart in a strip averaging 125 miles in width from North of Boston to South of Norfolk.

At each observation post one or more observers was on duty at all times, shifts being arranged locally. Each observation post was located with convenience to a telephone as a prime requisite.

When a plane of any kind passed within sight or sound of an observation post the observer noted, on a form supplied for the purpose, the number of planes observed; whether they were single-motored, bi-motored, multi-motored or unknown; whether "very high", "high", "low", "very low" or "unknown" (no effort to estimate in feet) whether seen or heard, direction in which sighted, estimated distance from the post and direction in which flying. The observer might be lifting the receiver of his telephone while jotting this down.

Has Telephone Right-Of-Way

The switchboard light for an observer's telephone is of a special color, so the switchboard operator will know the caller is entitled to send a collect telephone call to the army with no delay. An "army flash" cannot be sent on other telephones. If this were not so patriotic American citizens, if they thought they had sighted an enemy, would jam the telephone system with so many messages that none could get through. It would be comparable with the packing of French and Belgian roads with refugees who unwittingly aided their enemies by creating traffic jams that blocked the movement of their own troops.

The observer, however, using his regular home or office telephone, calls "Army Flash!" The operator asks no questions; she connects him with the local long distance board where he is immediately connected with a direct wire to the nearest filter board.

Ten seconds, on the average, after he says "Army Flash" a plotter at the Filter Board replies "Army. Go ahead, please."

So he reads his notations from the slip of paper. No time wasted in discussion; no explanations.

If he says "four planes" she places a small disk the size of a shirt button, bearing the number "4", upon a black spot on the Filter Board, which is really an irregularly shaped table constituting a one-inch to one-mile map of the filter area. The black spot indicates the location of the observation post.

"Pips" Show Type And Location

If he says "multi-motored" she adjusts the bottom part of a "pip" (small movable standard) in her hands so that the letter "M" is uppermost. If he reports "Very high" she adjusts the middle section to show "VH". If he reports "Seen" she adjusts the point of the pip to show green. If the

planes were only heard the point shows red. When he reports direction and distance from the post the plotter places the pip on the board at the place and pointing in the direction reported. So the first observer's report is on the board, put there more quickly than it was possible to explain it. The plotter says "Thank you" and is ready for the next.

That is fast work but so far not impressive. There's so much more to be done and so little time to do it. If the plane really is an enemy, sighted perhaps 100 miles from its objective, it probably is moving at five miles a minute and that means there's only twenty minutes from the time of sighting to do the following things:

Get complete information to headquarters.

Ascertain if the plane is friendly or enemy.

Ascertain exactly where he is, including his altitude in feet.

Ascertain his speed.

Ascertain where he will be when our own pursuit can reach him.

Get orders to the airdrome in the best position to fight off the enemy.

Get the planes off the ground.

Get up to the enemy's level.

Go where the enemy is.

Knock him down.

To complicate matters, much of the information already received and much that will be received later is and will be inaccurate. For instance, if an observer reports a flight three miles away it is quite likely to be two or four instead of three. And "High" or "Very high" are far from accurate terms. (What are those old jokes about "How high is high?" and "How long is a piece of string?") But planes going up to fight an enemy must know exactly how high.

Must Eliminate Inaccuracies

Filtering out the inaccuracies - evaluation and interpretation - is the task of the filter board plotters.

Before the first observer completes his report another observer will have seen the plane or planes. His light flashes at the filter board. The plotter answers - in a few seconds another pip is on the table. Then another and perhaps another, near each other and pointing in different directions.

By this time another plotter, standing behind the one seated at the table and taking reports, knows these are all the same flight. He also knows that planes ordinarily fly in straight lines - the shortest distance between points over hostile territory. So he removes the pips and places an arrow at the point where the plane really was. The inaccuracies as to position and direction thus are self-eliminating.

Most of the observers will report the correct number of planes, so the plotter takes the majority vote on this. He makes a little stand out of numbered and lettered pieces of cardboard, which he attaches to a metal frame which he moves ahead of the line of arrows which begins to form on the board. This stand describes the flight - perhaps "4VHM", meaning four planes very high multi-motored."

By the time fifteen or sixteen reports are in, an experienced officer, knowing the averages in this matter, can estimate within about 500 feet how many "very highs" and "highs" mean 10,000 feet. Sixteen "highs" and two "very highs" mean a very different altitude from nine "highs" and nine "very highs".

Colored Arrows Used

Arrows of three colors are used and the color is changed every five minutes. This automatically provides an estimate of speed. Without an estimate of the enemy's speed it would be impossible to decide where to go to meet him.

The pips are information. The arrows are military intelligence. On a balcony overlooking the filter are tellers who watch every move on the board. When one sees an arrow, or new stand, she speaks into the mouthpiece of her headset, reporting the military intelligence on the filter board. It is immediately duplicated on the operations board at the Information Center, which is regional headquarters. The filter board and operations board may be in adjoining rooms, but as there ordinarily are two or more filter areas in a region the filter board may be in another city. Direct wires, used for no other purposes, are utilized, however, so there is no difference in the time of transfer.

The military intelligence on the operations board is not yet far enough advanced for tactical action, however. We still do not know if the planes reported are friendly or enemy. It will be necessary to find out - the observer wasn't even asked to give an opinion because even an expert in airplane silhouettes could not give an opinion that would have any value.

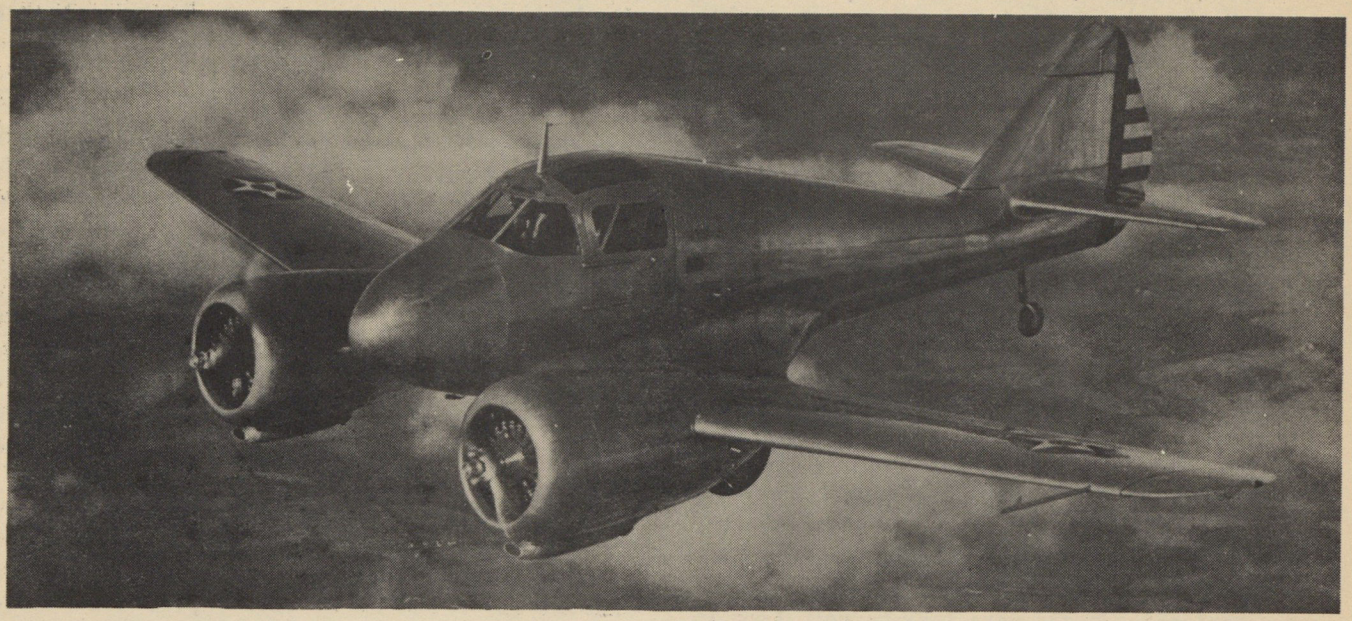
Liaison Officers Present

On a balcony overlooking the operations board are liaison officers from the Navy, Civil Aeronautics Administration, Bomber Command, and Air Support Command. They are in constant communication with their own organizations as to planes in the air. As soon as they see an unidentified flight on the board they check to see if it belongs to them. If not - it is an enemy. They report their findings to the raid clerk, who has a table beside the operations board. If friendly the raid clerk puts a green tab on the metal stand; if enemy a red tab.

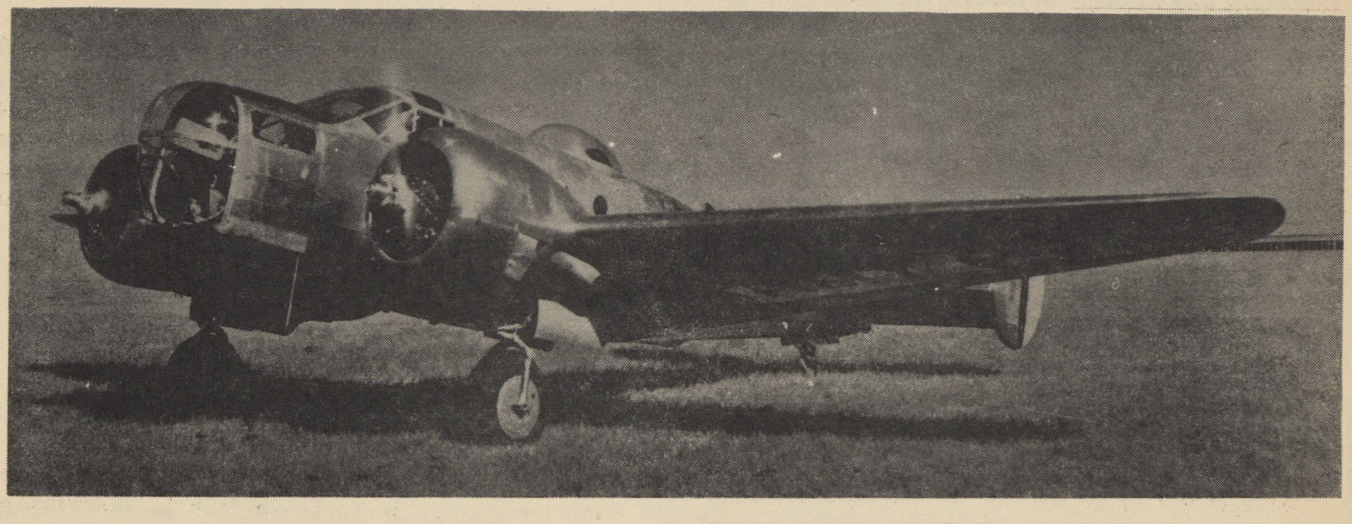
Also on the balcony overlooking the operations board is the controller or control officer, who is the tactical commander of the region, acting for

(Continued on Page 14)

NEW AIRCRAFT FOR THE ARMY AIR FORCES



AT-9



AT-11

NEW planes delivered to the Air Corps for service testing during the past month are the AT-9 and AT-11, both twin-engine advanced trainers.

The AT-11 is a low-wing, all-metal monoplane manufactured by the Beech Aircraft Corporation for training a crew of three or four men. It is equipped with flexible guns and bomb racks. The wing span is approximately 47 feet, the length 35 feet.

Equipped with a retractable landing gear and twin tail, the AT-11 is powered with two nine-cylinder, 450 horsepower Pratt and Whitney engines.

Propellers are two-bladed, and have a diameter of approximately eight feet. The plane will be used for the specialized training of bombardiers and gunners.

The AT-9 is also a low-wing, all-metal monoplane equipped with retractable landing gear. Manufactured by the Curtiss-Wright Corporation, it is designed for the training of pilots of multi-engine fighters and bombers. According to plans it is expected to facilitate the transitional training necessary in the transfer of pilots from single-engine planes to the latest types of multi-engine tactical aircraft.

Seats for the instructor and the student pilot are placed side by side in the AT-9. The plane also incorporates the same general performance and operating characteristics of modern multi-engine combat planes, and includes many of the same instruments. Powered with two 280 horsepower radial air-cooled engines, the plane has a wing span of 40 feet, and weighs more than two and one-half tons.

DEFENSE... *(Continued From Page 12)*

the commanding officer. Facing him across the operations board is a status board, which tells him how many planes are available at any moment at each airdrome in his region. When he sees the red tab he quickly decides which airdrome is in the best position, both as to location and planes available, to effect an interception and he immediately orders into the air enough pursuit to do the job.

It has taken me longer to write it and you longer to read it, but, on the average all these things are done within three minutes. One and a half minutes from time of sighting to the decision; another one and a half minutes for transmittal of the order. It's mighty quick work but during that time the enemy has traveled fifteen miles.

Information Center Guides Planes

Once his order is given the controller is through, but the planes now have to find and meet the enemy. Obviously the pilots of fast pursuit planes haven't time to circle over rivers or other landmarks finding their way; they haven't time to make instrument calculations; they have no way to ascertain any change of course the enemy may make while they're hunting him. So a man on the ground, in a little cubby hole at the Information Center, guides the pursuit to the enemy, even making use of any cloudy areas that might help - or dodging any that the enemy might utilize.

While the pilots are getting aboard their planes a radio officer is clearing a radio network for an intercept officer to talk directly with the pursuit commander in the air. Tellers at the filter board begin reporting direct to the intercept officer the flight he is to intercept - and a moment later the flight he is guiding. Weather information, including wind velocities at various altitudes, begins pouring into him from the weather officer.

With gadgets operating on the same general principles as slide rules he calculates the point at which our pursuit can cut off the enemy. He talks constantly with the flight commander. He guides the pursuit to the interception point. Two or three miles away the flight commander probably will see the enemy. He flashes back a code word to that effect. The intercept officer cuts off - he is through. The fliers are on their own now. They react in split seconds and can't take time to talk with any one.

Get In The Air Quickly

It takes the fliers about one and a half minutes to get into their planes and take off after receiving orders. Another seven and a half miles for the enemy. It takes about two and a half minutes to climb 1,000 feet and assemble. At this point the enemy will have traveled 35 miles from point of sighting. If the enemy is flying at 10,000 feet it may take another 3.4 minutes to climb up to him. That's 52 miles, but our pursuit will have advanced 15 while climbing.

Less than ten minutes to reach the enemy after that climb - not much leeway but that is the measure of the speed in the fastest military maneuver ever seen on this earth - the interception of fast bombing planes. Ten minutes if we're lucky and sometimes we hope to have fifteen or twenty, but there aren't any seconds to spare and the Interceptor Command is working to cut down the time for the interception.

The October test was threefold in purpose. First it was for the training of personnel. Second it was to ascertain how the system could be improved and speeded up. Third it was to inform the public as to what was being done to protect it from possible raids that might come at any time without warning and to show how the public could help.

Lieut. Gen. Delos C. Emmons expressed himself as well-pleased with the whole test, - with the work of General Dargue of the First Air Force, General McDonnell of the First Interceptor Command, of their staffs and assistants, and of the military personnel and civilian volunteers who gave their time and services.

One aspect of the test, not unexpected, was the difference in time elements at the beginning of the test and at the conclusion. For practical purposes the nation's air defense needs equal speed at all times; it must keep people in training and available for that unknown moment when they may be needed.

EXPANSION... *(Continued From Page 5)*

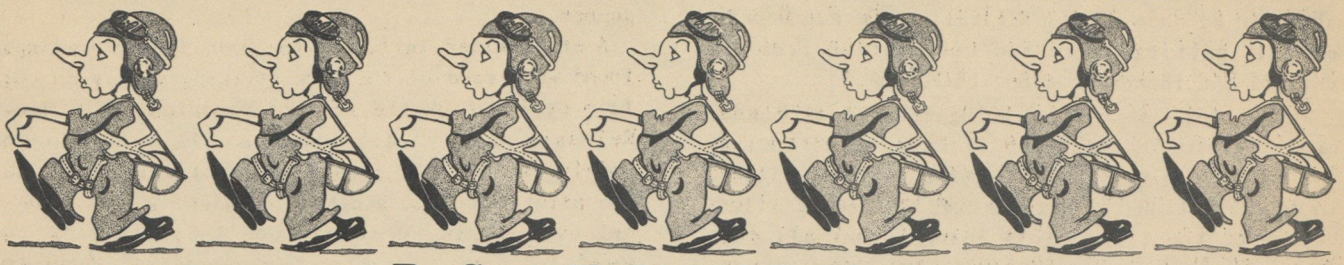
rather than on their own airdromes as was so widely believed. It is too easy to disperse or conceal aircraft on the ground and protect them with individual parapets so that losses will not be critical.

Air Power Versus Sea Power

Where air power and naval power have come into conflict in the present war, there has not been a single instance where naval power has prevailed over air power, whereas the invasion of Norway, the sinking of the *Bismarck*, the invasion of Crete and other engagements have provided examples of air power prevailing over naval power. Sea power, incidentally, is no longer synonymous with naval power. Sea power is a combination of air and naval power. Its vital importance has never been more clearly recognized than it is today.

Finally, air power is a factor of utmost importance, at times of supreme importance in war--any kind of war.

EVERYBODY'S GOING TO THE MOVIES



By Capt. Nathaniel F. Silsbee

THE Army Air Forces are going to the movies on a grand scale. They say one picture is worth ten thousand words, and what you once see, you can't "unsee". In these two phrases is wrapped up the whole philosophy of the modern trend toward the use of pictures, charts, maps and diagrams as effective teaching aids. During the past few years this has received a tremendous impetus by the adaptation of moving picture sound films and film strips to class instruction.

The War Department for some time has recognized the great value of visual aids in easing the teaching problem, particularly in view of the very rapid expansion, which has put a great strain on the instruction staffs of the various branches. A program for furnishing specially prepared illustrations to the instructors in the field is now well under way. Field Manual 21-5 "Military Training", and Training Circular #34, War Department 1941, contain instruction in the proper integration of training films within the training schedule. FM 21-6 "List of Publications for Training" contains a list of the training films released to date.

Film Units Established

To meet the instruction problems which arose with the tremendous expansion in the training of aviation cadets and airplane mechanics and technicians, in the autumn of 1940 the Chief of the Air Corps provided for the establishment of four Training Film Preparation Units. These are fully staffed with competent visual aid specialists, and it is their job to whip the vast amount of material into shape for proper presentation. These units are located at the technical schools at Chanute Field, Illinois, and Lowry Field, Denver, and at the flight training centers at Maxwell Field, Montgomery, Ala. and Randolph Field, Texas. Each of these units has a two-fold division of its work: (1) to prepare plans for motion picture sound films, and (2) plans for film strips.

The Training and Operations Division, Office of the Chief of the Air Corps, has prepared a list of some 58 Training Film Projects (all sound), some of which are now available, with several others in the works. A "First Priority" group of 24 sound films includes fairly complete projects covering Celestial and Aerial Navigation, Aerial Bombs and Bombing Technique, Aircraft Propellers, the Automatic Pilot, Aircraft Identification, with shorter ones on Aircraft Radio, Instrument Landings, Weather, etc.

11 In "Second Priority" Group

A "Second Priority" group of 11 sound films includes a series on Airplane Structures; on Airplane Hydraulic Brakes; on Teletype Printers; on Aircraft Machine Guns and Cannons and Machine Gun Sights, with others on Pursuit Aviation, Air Reconnaissance, High Altitude Flying, etc.

The "Third Priority" group contains 23 sound films of a miscellaneous character, including 9 on flight techniques, acrobatics, formation flying, etc., with others on Turbo-Superchargers, Aircraft Icing, Air Corps Supply System, etc.

A second type of official visual instruction aid is the film strip. These can be made invaluable for emphasizing certain details covered more generally in the sound films. Equipment and techniques may be clearly illustrated in the form of still pictures, drawings, charts, cartoons and the like. Obscure parts can be emphasized for teaching nomenclature and functioning, and motion can be arrested for detailed study.

When sufficient visual aid equipment is available, it is contemplated that in connection with a given course a complete sound film would be used at the beginning for orientation purposes. This would be followed by the use of film strips to cover the subject in detail, and at the end or the course the sound film may be shown again, as an effective method of review.

Although the advantages of the use of sound films and film strips are fairly obvious and quite generally recognized, it may be of interest to indicate some of the War Department reasons for regarding such visual aid as valuable time savers and also as methods of improving the quality of instruction.

They concentrate attention by showing only the essential action or subject. They bring the demonstrations of techniques and exercises directly into the classroom, and the same demonstration can

be shown repeatedly if necessary. Films on the use and care of new equipment, such as a new type of engine, propeller, carburator, etc. can be shown in advance of its arrival. (The War Department is getting increased cooperation from the various manufacturers along this line.)

Instruction at all training centers is standardized, and the services of expect instructors and the most highly trained personnel are utillzed in demonstrating the methods and techniques illustrated on the film. This insures that all students, regardless of location, have constant visual access to the latest approved methods as a standard in attaining their training objectives.

Although the training films and film strips are so designed that the picture itself will clearly indicate the exact lesson to be taught, there is plenty of scope for the individual instruetor, especially in connection with the film strips. Even in the case of the sound film, where the instruction is completely integrated with the pictures, the topnotch instructor will always add to the lesson by introductory remarks or discussion and comment afterwards.

Mechanics Series Complete

One of the most complete projects in connection with training film strips is the series for instruction in Airplane Mechanics. This will eventually cover 118 film strip subjects, divided into nine groups as follows: a) Film Strips for use in Basic Instruction, Airplane Mechanics - 13 film strips, including Maintenance Policies and Functions of Air Corps, Maintenance Publications, Maintenance Records and Reports, Aircraft Materials, etc. b) For use in Airplane Structures (10). c) For Hydraulics and Miscellaneous Equipment (14). d) For propellers (13). e) For Instruments (15). f) For Engines (12). g) For Aircraft Electrical Systems (17). h) For Carburation (11). i) For Aircraft Engine Operation and Test (13).

Films must be fitted editorially to the requirements of the various Air Corps schools, such as primary, basic and advanced flight training, aerial bombardment, navigation, etc. The Randolph Field Training Film Preparation Unit, for example, is charged for the most part with the production of films to be used in connection with the pilot training program.

Among other things, young aviation cadets have to be taught the things they must NOT do. To put this across effectively, the pictorial art of Jack Zumwalt, commercial artist and cartoonist of Dallas, was pressed into service. The result was the creation of Aviation Cadet Knucklehead of the Army Air Corps, who's never been right in his life and whose motto is "Keep 'em Falling."

Originally forming part of a film strip entitled "DON'TS", designed to warn student pilots against common errors, Knucklehead provides the perfect examples of when, where and how NOT to do things. The pictures of the mythical bonehead proved so attention-arresting that he soon became a "starlet of the first magnitude", appearing in scores of scenes.

A still wider influence for Dodo Knucklehead was found when some of the more striking scenes on the film strips took the form of Randolph Field News Releases with glossy photos. These have been widely used by the press, and public interest in the pilot training program stimulated. One amusing example is entitled "Don't Concentrate on Maps" and shows "The Flying Frankenstein" about to crash into the tower of a building labelled "City Hall, Altoona", with his face plunged into a sectional map and exclaiming, "I *should* be in the vicinity of Altoona!"

Libraries At Each Station

The procedure governing the requisition, supply and distribution of training films and film strips in Army Air Force is found in A.A.F. Regulations No. 65-4, of September 17, 1941. Training Film Libraries will be established at each Air Corps Control Depot in the United States. Sub-libraries and distributing points will be operated by the Commanding General, Air Force Combat Command, and the Chief of the Air Corps, at each Air Force headquarters, Air Corps flight training and technical training center, tactical school and other points at the discretion of the Commanding General AFCC and Chief AC.

DUNCAN FIELD

The above design, created by artist T. J. Hinnant II, will be carried on the cars of men and employees of Duncan Field in order to illustrate their part in the program to "Keep 'Em Flying".

The Middletown Program

Training Craftsmen for the Air Depot

By Corporal George Eckels

Second Transport Squadron

A comprehensive four-fold program for specialized training in the field of engineering, supply, administration, and military science has been developed and placed in operation by the Middletown Air Depot.

Typical of the training programs is that developed in the field of mechanics and engineering, in which the need was most urgent. It is a continuing program, based on a training course of four months duration.

Executing the program, under the supervision of Captain Herbert A. Pelton, is a complete staff geared to meet demands for speed - efficiently and safely. The staff includes a personnel administrator and a technical librarian who also supervises compilation of texts and technical materials. We have a civilian training director, two shop coordinators, a specialist on job analysis, a director of apprentice training, and about twenty clerks.

Township Instructors Used

Key men on the staff are 188 part-time instructors. There are twenty full-time instructors assigned by the Derry Township School District, (Hershey, Pennsylvania is in Derry Township) which pays their salaries.

The school district's expenses are subsidized by the Commonwealth of Pennsylvania and, for national defense training, a subsidy was also allotted by the United States Office of Education. Normal salaries of instructors are paid by the State while payment for overtime is made from federal funds. Derry Township instructors also aided in establishing engineering training courses and in editing textbooks produced for the emergency program. Key mechanics and foremen in Middletown Air Depot's shops outlined and wrote the training courses.

The senior mechanic or foreman of each department supervises training in his own sphere of specialization. Under this plan every man in the depot is being trained to be some kind of specialist. Four-fifths of all training at the depot is in engineering subjects. We use the pyramidal system of instruction in each department. By that we mean that as an individual student progresses toward a higher level of experience, he teaches what he has already learned to the newer men behind him. The values of this system are manifold. It teaches teamwork. It helps the instructor. It helps the experienced mechanic. It certainly aids the newer men. It saves time for foremen and department heads.

Training Practical

Vocational training at Middletown is a practical synthesis of instruction in working shops and adjoining classrooms. This plan allows trainees to gain "on-the-job" experience on material they will work on after their period of basic instruction is completed. Six portable classrooms have been built adjacent to the depot's engineering shops. Each classroom has its own maintenance crew. Wide windows and bright fluorescent ceiling lamps provide adequate lighting for lectures, blackboard discussions, meetings, and specialist training, twice around the clock.

In intensified technical training, one of the greatest needs is for practical instruction methods. Wide usage is made of visual aids and mock-up boards at the Middletown Training center. These excellent devices increase the "seeing range" of students. For example, as many as fifty students at one time may carefully examine a board showing the complete scheme of the electrical system for the B-18 Bomber. By pulling a switch, cut into the circuit, course instructors may short-circuit the board and then, as a test, designate a trainee to find the trouble. Large numbers of students may examine similar boards showing a B-18A hydraulic layout, instrument panels, and so on.

An obsolete and surveyed plane has been rebuilt and used to train mechanics to taxi and start engines. Use is also made of training films, produced by the Maintenance Command at Wright Field. These include titles on aircraft electrical systems, propeller installations, and engine mechanics. The Middletown Air Depot serves as a control center to distribute films to the fields served.

Writing Own Texts

When defense training classrooms were first opened at the depot, no textbooks containing the required specialized information were available anywhere. None had been written that was suitable. Textbook conpilers of the future may well look to the original work done by the pioneers of Middletown for guidance. Men there are writing their own course outlines and texts. The depot

has in use complete equipment for photostat developing and printing.

The effectiveness of the Middletown plan is revealed by statistics. Early in 1941, as the program started, the training staff worked day and night, building up course outlines and text books; selecting qualified instructors; and forming schedules. At the start of the expansion of the training effort, hundreds of new general mechanic helpers were being trained in basic principles of maintenance, besides some apprentices and a number of younger men assigned from the National Youth Administration. By the end of September, 1941 the school had graduated a large number of basically trained general mechanic helpers. The general plan was to allot 60% of each man's time to "on-the-job training" and 40% to formalized training in the individual's particular trade.

It has been impossible to procure mechanics skilled in the trades used in the air depots since industry has already absorbed these men. Therefore it was necessary to employ people whose only recommendation was that they had worked at some trade for not less than six months. Fortunately there has been a steady supply of such men due to the fact that the repair depot lies in a great industrial complex, centering in Harrisburg (Dauphin county) and spreading outward over several adjoining countries. Here there is a great backlog of available manpower. High selectivity was used as the training program was launched.

Training Begins At Once

Procedure for entering the government's aircraft maintenance service (also true in the case of training for occupations in technical supply and administration) is much the same as governs entrance to employment in any federal bureau. About 1500 candidates must be interviewed for 1200 vacancies. The mechanic is assigned to a section. His training begins at once. When it is discovered that a man does not have aptitude for training under an original assignment, he is given a second change in another specialized field. If he is not suited for any type of aircraft work he is discharged.

After about six months the trainee is eligible for promotion if his record is excellent. In half a year he has had about four months' formal training and two months' practical experience in the shop. When promoted he becomes a junior aircraft mechanic. When he is again promoted he becomes a journeyman mechanic.

To record trainees' skill, knowledge, personality, and general aptitude, a comprehensive progress reporting system has been introduced in the form of a card index. A report of each student's work in the shop and in the classroom is made each month by his immediate supervisors. Introduced as a visual aid is a color-tab system which reveals at a glance the individual's current status. The system also shows the progress made in a whole department, or in a single trade, or under one designation.

Development Speed Important

Speed of individual development is also important. The progress report shows this on a month-by-month basis. The color code for grading quality of performance is: blue, excellent; purple, good; orange, fair; red, unsatisfactory. When, for example, a sub-depot requires thirty trained mechanics for emergency or permanent assignment, the engineering officer can determine which men are qualified and available, in a very few minutes.

Advancement to higher positions in other posts may be thought of as a function of "blueness" of record, although administrators consider fully other factors, such as whether transfer to a distant post in the control area would constitute a hardship for the individual or his family. Further, all of the men who have shown excellence in performance cannot be held ready for transfer. Some of them must be retained in order not to weaken the local production efficiency.

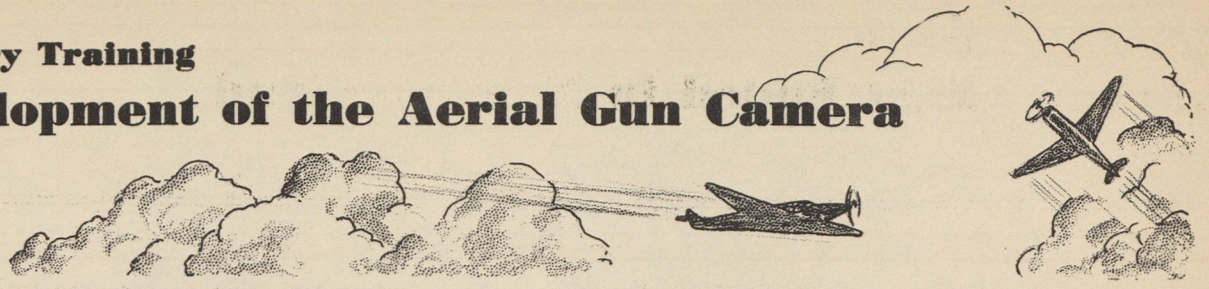
Similar problems have arisen in the field of administration, especially with respect to the standardization and handling of records which could be expected to grow to massive proportions week by week. The officer appointed for this type of training has also been given command of a still unexecuted plan to establish a military college at the depot, where specialized officers may be trained. This school, like others to be founded at other posts, will be a sort of extension center for enlisted men considered for commissions. This phase of training is still in the explorative stage.

Special Commendation

So capable has conduct of the training program by officers at Middletown Air Depot been considered that special commendation has recently been made by an expert consultant to the Secretary of War. An idea has grown to maturity and produced definite results in less than twelve months. Whatever defense needs of the future may be, the Air Corps' training section at Middletown is ready. This is the answer to a question that had to be answered in record time. Thousands of skilled mechanics trained at Middletown are already employed at bench, at engine, at lathe, in supply warehouses. In the months to come, thousands of others will go up to the line to work for national defense. This vast army of trained civilian technical experts will literally 'keep 'em flying."

Gunnery Training

Development of the Aerial Gun Camera



THE use of gun cameras for training pilots in aerial gunnery dates back to World War I, as does the actual use of machine guns in aerial combat. But just as the actual armament of heavy-caliber machine guns and aerial cannon now in use on our newest planes is far superior to the one or two hand-operated guns which armed planes of the first world war, so is the new training equipment 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, and records both of these on each frame of film taken. In addition, the new equipment has an overrun device, which keeps the camera going after the pilot ceases firing for a predetermined time, to record what happens after he ceases to fire.

May Be Used In Combat

Earlier gun cameras were mounted on machine gun mounts, necessitating 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 works 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 of it, after he has ceased firing his guns.

The new Air Corps GSAP camera is electrically driven, equipped with a 50-foot film magazine using standard black-and-white 16 mm. motion picture film. The pilot may vary the speed of the camera from 16 to 64 frames a second, by a reset knob. The machine compensates for atmospheric conditions by aperture controls for bright, hazy and dull weather, which are accessible in flight. But the film latitude is sufficient for the camera to produce satisfactory pictures 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.

Lens May Be Heated

The device is so designed that the optical system showing the gunsight in each frame may be replaced with a straight lens arrangement to get ordinary pictures without the gunsight, if desired. 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 his gun ahead of the swift-moving adversary plane. 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 an 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 between the two planes, the speed at which his ship is traveling and the speed of the adversary plane. And it is in the measurement of the lead which the gunner takes, which gives the new equipment an important advantage.

Each frame of film has four indice marks midway on the sides, the top and the bottom of the frame. The camera is adjusted before takeoff so that the sight, an electrically lighted two barred cross, coincides with these indice 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, actually the guns of the attacking plane would be pouring a stream of lead into the opponent.

Can Determine Hits

The developed film is projected on a small viewer screen, equipped with a mil 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 can determine whether the frame should be scored as a hit.

After the instructor scores each strip of film, he can call in the pilot who made it, and point out his errors. Frequently the film is shown to a group of pilots in the classroom on a larger screen, also equipped with the mil scale, 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 branch technicians have suggested that each magazine be placed in a hand movie camera, by the

(Continued on Page 30)

Air Forces Search

Ocean Flight Ended in Newfoundland

A five-man party from the Forty-first Reconnaissance Squadron, stationed at the Newfoundland Air Base, last month located and searched the wreckage of civilian flyer Tom Smith's Aeronca "Baby Clipper" which crashed in the rocky wastes of Newfoundland more than two and a half years ago.

Smith, a pilot from Clarksburg, W. Va., was headed for London when he took off from Old Orchard Beach, Me., on May 28, 1939. He was never heard from again, and, until recently his fate was not known. Then the wreckage of his light plane was sighted by an aircraft of the Royal Canadian Air Force. Search of the site was ordered accomplished by personnel of the Newfoundland Base Command.

Flying an OA-9, Lieuts. P.A. Sykes, pilot; R.W. Boggs, co-pilot; J.H. Shaw, navigator, and F. R. Amend, observer, and Cpl. R.H. Hubsch, engineer, set out to locate the plane, reported at approximately 47° 47' Latitude and 57° 38' Longitude.

Wreck On Barren Ridge

The search party found the wreck atop a rocky ridge about 15 miles north of the south-coast Newfoundland town of Burgeo, and three miles east of a mountain stream named Grandy Brook. The terrain was described as mountainous, rocky and barren and with very few trees.

Landing on a small lake at the foot of the ridge, the men anchored the OA-9, inflated a life raft and made for shore. They found the underbrush very thick and hard to penetrate, and after an hour's work managed to push through to the site of the crash.

Smith had made an excellent landing, considering what was available, and the searchers found the plane lying in a normal upright position, damaged very little. After more than two years the tires were still inflated. The plane's two auxiliary fuel tanks, with a total capacity of 160 gallons, and the regular 12-gallon tank in the nose of the plane were empty, probably due to the years of evaporation and leakage.

Newspaper accounts of Smith's proposed trip reported that he had prepared very thoroughly for his flight across the Atlantic, and he was said to be determined to prove the ocean flight feasible in a light plane.

Numerous papers and charts and much equipment were found in the plane, but there was no trace of the pilot. The mission discovered a note in which Smith had written that he had been forced down by icing conditions, that it was sleeting and that he was afraid of freezing to death if he remained in the ship. He wrote that he was going to walk in a northwesterly direction to hunt for some sign of habitation.

The Aeronca had been equipped with a complete set of blind flying and navigation instruments. Everything of value was salvaged and returned to the flyer's father.

A second search in the direction Smith had written he would walk resulted in the discovery from the air of an easily discernible line of "Indian Signs"--mounds of rocks and sticks placed to point in a northwesterly direction. These signs were about three miles from the wreck.

Landing again on the lake, the searchers looked for more notes, but found only a 1928 Portuguese coin and two bottle tops. About 300 yards from the line of mounds, a log hut, which apparently had been erected by a trapper, was discovered. There was no evidence that Smith ever had found the cabin. Whether Smith or the hut-builder had erected the mounds remains a mystery, for the search party found nothing further.

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It is the function of the Air Council of the Headquarters Army Air Forces to periodically review and coordinate all major aviation projects of the Army.

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Aviation cadets assigned to the new Air Corps primary training school at Avon Park, Florida, are never quite sure upon arrival whether they are in the Army or on a millionaire's vacation. The school's barracks, formerly a fashionable resort hotel, are located between two lakes, surrounded by palm trees, and have a private golf course. Ground school classes are held in a lodge on the shore of a nearby lake. A civil contract school, it is operated by the Lodwick Aviation Military Academy.

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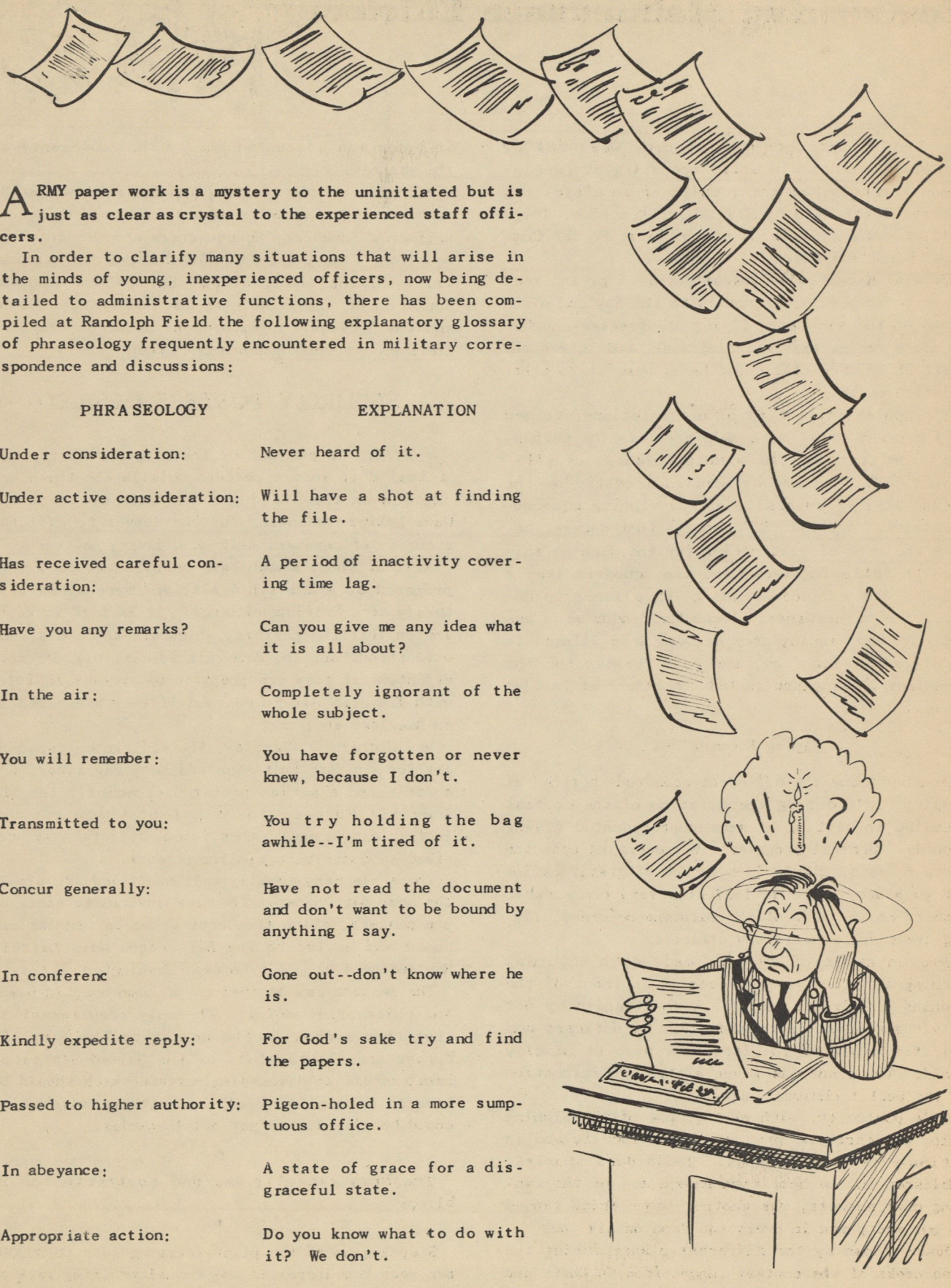
Dispatches from London indicate that the German Luftwaffe has developed a new fighter which is being used against the R.A.F. It is described as a Fokker-Wulf monoplane with a radial engine estimated to be rated at 1320 horsepower. The plane, it is believed, is capable of doing 370 miles per hour at 19,000 feet. Ceiling is estimated at 40,000 feet.



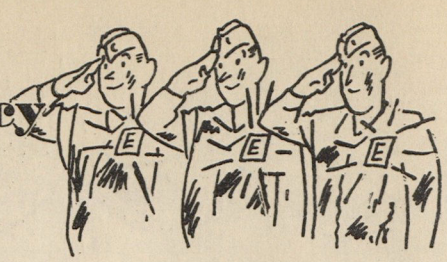
ARMY paper work is a mystery to the uninitiated but is just as clear as crystal to the experienced staff officers.

In order to clarify many situations that will arise in the minds of young, inexperienced officers, now being detailed to administrative functions, there has been compiled at Randolph Field the following explanatory glossary of phraseology frequently encountered in military correspondence and discussions:

PHRASEOLOGY	EXPLANATION
Under consideration:	Never heard of it.
Under active consideration:	Will have a shot at finding the file.
Has received careful consideration:	A period of inactivity covering time lag.
Have you any remarks?	Can you give me any idea what it is all about?
In the air:	Completely ignorant of the whole subject.
You will remember:	You have forgotten or never knew, because I don't.
Transmitted to you:	You try holding the bag awhile--I'm tired of it.
Concur generally:	Have not read the document and don't want to be bound by anything I say.
In conferenc	Gone out--don't know where he is.
Kindly expedite reply:	For God's sake try and find the papers.
Passed to higher authority:	Pigeon-holed in a more sumptuous office.
In abeyance:	A state of grace for a disgraceful state.
Appropriate action:	Do you know what to do with it? We don't.
Giving him the picture:	Long, confusing and inaccurate statement to a newcomer.

"E" Awards at Langley

Engineering Maintenance Efficiency



ALMOST unprecedented records were set by heavier-than-air units operating at Langley Field recently, as the results of an efficiency contest instituted by Brig. Gen. Arnold N. Krogstad, commanding general of the First Bomber Command, First Air Force.

General Krogstad's contest involved giving recognition at weekly ceremonies to the day and night crews of the airplanes flying the greatest number of hours during the preceding week, and it was the start of an idea that could be of benefit to other aviation units.

The contest consisted of presentations, to men of the crews whose work made possible the mechanical condition of the winning planes, of efficiency "E's," pinned by General Krogstad on the grease-stained coveralls of the winning squadron mechanics. A large "E," about a foot square, became the mark of distinction for the winning ship for the following week, and the squadron itself was awarded a banner reading "Excellence in Engineering Maintenance." An added inducement was offered when winning crew members were allowed to enter, admission free, the post theater for the time that their plane ranked the others at Langley Field.

Flying Records Set

Rivalry among the different squadrons berthed at Langley Field during the duration of the contest resulted in setting of some unprecedented flying records. General Krogstad, in commenting upon the contest, said: "This is a source of gratification and pleasure, since it indicates very commendable efforts on the part of the maintenance crews, flying crews and supervisory officers."

Presentation of awards, made each Saturday morning at impressive ceremonies in front of the winning squadron's hangar, were attended by not only the squadron personnel, but by officers and enlisted men from the large air base at Langley Field. The plane was given a thorough inspection by the post technical inspector.

Wide publicity, with photographs of the winning ship, officers and men, was given locally and in nation-wide publications. Individual stories, published in the home-town newspapers of the winning crew members, was another honor which tended to put every man in every squadron on his toes.

Hours flown by the different planes during the five weeks of the contest ranged from 60 hours and 20 minutes to the almost unprecedented time of 106½ hours for a week's flying time. The variance in hours was accounted for by the inclemency of the weather.

All planes competing in the contest were B-18A bombers. Winning units were the Eighteenth Reconnaissance Squadron; Headquarters and Headquarters Squadron, Twenty-second Bombardment Group, winners twice during the contest; Second Bombardment Squadron of the Twenty-second Bombardment Group and the Nineteenth Bombardment Squadron, also of the Twenty-second Bombardment Group.

SECURITY POSTERS DESIRED

ARTISTS in and out of The Army Air Forces are asked to submit posters, similar to those being run on the inside of the back cover of the News Letter, pointing out the danger to national security of careless talk on military matters.

Most of those which have been run already were prepared by a British artist and were aimed primarily at a British audience. It is felt in Washington that the posters, which are to be distributed throughout The Army Air Forces, will be more effective if they are prepared by artists familiar with The Army Air Forces and if they are aimed at an American audience.

Mr. Richard Q. Yardley, the well-known cartoonist for the Baltimore *Sun* and many magazines, has contributed a series prepared especially for The Army Air Forces, the first of which was run in the last issue. Other famous artists have been asked to contribute similar posters.

There are many equally well-qualified artists in The Army Air Forces. They are invited to contribute posters, which should be drawn on regular mat board and mailed to The Air Forces News Letter, Headquarters Army Air Forces, Washington, D.C.

The posters may be serious or humorous, in black and white or in color. The only requirement is that they emphasize the danger to The Army Air Forces and the security of the United States of carelessness in discussing matters which should be treated as confidential, or anything else which could be of value to potential enemies.

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The Navy recently awarded contracts for 21 blimps.

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Stepping up of the pilot-training rate to 30,000 per year has increased the annual training rate of Air Corps pilots approximately 10,000 percent in the past four years.

MEDICINE

DISCIPLINE, in general, is the willing obedience to all orders and instructions, and in the absence of orders and instructions, the decision to follow a line of action one believes the orders and instructions would have required.

Discipline implies promptness and dependability. There exists among many an attitude of mind which makes for self-discipline, but in the case of large groups, one cannot depend upon it. The individuals must be trained, and the more complicated and hazardous the action required, the greater necessity there exists for training. Training leads to correct habit formations, which in turn, develop self-confidence, and discipline is then more apt to become manifest.

Flight Discipline may be described as a state of mind which has resulted from a willing and wholehearted obedience to all orders and instructions affecting conduct preliminary to and during flight, in order that lives may be saved and tasks performed.

Oxygen Discipline has become an important part of Flight Discipline.

Recent advances in aeronautical and power plant engineering have increased the ceiling of aircraft to heights, which require most exact methods in delivering oxygen to individuals in an airplane in order that full advantage may be taken of such high altitude equipment.

Training In Use Of Oxygen

The use of modern oxygen equipment, including the individual accessory emergency oxygen unit, in routine flights and in emergencies requires the training of all individuals prior to the time such flights are required and prior to the occurrence of the emergencies.

Only crew members who have demonstrated their ability to use properly oxygen equipment should be selected to perform high altitude missions. These men must also appreciate that it is mandatory to examine the oxygen equipment prior to flight and assure themselves that it is functioning properly. The crew must also be thoroughly convinced as to the importance of following the detailed instructions governing the use of oxygen and allow no interference to its continuous use until safe altitudes are reached. When they have developed that frame of mind, Oxygen Discipline has been attained.

Par. 1 a Technical Order No. 03-50-1 W.D. Office of the Chief of Air Corps, dated April 15, 1939, states, "Except in urgent, unforeseen emergencies all personnel will use oxygen at all times while participating in flight above 15,000 feet. Oxygen will also be used when remaining at an altitude below 15,000 feet but in excess of 12,000 feet for periods of two hours or longer duration and when participating in flight below 12,000 feet but at or in excess of 10,000 feet for periods of six hours or longer duration."

Death At High Altitudes

The limit of "unimpaired" performance without oxygen is 10;000 to 11,000 feet. Sudden deprivation of oxygen above 23,000 feet will result in mental deterioration, unconsciousness and death, the time required depending on the altitude at which the interruption of the oxygen flow occurs.

The margin of safety is so narrow at extreme altitudes that the failure of complying with instructions relative to the use of oxygen for so short a time as 35 seconds at 35,000 feet will result in unconsciousness.

The commanding officer of Air Corps troops is responsible for the oxygen discipline of the command, and under him the senior flight surgeon of the unit is responsible for the instruction and training of flight personnel in the limits and use of oxygen equipment. The several commanders are responsible that oxygen equipment is used in accordance with existing instructions and principles.

"Unimpaired" Performance Sought

The training of crew members will provide familiarity with the general subject and oxygen equipment,and the requirements therefor, and will result in their ability to properly protect themselves from exposures to high altitude and so accomplish their tasks. The object to attain is "unimpaired" performance.

Training consists of lectures which include measures that can be taken by individuals before and during flight to insure an unimpaired performance; demonstrations such as movies, etc. and experience in so-called "low pressure chambers." It is anticipated that in time low pressure chambers will be more generally available for the purpose of training personnel in the use of altitude oxygen equipment.

Altitudes can be assimilated in these chambers and personnel can be trained in and experience altitude conditions and in the use of life saving

accessory emergency unit (emergency ration of oxygen) at extremely high altitudes under controlled, safe conditions, until confidence in their equipment and self-reliance in the use of it can be developed.

Low Pressure Chamber Used

Training in the low pressure chamber is divided into elementary and advanced. Elementary training might be conducted at the Pilot Replacement Centers as part of their indoctrination and would include experience in preventing "earblock," determination of "anoxic level," and in the use of altitude oxygen equipment. Advance training, available to crew members for service flying, would include training in prophylactic "decompression," experience in altitude between 30,000 and 40,000 feet and the use of the life saving accessory emergency oxygen unit.

Lack of oxygen discipline is the result of dissemination of false and unscientific information relative to the need of oxygen during flight at seemingly low altitudes and absence of instruction and training in flight or altitude prophylaxis. There is no doubt but that in recent months experienced pilots have become oxygen conscious. The time is ripe to develop discipline in its use to the novice.

BY LIEUT. COL. READ B. HARDING
FLIGHT SURGEON, KELLY FIELD

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Colonel David N.W. Grant, Chief of the Air Corps Medical Division, has been named to fill the newly created position of The Air Surgeon.

In his new position Colonel Grant will serve as a member of the Air Staff, where his function will be to coordinate the medical activities of The Army Air Forces. He will also retain his post as Chief of the Medical Division, Office of the Chief of the Air Corps.

The new Air Surgeon is a graduate of the Army Medical School, the School of Aviation Medicine at Randolph Field, the Air Corps Tactical School and the Chemical Warfare School. He has been on duty in Washington since October 1, 1939.

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The Flight Surgeon must be a man of vision and ambition, a before and after dinner guzzler, a night owl; work all day and all night and appear fresh the next day.

He must be a man's man, a ladies' man, a model husband, a plutocrat, a technocrat, a Republican, a New Dealer, an Old Dealer, and a Fast Dealer, a technician, electrician, politician, a mathematician, machinist and ambidextrous.

He must be a promotion expert, create a demand for his services, be a good correspondent, attend all meetings, tournaments, funerals and births, visit fliers in hospitals and jails once a week and in his spare time do missionary work.

He must be 25 years of age or over, married, single or divorced, with unlimited endurance and frequent overindulgence in wine, wind and gab; must have a wide range of telephone numbers in all principal cities and villages for cross-country purposes.

He must have an attractive home (a tent will do), belong to all clubs, pay all expenses at home and on cross-countries on one-third of what his associates have, payable when Congress chooses to give it to him.

He must be an expert talker, liar, dancer, traveller, bridge player, poker hound, toreador, golfer, diplomat, financier and philanthropist; an authority on palmistry, chemistry, archaeology, psychology, physiology, neurology, meteorology, criminology, dogs, cats, horses, blonges, brunettes and red heads.

And furthermore the practice of medicine is prohibited.

(Note: This is the Medical Division's own version)

BRITISH ... *(Continued From Page 9)*

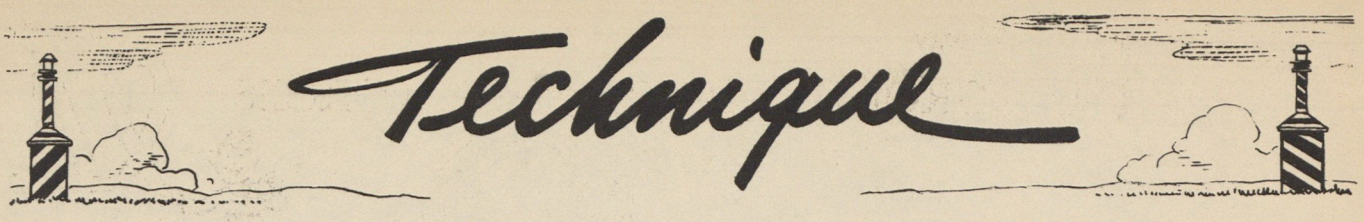
of Aeronautics, located at Tuscaloosa, Alabama; Darr Aero Tech, at Albany, Georgia; Graham Aviation Company, Americus, Georgia; and the Southern Aviation School, at Camden, South Carolina. Stearman PT-17's are used at all the primary schools.

Basic Training of the British is carried on at Cochran Field, Macon, Georgia, and Gunter Field, Montgomery, Alabama. Both are run directly by the Army. Cochran is another brand new field, construction having begun last April. Actual flying from the field began on June 4--three days ahead of schedule. The British cadets arrived August 17. Lieut. Col. D. D. Fitzgerald, Commanding Officer of Cochran Field, has found teaching the British to be "an enjoyable experience, and helpful to both the cadets and ourselves." Training planes used at the basic schools are BT-13's.

Return Home In Early 1942

Aircraftsmen receive advanced training from Air Corps instructors at Craig Field, Selma, Alabama, which is a single-engine school; and at Turner Field, Albany, Georgia, a twin-engine school. Turner, another new School, will have a capacity of about 800 pilot cadets--all British--when it is in full operation. Also located at the field is a navigation school, where American navigators are trained.

No cadets so far have graduated from advanced schools. It is expected that the first contingent will complete the course and return to England early in 1942. Once there they will be given further operational training with tactical units before being assigned to actual combat.



DEVELOPMENT of a control to reduce the number of levers normally used by the pilot has reached the flight test stage. While designed primarily for the single seat type of plane, its application in the larger planes is anticipated.

In the operation of an airplane equipped with an exhaust gas turbine-driven supercharger, the pilot now has four controls for the power plant--the throttle, the supercharger, the propeller and the mixture. Engine failures, due to excessive manifold pressures, can be caused by the pilot leaving the propeller control set for a low r.p.m. and opening the throttle. This builds up the brake mean effective pressure in the cylinder to a point that may cause either a head failure, a rod failure, or both. The same result would be obtained if the supercharger control were pushed to the full "on" position with the propeller set for a low r.p.m.

Three Controls Linked

In order to prevent these excessive manifold pressures, a linkage has been devised, by means of which the supercharger, throttle and propeller are coupled together. When the throttle lever is pushed forward or pulled back, the supercharger and propeller controls go with it. Thumb latches are provided on the control knobs so that the three levers can be operated individually, but when the throttle lever passes these levers, they re-engage and move with the throttle lever until again manually disconnected.

In this way the manifold pressure is gradually built up to a safe maximum when the engine is operating at a high r.p.m. While this combination does not give the ideal relationship of the three controls throughout the range of operation, it does give a workable combination for the average pilot. It also relieves the pilot of the operation of two controls under combat conditions and allows him to concentrate his attention on the enemy aircraft or on the other planes in his own formation. In the case of long-range cruising it still allows the pilot to make close adjustment of the individual controls to obtain better cruising conditions.

Foreign Designers Unsuccessful

Foreign designers have made attempts to build automatic boost controls, but so far these are effective for a limited altitude range only. The turbine supercharger, when set for any given altitude, produces a very slight increase in manifold pressure as the altitude is increased.

The inherent characteristics of the power plant made this control practical and it is expected that further refinements will follow with further tests on the experimental model. While it is impossible to know at the present time just when this combination control will be ready for delivery to the service activities, it is a trend of development concerning which it was considered they would be highly interested in receiving information.

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Randolph Field is utilizing a simple method, devised by the Air Corps Materiel Division, for promoting accuracy landings during night flying. On the expansive landing field, 10,000 feet long and 3500 feet wide, a landing strip, 3200 feet long and 400 feet wide, is set apart and marked off by a row of eight equally spaced lights on each edge. Green lights indicate the start of this improvised runway and amber lights denote the end. Red obstacle lights may be placed as much as 1000 feet beyond the landing strip itself - if needed.

Mounted on a conical base two feet high, the lights are shielded by a specially designed hood so as to make them barely visible, the illumination being concentrated on the landing strip.

Power for the portable lighting system comes from an air-cooled gasoline engine, just about the size of an outboard motor for a row boat. Within forty minutes the lights can be strung out along the ground, the miniature power plant cranked up, and everything is in readiness for night flying to get under way. It only requires about ten minutes for a three-man crew to dismantle the lighting system and load the equipment into a pick-up truck.

Field "Too Big"

Officers of the Basic Flying School declare that Randolph Field is too big for the 700 aviation cadets in training there to obtain any appreciable practice out of their night landings, pointing out that they can "cut the throttle" almost at will, establish a glide, and feel sure they will make the 2300-acre field. They believe these future pilots should not be permitted to grow careless in their accuracy landings at night, since they must buckle down to accurate landings at night just as soon as they are assigned to bomber or fighter squadrons.

As for the cadets, they are unanimous in their praise of the portable lighting system, claiming that it is even easier to land on the strip than in the glare of the floodlights with the whole flying field available.

Further Expansion Underway

EIGHTY-FOUR GROUPS FOR THE AIR FORCES

TO keep pace with the expansion of personnel and materiel of The Army Air Forces under the national defense program, it has become necessary to expand the 54-Group program to provide for a total of 84 combat groups as the next goal for the development of the army's air defense forces.

Although the establishment of a 54-Group or an 84-Group program does not imply in any way an ultimate ceiling for expansion, it had become evident that the framework provided by the earlier 54-Group program was entirely inadequate to house the expanding air strength of The Army Air Forces.

The 54-Group program, first announced in March, 1941, is being expanded approximately 50 per cent. to provide for an orderly and rapid continuation of growth of all essential elements of the army's air organization.

The enlarged program contemplates an increase in non-commissioned personnel of The Army Air Forces to a grand total of more than 400,000 aviation cadets and enlisted men by the end of the current fiscal year, June 30, 1942. Subsequent increases in personnel strength, perhaps to the 600,000 level, is possible beyond that date.

Adoption of the 84-Group program does not involve any change in the organization of The Army Air Forces, now in process of detailed organization under the leadership of Major General Arnold, Chief of The Army Air Forces and Deputy Chief of Staff. The two major components of The Army Air Forces, the Air Corps and the Air Force Combat Command, will remain undisturbed by the expansion.

Will Go To Combat Command

The new tactical groups are to be assigned to the Air Force Combat Command for operational training, while the Air Corps will continue in charge of the individual training of pilots and technicians, in addition to its supply, procurement and maintenance duties.

Attainment of the objectives of the 84-Group program will involve considerable expansion of recruiting and training activities. The 54-Group plan contemplated an expansion of The Army Air Forces to 16,800 officers, 187,000 enlisted men (including enlisted men assigned from other arms and services), and 15,000 flying cadets. The rate of output of the training schools of the Air Corps was placed at 12,000 pilots and 48,000 technicians per year initially to meet requirements of the 54-Group program. Subsequently, however, it became necessary to increase the goal of the training program to 30,000 pilots and 100,000 technicians per year.

Under the 30,000 pilot training program, three Air Corps Training Centers supervise the activities of 41 civilian schools giving 10 weeks of elementary training; 15 military basic flying schools and three civilian schools giving basic training; and 21 advanced military flight training schools, seven of which are single-engine flying schools, and 14 two-engine flying schools. There are three flexible gunnery military schools, one civil navigation school and three replacement training centers (pilot, bombardier and navigator). There are three navigator schools and six bombardier schools. Technical training of enlisted specialists is conducted in 19 other schools and three replacement training centers.

Expansion to 400,000

By way of comparison with the enlarged program, which contemplates a total of more than 400,000 enlisted men, it is interesting to note that on June 30, 1940, Army Air Corps personnel included 3,397 Regular Army and Reserve officers, 1,894 flying cadets and 45,914 enlisted men. At that time there were 16 skeleton groups and wings and the definite goal for expansion was 54 combat groups composed of all types of airplanes.

On June 30, 1941, the strength was 10,697 Regular Army and Reserve officers, 8,707 flying cadets and 126,666 enlisted men.

On December 18, 1940, four air district headquarters were activated, together with 14 additional wing headquarters, to provide the overhead to care for the assignment of all personnel and planes in the 54-Group program. Other groups were ordered into being January 15, 1941, and were formed from existing Regular Army units. By that time, the Army Air Corps had been expanded to approximately 6,180 officers, 7,000 flying cadets and 83,000 enlisted men.

The air districts now have become air forces, in a step intended further to expedite the growth and training of The Army Air Forces.

This was followed June 22, 1941, by the War Department by the unification of its air activities in the present organization, The Army Air Forces.

(Continued on Page 30)

The Month in Review

By Falk Harmel

Contracts For Airplanes

The Ford Motor Company, Dearborn, Mich., which has been producing Pratt & Whitney engines under license of the United Aircraft Corporation, Pratt & Whitney Division, was awarded a contract by the War Department totalling $182,955,559.02 for the manufacture of this type of engine, together with spare parts therefor.

The Republic Aviation Corporation, Farmingdale, L.I., New York, received a contract from the War Department in the amount of $64,404,036.50 covering airplanes and spare parts.

Orders for additional Wright Aeronautical engines were placed by the War Department with the Studebaker Corp., of South Bend, Ind., totalling $74,338,783. These engines will be manufactured in plants constructed under Emergency Plant Facility contracts and under license of the Wright Aeronautical Corp.

Changes Of Station

Scheduled for transfer to Ellington Field, Texas, from Brooks Field, Texas, are the Fifty-ninth and Seventy-seventh School Squadrons. Their strength of 150 men each will be brought up to 200 men each with the transfer of recruits from Ellington Field.

Upon completion of the five new schools in the Southeast Air Corps Training Center under the 30,000 pilot training program, a total of 45 units will be transferred to them from other stations in this center. Five Air Base Groups, each comprising a Hqrs. and Hqrs. Squadron, an Air Base Squadron and a Materiel Squadron, and 30 School Squadrons will be involved in this transfer. Maxwell Field will send eight units each to Greenville, Miss., and Moultrie, Ga. Eight units will go from Selma, Ala., to Dothan, Ala.; 12 from Albany, Ga., to Valdosta, Ga., and nine from Barksdale Field, La., to Columbus, Miss.

Three Air Base Groups, the Thirty-seventh, the Forty-fourth and the Ninety-first, were assigned, respectively, to the Fourth, Second and First Air Force Service Commands, and to be stationed, in the order given, at Oklahoma City, Okla.; McChord Field, Wash., and Mitchel Field, N.Y.

Orders were issued for the transfer of the Hqrs. and Hqrs. Squadron, Second Air Support Command, and the 326th Signal Company, Air Wing, from Fort Douglas, Utah, to Oklahoma City, Okla., and the Hqrs. and Hqrs. Squadron, Fourth Air Support Command, from Fresno, Calif., to Hamilton Field, Calif.

The Twenty-second Observation Squadron has been attached to the Third Armored Division at Camp Polk, La., but will remain assigned to the Fifth Air Support Command, with headquarters at Bowman Field, Ky.

New Units And Stations

Recently called to active duty were the Hqrs. and Hqrs. Squadrons of the First, Second, Third and Fourth Air Force Service Commands, with respective permanent stations at Windsor Locks, Conn.; Fort George Wright, Wash.; Drew Field, Fla., and March Field, Calif. These units were organized at Westover Field, Mass.; Portland, Oregon; Savannah, Ga., and March Field, Calif., respectively, and the source of the personnel therefor were, in the order named, the Hqrs. and Hqrs. Squadrons of the Fourth Bombardment, Eleventh, Twenty-second and Ninth Pursuit Wings at Westover Field, Mass.; Portland, Oregon; Savannah, Ga., and March Field, Calif., respectively. Thirty-four Air Base Groups were assigned to these four Air Force Service Commands, nine to the First, seven to the Second, twelve to the Third and six to the Fourth. These Commands were assigned to the numerically corresponding Air Force.

Supplementing the Replacement Centers at Maxwell Field, Ala.; Kelly Field, Texas, and Moffett Field, Calif., three additional Air Corps Replacement Centers were created, their locations being Ellington and Sheppard Fields in Texas, and Kessler Field, Miss. New titles were conferred upon these Centers, the two last named, which are under the immediate jurisdiction of the Commanding General of the Air Corps Technical Training Command, being designated "Air Corps Replacement Training Center (Technician)," and the other four, under the immediate jurisdiction of the commanding generals of the Air Corps Training Centers in which they are located, being designated "Air Corps Replacement Training Center (Aircrew)."

With the completion of additional buildings at Scott Field, Ill., the necessary facilities were provided to permit the opening of a second school for the instruction of enlisted men as radio operators and mechanics, thus doubling the present student capacity.

Under a new schedule inaugurated on November 2, new students will arrive at the rate of 400 every week instead of every two weeks. The assignment of the new groups of 400 students arriving weekly will alternate between Radio Schools Nos. 1 and 2, and at the end of the standard 22 weeks' course of instruction, on or about March 1, next, the full quota of 4,400 new students will have been reached.

(Over)

Decorations

Gallantry in action against the enemy and heroic conduct in saving the lives of others led the War Department to confer decorations upon two officers and two enlisted men connected with the Air Corps.

Captain Elmer G. Rhenstrom, Air Reserve, now on extended active duty at Scott Field, Ill., was awarded the Silver Star for gallantry in action during the World War. At that time a second lieutenant and a member of the Ninety-fifth Aero Squadron, First Pursuit Group, he was engaged on a special mission when he was attacked by three enemy airmen. Single-handed he succeeded in destroying one of the planes and later accomplished his mission of strafing and killing enemy horses drawing heavy artillery in retreat, thus delaying their progress and leading to their capture by ground forces.

Captain John M. Talbot, Medical Corps, Flight Surgeon; Pvt. 1st Cl. Peter Schur, 20th Air Base Squadron, and Pvt. Mathew L. Pelikan, 35th Pursuit Squadron, were awarded the Soldier's Medal. Captain Talbot saved an enlisted man from drowning, as did Privat Schur, while Pvt. Pelikan rescured a woman from a burning house.

A passenger in an amphibian plane which went out of control, crashed and overturned in a lake, Captain Talbot, while in an upside down position, sus pended by his safety belt, perceived one of the crew lying unconscious below him and in grave danger of drowning in the water which was gushing into the cabin of the plane. Disregarding his own safety, he unfastened his safety belt, reached the imperiled enlisted man and succeeded in bringing him to the surface of the water. Although suffering from the immersion and shock, he next clambered about the plane, which was in imminent danger of sinking, and administered first aid to other badly wounded crew members.

Private Schur, one of the crew of a crash boat plying the shark-infested waters of Manila Bay, jumped to the rescue of a fellow soldier who fell overboard from an Army transport and, being stunned by the fall, was in danger of drowning. Bringing the helpless soldier to the surface, he was assisted to a place of safety.

Perceiving a woman trapped on the porch roof of her burning home and on the verge of jumping to the ground to follow her sister, who was injured in doing so, Private Pelikan, after cautioning her not to jump, climbed to the roof with great difficulty and succeeded in carrying her safely down to the ground. In quick succession he rushed both women to the hospital. The injured sister subsequently succumbed to her injuries.

The Civil Aeronautics Administration announced a plan for increased cooperation among the American Republics to bring young men from countries below the Rio Grande to the United States shortly after January 1, 1942, to be trained as pilots and aviation technicians. The program, sponsored by the Interdepartmental Committee on Technical Aviation Training for Citizens of the Latin American Republics, includes courses from six months to two years and calls for initial training of 275 pilots, 18 aeronautical administrative engineers, 87 instructor mechanics, and 120 airplane service mechanics each pledged to advance to a career in commercial aviation. Pilot training will be supervised by the Army Air Corps and Civil Aeronautics Administration in the Air Corps schools (with exception of military subjects) and at approved certificated schools. Mechanical training will be carried out by the Civil Aeronautics Administration.

For the purpose or reorganization, the Hqrs. and Hqrs. Squadrons of the Sixth, Eighth, Tenth Pursuit and the Twenty-first Bombardment Wings were removed from active service and their personnel redistributed by the Chief of the Army Air Forces. The equipment of these units was turned over to the Hqrs. and Hqrs. Squadrons of the First, Third, Second and Fourth Interceptor Commands, respectively.

Fourteen Pursuit Groups (Interceptor) were assigned to these Interceptor Commands, five each to the First and Third and two each to the Second and Fourth. In addition, a Signal Aircraft Warning Company was assigned to the Second, Third and Fourth Interceptor Commands, and two such units in addition to a Signal Operations Company, Aircraft Warning, to the First Interceptor Command.

Interceptor Groups Assigned

Drew Field, a sub-post of MacDill Field, Tampa, Fla., was recently made an independent station. It is now garrisoned by 860 officers and men, but it is expected to be expanded in the near future to 2,750 officers and men. A cow pasture flying field a few months ago, the base is now at the half way mark of a $663,700.00 program of runway construction, scheduled for completion on December 15, next. The field will then have more than 300,000 square yards of paved runways and fringing aprons.

Of the initial class of 13 Negro students who began their primary training at the civilian elementary flying school at Tuskegee, Ala., one officer and five aviation cadets completed the ten-week course of instruction. They will remain at Tuskegee to undergo basic and advanced flying training, each of ten weeks' duration, and which are conducted by Air Corps instructors. Upon their graduation from the 30 weeks' course, they will be commissioned second lieutenants in the Air Corps Reserve and assigned to the Ninety-ninth Pursuit Squadron, which will also be based at Tuskegee. Ten Negro aviation cadets constitute the new primary class at Tuskegee.

SUPPLYING THE PARTS

WRIGHT FIELD LINKED WITH THE NATION

A nation-wide teletype network has been linked with a new tabulating system at Wright Field to give the Materiel Division an automatic daily report on Air Corps supply stores at depots all over the United States.

Nucleus of the new tabulating system is a battery of specially-built card punching machines designed to strike daily balances on Air Corps supply stores. The machines operate automatically from teletype tape bringing in reports from depots. Designed especially for the Air Corps, they are the first of their kind in the world.

The new machines do a job which would be physically impossible under the old hand filing system. They keep tab on all the Air Corps stocks of airplane engines, propeller assemblies, airplane tires, fuel pumps, landing gear struts and the thousands of other items and parts which go to make up Army planes and equipment.

Link Depots With Wright Field

Operated in conjunction with the new machines is a teletype network, linking supply depots and tactical bases with the Materiel Division. And through the new system the Army now gets a daily balance on all its equipment, which report 40,000 changes a day in balances on individual items of equipment at individual air bases.

Biggest advantage of the new system is the fact that the balances are received on teletype tape, which is fed through the newly devised card punching machine. This machine automatically records each new balance on a card which is then filed automatically. Thus the new plan makes it possible to correct the record of any depot's store of any one of the 300,000 articles stocked, as soon as the balance is changed by shipment to or from the depot.

Prior to establishment of the new setup, the Air Corps kept check on its stock by a system of machine posting in duplicate of stock record cards at stations and depots. Once a year the duplicates were sent in to the Materiel Division headquarters at Wright Field, where they were transcribed to tabulating cards, which in turn were used for preparing reports for the supervisors for purchasing and distributing new stock as required. The stock record cards were hand filed at Wright Field, prior to punching of the tabulating cards.

But the once-a-year balance became out-of-date so quickly after it was taken, that it proved to be to a large extent useless, except in normal peace times when there was no great fluctuation in requirements. The rapid pace of present Army Air Corps expansion soon proved this system completely inadequate.

With the new system, the Wright Field Budget Office receives at the close of each day's business, the closing balances on hand of all items in which any change has been made during the day, at each of the several depots. And from the automatically recorded tabulating cards, a report is available each day to the supervisors, of the condition of the stock of the day before, thus making possible automatic stock replenishment at the depots as it is needed, and eliminating much delay and confusion in replenishing stocks which had been largely consumed since the last balance was received at Wright Field under the former system.

To illustrate the working of the new system: Suppose the Fairfield Air Depot, at Patterson Field, Ohio, is asked to send three Allison engines to Selfridge Field, Michigan. As soon as the shipment is made an operator at Fairfield punches a card in a card punch machine showing the new balance in engines, resulting from this subtraction from the Fairfield stock. The card is fed into his teletype sending machine, and the receiving machine at Wright Field records the same punches on a roll of teletype tape. The tape is then fed into the new automatic card punching machine which duplicates the first card punched at Fairfield, and automatically files the new balance card in its proper place, throwing out the old balance card which it replaces.

Special Advantage

A special advantage of the new system is in the refinement made possible by a "borrowing" practice which has already been in use in the Air Corps for years. To carry the engine example further: Suppose Fairfield has a shortage of the Allison engines desired by Selfridge Field. The Fairfield operator teletypes a message to the Budget Office headquarters explaining the Selfridge requisition and the shortage. A check in the master file at Wright Field on the Air Corps stock of engines may indicate that Middletown Air Depot, at Middletown, Pennsylvania has an adequate stock of these engines and can supply them to Selfridge Field. The request is relayed from Wright Field to Middletown via teletype, and soon transports are flying the engines from Middletown to Selfridge

Field, with only a little time lost beyond what would have been consumed in filling the original order from Fairfield Depot.

Under the old setup, it would have been necessary for the depot needing the engines to check individually with other depots, or to have the Maintenance Command at Wright Field make such a check, whenever such a borrowing was required. But now the central office can check its master file and see at once where it can get the necessary equipment, making it possible to service any Army air field in the country, from any of its depots, in emergency.

The new network is also available for communication between any office at Wright Field and any of the Air Corps fields and depots, and by relay permits the various fields to communicate with each other.

An Example

Suppose Selfridge Field wishes to communicate with Hamilton Field, California. The message leaves Selfridge Field and comes into Patterson Field to be recorded on a relay tape. This is fed into another sending machine and relayed to Wright Field. By similar process, the message is relayed to the Sacramento, California, Air Depot, and from that station to Hamilton Field. Since the relay message is punched on the tape for each relay, the three relays may be made without the operators at Patterson, Wright or Sacramento fields knowing what the message was.

Wright Field officials believe that the new system's cost is more than compensated for, in the savings resulting from the speeding up of the entire supply and maintenance service. While no accurate estimate can be made of the airplanes that were grounded for lack of parts, the time wasted as a result of shipping orders issued and subsequently cancelled due to lack of stock at a particular depot and the inaccurate procurement of replenishment stocks as a result of inaccurate knowledge of stock on hand under the former system, it is apparent that all these were important cost items in operating the maintenance and supply service.

But the saving does not stop there. An actual net savings is shown in the use of the new system, over the former system, despite the cost of the new machines and their operators, by eliminating the use of billing machines and their operators and the laborious hand filing processes of the former setup.

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Air Corps officers assigned to the Headquarters Army Air Forces or The Air Force Combat Command are still officially regarded as Air Corps, and not Air Forces, officers, according to a Headquarters Army Air Forces interpretation of recent War Department and Air Forces rulings and organizational changes.

GROUPS... *(Continued From Page 26)*

The Army Air Forces, through the Air Force Combat Command and the Air Corps, will direct training, both individual and organizational, and the operation of all air units in the four air forces in the continental United States and in the territorial and outlying posts of the growing air defense system.

The training program required in connection with the 84-Group program would make The Army Air Forces one of the world's largest universities for applied science, with a total of more than 100 flying and technical training schools in operation.

A number of the 84 combat groups to be created as the goal of the new program will be assigned to overseas departments. The greater part, however, will be assigned to the Air Force Combat Command.

Aviation components of the Hawaiian and Panama Canal Departments will be organized into department air forces under command of their respective department commanders, to attain the unity of command so essential for successful operations.

Completion of the 84-Group program, with necessary airplanes, materiel, personnel, bases and equipment, presents a problem worthy of the utmost effort, efficiency and coordination.

CAMERA... *(Continued From Page 19)*

instructor, who takes a few frames of pictures of the pilot who is to use the film in his plane. The daylight-loading magazine is then taken out of the hand camera, and loaded into the GSAP camera for use.

Processing Almost Automatic

Early in the use of gun cameras, it was learned that a principal advantage to the trainee 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 without expert photographic knowledge can use. Without divulging the details of the processing it may be said 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 spooled 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 he makes them.

Deliberately Made Heavy

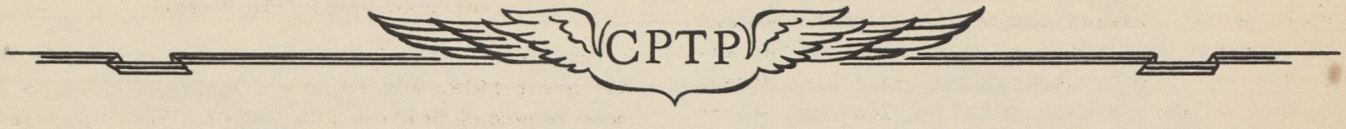
One gun camera developed at Wright Field in the late 1920's was made of very heavy materials, simulating as nearly as possible the weight as well as the size of the gun it replaced. The usual Air Corps search for lighter metals was abandoned, and parts were made of bronze and other

(Continued on Page 32)

Flying Time Counted

Cadets May Get CAA Training Credit

By Lieut. George H. Haddock



THE recent change in regulations which makes it possible for the Air Corps to credit a qualified cadet with a maximum of 30 hours flying time for previous flying instruction or experience, will not necessarily shorten the cadet's term in the elementary phase of instruction.

What it does do is permit the Air Corps to take advantage of flying instruction given to those cadets who come to the civil contract schools from schools operating under the C.A.A.'s Civilian Pilot Training Program, and to permit other cadets having previous flying experience to forego at least a part of the scheduled elementary training.

The ground school requirements remain the same, however, and every cadet will still be required to qualify in these subjects prior to graduation from the elementary flying school.

Thus, any reduction in the time spent in the elementary phase will depend upon the individual qualifications of each student to forego a part of the required 60 hours flying time and the required ground school work.

Supervisors Determine Allowances

When a Civilian Pilot Training Program graduate enters the military training, for example, his knowledge and skill will be observed carefully to determine whether or not any allowances will be made to him. Partial or maximum allowances to be made will be at the discretion of the Air Corps Supervisor at the school concerned.

The Air Corps method in advancing aviation cadets in five-week classes has been found to be advantageous in many respects. Actual flight training is but one of the phases of instruction necessary to produce a skilled and dependable Air Corps pilot. The important grounding in military education in general, and the instillation of the vital factors of morale and cooperation are among the phases which cannot be neglected.

The move to make it possible to grant partial flying time credit was the result of a desire on the part of the Air Corps to take advantage of the flying training provided by the Government-financed CPTP, and thus help to reduce the cost of such training to the War Department.

Graduates of the CPTP have furnished a major source of aviation cadets since the beginning of the Army Air Corps expansion program. Approximately 10,000 graduates have been sent to the Army and the Navy for training as military pilots, and now, with the change in Air Corps regulations, both services may allow credit for previous flight instruction. The Navy can allow up to 33 hours.

Furnish Flight Instructors

One of the most important functions of the CPTP, as far as the Air Corps is concerned, has been the furnishing of flight instructors for the civilian contract schools providing the elementary training.

Air Corps officers have found also that CPTP graduates entering as aviation cadets in fewer cases fail to qualify for the next higher phase. A recent compilation showed that an average of 84 per cent of the CPTP graduates successfully passed the elementary phase of flight instruction, with some of the later classes reaching 92 per cent.

By comparison it has been shown that approximately 39 per cent of non-CPTP graduates fail during the elementary phase of the Air Corps program.

This good showing by the trainees from the CPTP is credited in part to the fact that the men who either cannot be or don't want to be military flyers are weeded out before entering the Air Corps training. Classes beginning Air Corps instruction without previous training still must lose their percentage of men not fitted to be military pilots.

STUDENTS LOSE RATINGS

ENLISTED men who hold air mechanic ratings and who are detailed as students at flying schools must forfeit their ratings, the Military Personnel Division, Office Chief of Air Corps, announces.

These men will not have opportunities to perform the duties of air mechanics at the civilian flying schools at which they will get their pilot training. In the event such students fail to complete the flight course successfully, however, they will be considered eligible for re-rating when they return to their regular units.

The division considers that this action will work no hardship on air mechanics who may be selected for flight training, since they will be on full-time flying status while undergoing training. The increased income from flying pay will compensate for the loss of the extra income derived from their mechanic's ratings.

CAMERA... *(Continued From Page 30)*

weighty 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 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, the gun cameras became electrically operated about 1938. As photographic lens and films improved, the 16 mm. film was substituted for the bulkier and more costly 35 mm. 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, somewhat like that of a boat.

This camera was the immediate predecessor of the GSAP camera which was developed after a comprehensive survey of the problem of aerial gunnery instruction by Wright field technicians, who discarded previous types in their effort to produce a new and highly efficient piece of equipment.

First prepared for fixed mounting, the GSAP camera is being adapted for flexible gunnery practice also. Here the Air Corps engineers are confronted with a new problem, since today's flexible gunnery consists in the manipulation of power turrets, bristling with two to four heavy caliber machine guns, instead of the single, manually operated gun of the past.

Besides dogfight training for individual pilots, the gun camera is valuable for other purposes. Blind spots on planes to determine how large a group of fighters is necessary to attack a single large enemy bomber can be discovered, and the proper angles of approach for keeping as much as possible out of his line of fire.

Historically, it is believed that the first gun cameras were employed by the British and French during the world war, about 1915 or 1916. The first British gun camera had a film with six exposures, which could be divided into 12 frames, and each time the camera was fired a cocking operation was necessary. The device was 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 British army officials for some time, until the training showed results in greatly increased accuracy of fire, according to accounts of that time.

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

American Similar To British

The first American gun camera, produced by Eastman about 1918, was in many respects similar to a more advanced British gun camera. These cameras were built to resemble the machine guns which they simulated, having long barrels and spade grips like those which swung the manually operated guns. They were powered by spring-wound motors and regulation gunsights. They used 35-mm. movie film and were equipped with stopwatches. The stopwatches were so installed that every time a picture was fired the face of the stopwatch showed, recording the time.

This device was added after it was found that gun camera dogfights resulted in disputes between pilots over who fired the first vital shot, thus winning the combat. The cameras contained a simulation of the gunsight, on a glass plate in the camera barrel, marking off each frame of film into quarters. The plate was marked also with concentric circles, indicating the variation of the target from the center of the sight. Lighting for the stopwatch pictures was provided by a system of mirrors, reflecting natural light into the stopwatch chamber. By checking the time on the frame which showed the first vital shot on each of the opponent's films, the priority of claim could easily be established.

Since this basic type gun camera was established, there have been numerous changes and developments. American armament technicians soon developed, by changing the mount, a gun camera for both flexible and fixed gun positions. For fixed forward-firing gun cameras, the control was operated by a solenoid from a button on the control stick, the same system used for forward firing guns. The camera was sighted with the machine gun sights.

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On the occasion of the thirty-eighth anniversary of the first airplane flight by the Wright Brothers at Kitty Hawk, N.C., Professor Richard V. Southwell, world-renowned specialist in aerodynamics, theory of structures and other sciences applied to aeronautics, will deliver the annual Wright Brothers Lecture for 1941 at Columbia University, New York City, before the Institute of Aeronautical Sciences. His subject will be "New Pathways in Aeronautical Theory."

The Wright Brothers Lecture is endowed by a fund of $18,000 provided by the late Edmund C. Lynch, of New York, to honor the memory of his brother, Vernon Lynch. Since 1937 it has been an annual presentation by the Institute of Aeronautical Sciences.

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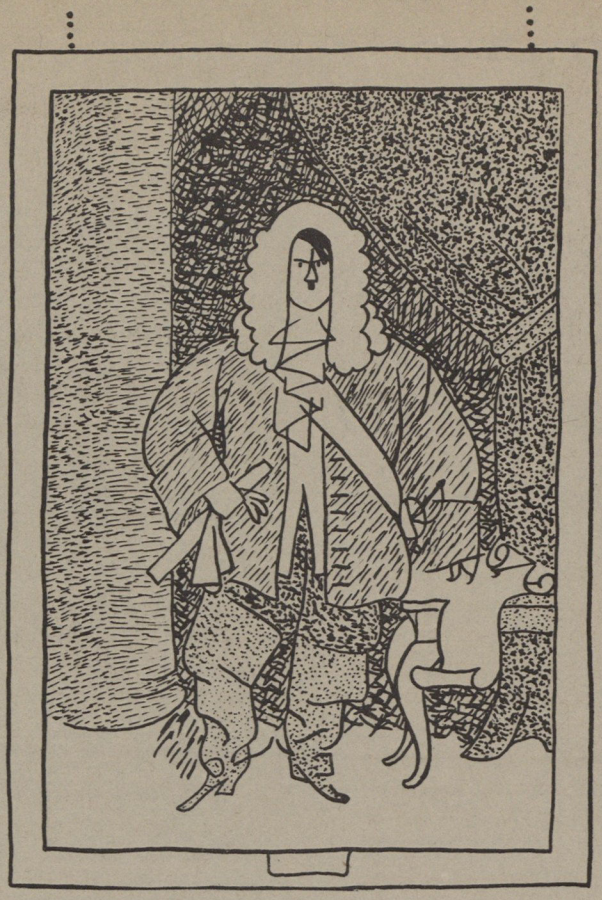
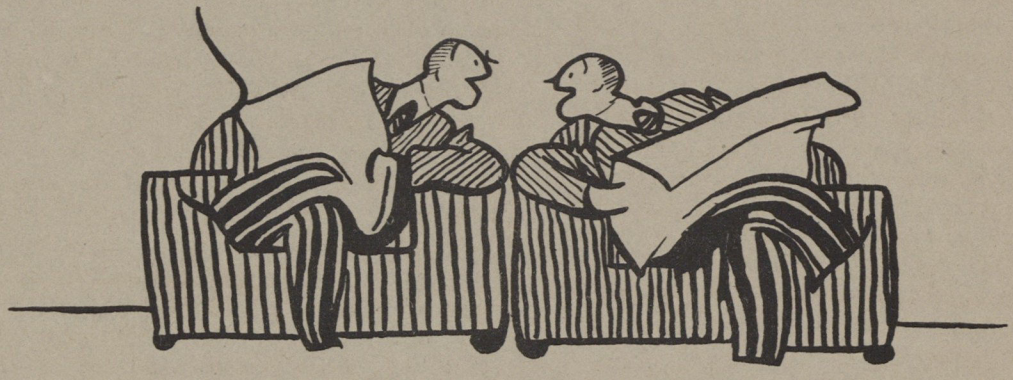
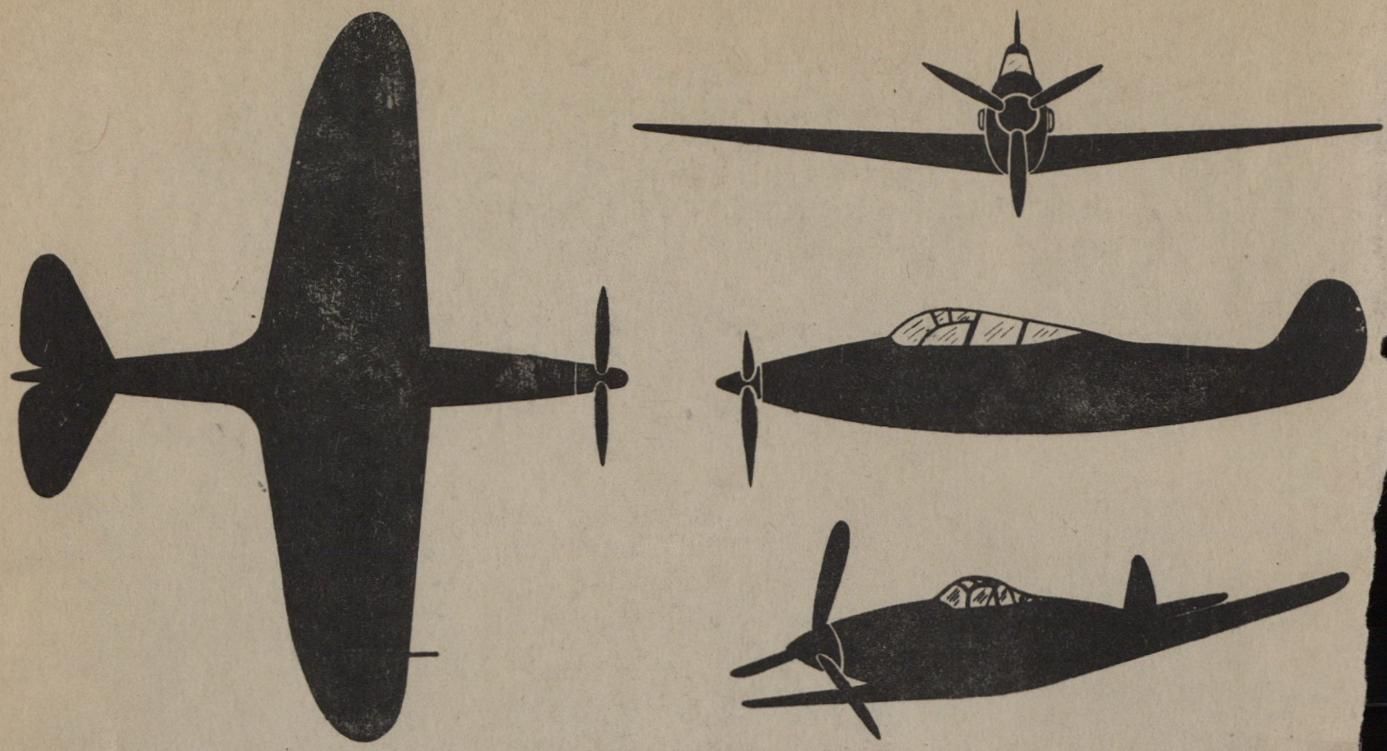




"... strictly between these four walls!"

CARELESS TALK COSTS LIVES



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