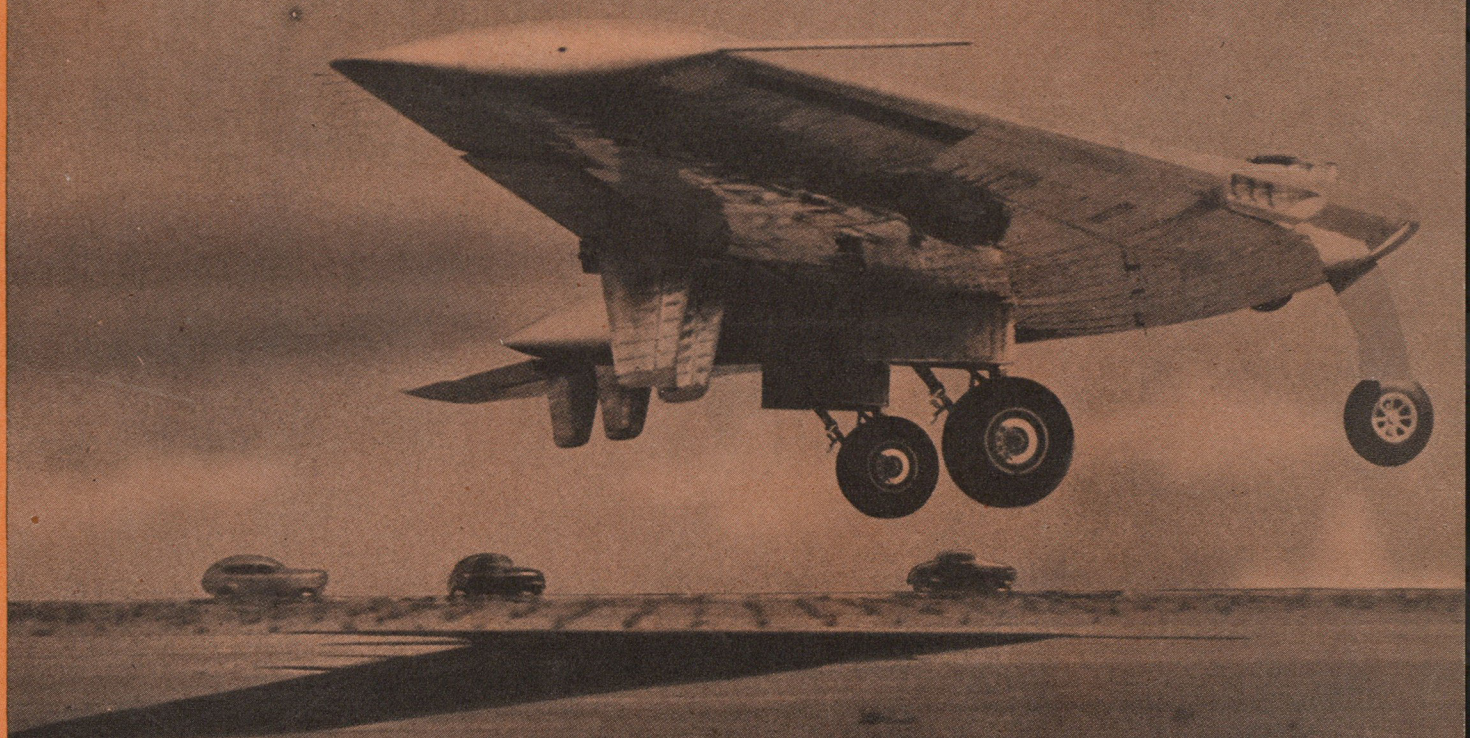
AIR FORCE

THE OFFICIAL JOURNAL OF THE AIR FORCE ASSOCIATION, DECEMBER, 1947



NORTHROP'S 8-JET FLYING WING Page 22

NOW—Bell Helicopters Battle Locust Hordes

Argentina fights locust plagues with every weapon at its command. But each succeeding season has brought new, bigger clouds of voracious insects—to turn green fields brown, leave herds of sheep and cattle starving. Losses to the corn crop alone totaled more than $25,000,000 last year.

Today, new weapons are being sent into the locust-darkened skies—a task force of 10 Bell Helicopters armed with deadly insecticide. Tersely the Buenos Aires firm, TAYR, reports:

"Helicopters flying directly into locust swarms . . . credited with 98% kill . . . first time locusts effectively stopped in Argentina."

During one helicopter attack, operations had to be quickly shifted "because ground for four square miles so littered with dead locusts uneconomical to continue." Working in teams of two helicopters, each pair applies 10,000-12,000 pounds of anti-locust dust daily.

In other ways, TAYR expects to benefit from the usefulness of The Modern Magic Carpet*. The Bell Helicopters will count cattle, locate strays, dust many crops. For supervisory personnel, they'll shrink the Argentine's vastness.

Overseas and at home, Bell Helicopters make the difficult easy. They're on the job in all kinds of weather—delivering mail, dusting crops, gathering news and pictures, exploring for oil, surveying, prospecting and saving lives. You name it, the Bell Helicopter does it. For full facts, write Helicopter Division, Bell Aircraft Corp., P. O. Box 1, Buffalo 5, N. Y.

BELL HELICOPTER

PRODUCT OF BELL *Aircraft* CORPORATION

PIONEERS IN JET-PROPULSION, RADIO-CONTROLLED FLIGHT AND SUPERSONIC AIRCRAFT FOR THE U. S. ARMY AND NAVY. DESIGNERS AND BUILDERS OF THE WORLD'S FIRST COMMERCIALLY LICENSED HELICOPTERS FOR LAND AND WATER.

IF YOU know some young men who want to get into aviation, you can help them get started right now – under terms that cannot be duplicated anywhere else at any price!

You can point out to them the benefits of the new Air Force Aviation Career Plan which enables qualified men to select the Air Force Specialist School they prefer, *qualify for it before enlisting,* and be assured of attending it after completion of basic training.

From a group of more than 40 courses, young men can choose the work in which they're most interested, get the finest available training in it, and be ready to take their places in one of the world's great pace-setting sciences.

The Aviation Career Plan is open to any high school graduate, between 18 and 34 (17 with parents' consent). Applicants found eligible for the course they request may enlist in the Air Force for 3, 4 or 5 years.

Another program you might discuss with young men in your community is Aviation Cadet Pilot Training – now open to unmarried applicants between 20 and 26½ years of age, who have completed at least one-half the requirements for a college degree from an accredited institution (or who can pass an equivalent examination). Graduates will be commissioned Second Lieutenants and assigned to pilot duty with the Air Force. Full details on the Aviation Career Plan and Aviation Cadet Pilot Training are available now at U. S. Army and Air Force Recruiting Stations and Air Force Bases. Will you help by putting young men in touch with these outstanding opportunities?

U. S. ARMY
AND U. S. AIR FORCE
RECRUITING SERVICE

CAREERS WITH A FUTURE
U. S. Army and U. S. Air Force

YOUNG MEN MAY NOW CHOOSE TRAINING IN ANY ONE OF THESE GENERAL FIELDS

- Airplane Maintenance
- Aviation Specialists
- Jet Airplane and Engine Mechanics
- Armament
- Radio
- Radar
- Wire Communications
- Weather
- Photography
- Construction
- Vehicle Operation
- Automotive Mechanics
- Administration
- Supply
- Medical Technician

THERE ARE MORE THAN 40 USAF SPECIALIST SCHOOLS

AIR MAIL

Amazing Cover

Gentlemen: The cover of your October issue is most amazing. The man in the picture looks like the devil. Whether this is intentional or not I do not know. If intentional, does it represent that today's Air Force is a devil of a unit compared with what it used to be or does it imply Hell to the enemy?

H. R. Jackson
Baltimore, Md.

● *The similarity was entirely coincidental. Reader Jackson is free to exercise his imagination as to the picture's symbolism.*—ED.

Aching Eyes

Gentlemen: Well bust my prop if you haven't come up with some real stuff. The Henderson Tower article (October) is the best thing I've read in a long time. My be-spectacled eyes have been aching for something like this. If you can give us like samples in succeeding issues, brother, you won't have to worry about reader interest.

K. R. Pyatt
Dallas, Texas

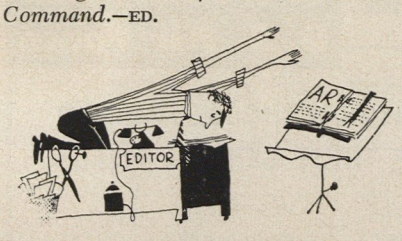
● AIR FORCE *plans to carry at least one story of the Henderson Tower type in each issue. This month see* Hell Over Bizerte, *page* 28.—ED.

Fancy Nomenclature

Gentlemen: Just what ever became of the 16th, 17th, 18th and 19th Air Forces? Were they ever activated in a small way and then just dropped or did the Air Forces just skip to the 20th because they wanted a fancy-sounding number for the big global air force?

Harvey Roehl
Ithaca, New York

● *The four Air Forces mentioned were never activated. The 20th Air Force grew out of the 20th Bomber Command.*—ED.



Spelling by the Book

Gentlemen: In your September issue you abbreviate the word "squadron" any number of times as "Sqdn." AR 850-150 indicates that the correct abbreviation is "Sq." Which is correct?

Sgt. Myron C. Sabin
Kirtland Field, N. M.

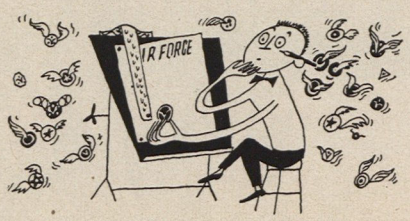
● *AR 850-150 by all means!*—ED.

Credit Where Due

Gentlemen: Your technical section keeps referring to supersonic sweepback as the Busemann wing, giving credit for its development to some German. I can remember sweepback as far back as 1926; it appears to have existed earlier.

H. K. Watson
Jackson Heights, N. Y.

● *This earlier sweepback was rigged into planes like the Curtiss Falcon for directional stability. You'll find explanation in article Delta Design,* AIR FORCE, *Feb. 1947.*—ED.



No Offense

Gentlemen: Looking along the left hand margin of your front covers I never found the insignia of the 9th Troop Carrier Command of the 1st Allied Airborne Army and I've felt badly neglected. Insignia for the 9th Air Force (of which 9th TAC was once a part) is always there but never the 9th TC's own individual patch. How come such oversight?

E. H. Stahl
San Francisco, Calif.

● *Reader Stahl need not feel neglected. If all of the air commands such as MAAF, PACUSA, USSTAF, ATC were represented, there would be no room for a cover picture. Insignia have therefore been arbitrarily confined to the numbered Air Forces.*—ED.

Mistaken Identity

Gentlemen: In your October issue *(Air Force Day, 1947)* there is a picture of Mr. C. K. Barton, whom you call the Governor of New Jersey. I suppose this will be one of the thousands of letters you'll receive on the same subject, but believe me, you had better watch out whom you call the Governor of this state. Did you know that the man who *is* New Jersey's Governor is known as Driscoll (Alfred E.)? I am sure that this is a misprint since we in New Jersey don't even know the man pictured.

L. J. Riddle, Jr.
Harrison, N. J.

● *The unknown gentleman, C. K. Barton, was New Jersey's Acting Governor at the time the picture was taken.*—ED.

Something Gone

Gentlemen: Something went out of AFA for me when I looked at a picture accompanying the article on the summer encampment and the caption beneath it which read, "Still one of the finest disciplinary exercises is the time-honored close order drill . . ." If that caption wasn't written by some eager beaver PRO anxious to keep his seat on the gravy train I'm very much mistaken.

H. E. Rowbottom
Crawfordsville, Indiana

● *The caption in question was written by a one-time buck private who holds no brief for close order drill other than a guess that, disagreeable as it was, c.o.d. taught a lot of men the importance of self-discipline—a quality which probably kept many of them alive in the field.*—ED.

Griped No End

Gentlemen: It gripes me no end that in your October issue you informed all that the history of the 14th Combat Wing was ready for sale and that it included coverage of the 491st, 44th and 392nd Bomb Groups. You left out the 492nd which was at North Pickenham before the 491st and had a very good record. As a former member of this group and one of Colonel Snavely's boys I would like to know why we were not included.

Floyd R. Kingsley
Rantoul, Ill.

● *An oversight. Sorry.*—ED.

How Young Is a Youngster?

Gentlemen: On the part of several score ROTC students at Stanford University and the Universities of Nevada, Arizona and Calfornia, all of whom attended summer ROTC camp at March Field in California, I would like to object to being called "youngsters" *(Summer Encampment,* AIR FORCE, *October, 1947).* I believe ours was a fairly representative group as they go and the average age was well over 23. There were over 100 at camp of which only three or four were non-vets.

Ed Korrick
Stanford University, Calif.

Packet-helicopter teams which will provide a rescue service for any spot on earth are one of the goals of the Air Force.

The need was dramatically demonstrated recently when the Air Rescue Service of the Air Transport Command transported helicopters in Fairchild's Flying Boxcars to the jungles of Nicaragua. Crew members of a Flying Fortress lost in the almost impenetrable jungle were located and transported to safety by this efficient team.

The C-82 Packet, with its huge unobstructed cargo capacity and its range, can fly in and out of short airstrips. The helicopters can hover like humming birds over impassable terrain. Together they make an unbeatable team that offers welcome protection to civil and military aviation all over the world.

Fairchild Aircraft

Division of Fairchild Engine & Airplane Corporation, Hagerstown, Maryland

This Month

The Cover

California, long accustomed to basking in the aeronautical spotlight, has been attracting even more attention in this field than usual in recent months. Top billing in the nation's press went to Howard Hughes' mammoth flying boat but of greater military significance was the initial flight of the Northrop 8-jet flying wing. The picture on this month's cover was snapped just as the plane left the ground for the first time at Northrop Field.

The Lady's Past

Lt. Thelma Thompson (*Battleground for Guided Missiles*—Page 18) is a 30-year old Air Force Wac who hails from Seattle, Wash. She studied journalism at Spokane Junior College and the University of Montana and then did newspaper and radio writing in Spokane. She was commissioned in the WAC on September 1, 1943, saw headquarters duty with 2nd and 4th Air Forces, and in December of 1946 was transferred to Washington and assigned to the Information and Education Division, War Department Special Staff. She's now on duty in Germany.

Pacific Legend

Selby Calkins (*O'Halloran On Target*—Page 23) has been doing free-lance writing for many years. One of the first Air Force officers assigned to the B-29 project under Maj. Gen. K. B. Wolfe, he was Intelligence Officer in the advance echelon of the 20th Bomber Command in India, later went to the Western Pacific in advance of the first B-29s to fly in that area, served first on Saipan, then on Guam. The amazing O'Halloran (only the name is fiction; the rest is gospel) held forth on Saipan. Calkins is now Advertising-Promotion Manager of Pan American World Airways System.

Contest Winner

The United Nations drawing on Page 9 was done by Leif Paulson of Sweden who won a hundred dollar "honorable mention" prize with it in a UN postwar contest. The jury judged entries from 30 nations.

VOL. 30, NO. 12 DECEMBER, 1947

AIR FORCE

THE OFFICIAL JOURNAL OF THE AIR FORCE ASSOCIATION

FEATURES

DEPARTMENTS

EDITOR and PUBLISHING DIRECTOR, James H. Straubel

Managing Editor, Ned Root; **Technical Editor,** William S. Friedman; **Assistant Editors,** Janet Lahey, Helen Whyte; **Art Direction by** J. Walter Flynn.

AIR FORCE MAGAZINE is published monthly at Dayton, Ohio. **EDITORIAL OFFICE:** 485 Madison Avenue, New York 22, N. Y. Publisher assumes no responsibility for unsolicited material. **ADVERTISING OFFICES:** New York 22, N. Y., 485 Madison Avenue, telephone Plaza 5-6914, Sanford A. Wolf, Advertising Manager; Los Angeles 5, Calif., 684 South Lafayette Park Place, Robert W. Walker Co.; San Francisco 4, Calif., 68 Post Street, Robert W. Walker Co. **MAILING:** Entered as second class matter, June 17, 1946, at the post office at Richmond, Va., under the Act of March 3, 1879. Transfer of 2nd class entry to Dayton, Ohio, pending. **SUBSCRIPTIONS:** Membership in the Air Force Association, $4.00 per year, $2.00 of which is for 1 year subscription to AIR FORCE. Subscription rate to non-members, $4.00. Single copies, 35 cents. **REGISTRATION:** Trade-mark registered by the Air Force Association. Printed in U.S.A. **CORRESPONDENCE:** All correspondence pertaining to AIR FORCE should be addressed to 485 Madison Ave., New York 22, N. Y. All other correspondence pertaining to the AFA should be addressed to 1616 K Street, N.W., Washington 6, D. C.

AIR FORCE IS PUBLISHED BY THE AIR FORCE ASSOCIATION

The "Mounties" have an Air Arm, too!

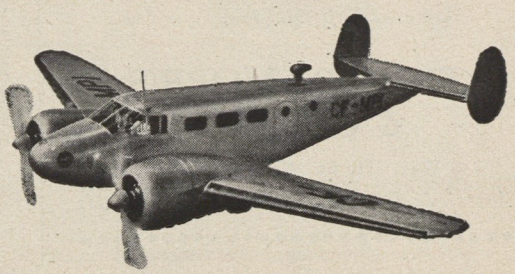
The Royal Canadian Mounted Police Force, world standard for efficiency in civilian protection since 1873, uses nearly every form of transportation known . . . including the airplane. Along with fine planes of Canadian manufacture, the "Mounties" are using Beechcraft twin-engine 18's because of their reliability, speed and cruising range in all kinds of weather.

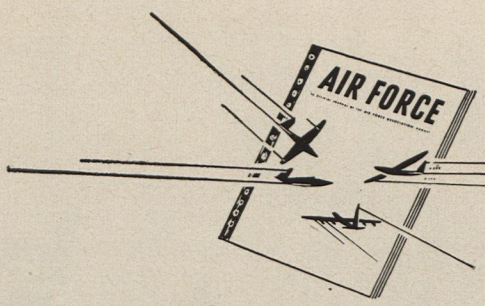
Business can well borrow a leaf from the Mounties' book of experience. The Beechcraft twin-engine Executive Transport—equipped with every navigating facility and comfortable in the extreme—is ideal company transportation for both regular and emergency use. It accommodates up to nine people, operates with notable economy, and can land and take off from relatively small fields.

The hours—and fatigue—which the Beechcraft Executive Transport saves company officials and personnel make for an efficiency which is reckoned in dollars and cents by many of America's leading businesses. Your Beechcraft distributor is ready at any time to help you appraise your company's air transportation needs in the light of Beechcraft's wide experience in this field. Call on him.

Beech Aircraft

CORPORATION WICHITA, KANSAS, U. S. A.





RENDEZVOUS

Where the Gang gets together

MASS. GUARD: Air Force Association members who live in the vicinity of Boston will be interested in knowing that the 151st Aircraft Control and Warning Group, Massachusetts National Guard, has quite a few vacancies with good grades for qualified radio operators and mechanics, aircraft control information center operators, clerk-typists, clerk-nontypist, cooks, etc. I will answer all inquiries. CHARLES H. TUESLEY, MAJOR, AC, MASSACHUSETTS NATIONAL GUARD, COMMONWEALTH ARMORY, 925 COMMONWEALTH AVE., BOSTON, MASS.

MEDICAL CASE: Could Rendezvous locate a Captain O'Brien, head Medical officer from September to December 1945 of 1369 AAF Base Unit, ICD ATC? Would like his present address. I have a medical claim and I'm sure he will remember my case. WILLIS B. ASBURY, 106 W. 8TH ST., BIG SPRING, TEXAS.

LOST IN TULSA: Can Rendezvous find the address of William Fulton of Tulsa, Oklahoma? He held the rank of Second Lieutenant in the fall of 1945. CALVIN FRAZIER, WINONA, W. VA.

20th REUNION: I would like to contact all former officer, enlisted and civilian personnel who were assigned or attached to the 20th Bomber Command or to any assigned or attached unit thereof while stationed in India and China from 1944 to 1945, for the purpose of forming a veterans' association and to get the gang together to help celebrate on next June 15, the fourth anniversary of the first bombing of the Japanese mainland by B-29s. Any former member of this command who served in India or China is requested to forward his name and present address to the undersigned indicating the unit with which he served. LEE HERMAN, P.O. BOX 132, MITCHELL FIELD, N. Y.

PRIVATE PEHLKE: I would like to get in contact with anyone who might have known my brother, Pvt. Clifford Pehlke. He was in action in Manila and was reported missing in January 1943 and, a year later, reported officially dead. I would appreciate hearing from anyone who knew him and to learn just what happened to him. E. A. PEHLKE, 819 1ST AVE., HAVRE, MONT.

GUY NAMED KIRK: I don't know too much about the buddy I want to locate but his last name was Kirkpatrick and he was called "Kirk." He was a Link Trainer Operator and the last time I saw him was at Spence Field, Moultrie, Georgia, in July 1945. He was married and had at least two children. I thought he came from Connecticut. ROBERT G. STAFFORD, 295 FRANKLIN ST., BLOOMFIELD, N. J.

LIBERATED BAG: In October 1944, while awaiting shipping facilities back to the States, I spent several days at the "Repple-Depple" located in the sports stadium outside Naples, Italy. During this time somebody "liberated" my B-4 bag containing clothes, souvenirs, pictures, letters, films, and a diary. I'd give my eye teeth to recover all or any part of the loot. I'd especially like to get the films, pictures and diary back. The snapshots were taken mostly on the Isle of Capri, and there was also a large wedding picture of me and the little women. Needless to say if I could find them, there would be no questions asked. T/SGT. ROBERT M. JONES, 12077912, 97TH BOMB GROUP, 342ND SQ., APO 520, POSTMASTER, NEW YORK, N. Y.

7th A.F. FRIEND: I wonder if through the Rendezvous column I could get in touch with someone who was a member of the 864th Bomb Sq. (H), 494th Bomb Gp. (H) of the 7th Air Force. A good friend of mine, T/Sgt. Waldo M. Keeney, was a member of that Group and was reported missing in mid-1945. I thought maybe someone from his old outfit might know whether or not he was ever rescued. JAMES M. KENDALL, BOX 194, BASE LINE, MICH.

641st BOMB SQ.: I would like to get in touch with any of the boys of the 641st Bomb Sq. (L), 409th Bomb Gp. (L). I was in the first bunch who activated this organization and left it at Britigny, France, Christmas day of '44. S/SGT. GLADDEN H. HEATH, HQ. 57TH FIGHTER GP., APO 942, C/O P.M., SEATTLE, WASH.

KEEPING IN TOUCH: Would you put my letter in the Rendezvous column to see if I can get in touch with anyone who was in the 379th Gp., Kimbolton, England, or anyone in Colonel Roosevelt's Weather Sq. at Norwich. JOHNNY JOHNSON, HIER'S CAMP, RT NO. 5, MOULTRIE, GA.

HERALDRY LOST: We would like to hear from some former member of the 446th Bomb Sq. (based in Africa, Sicily, etc.) to get a picture or a sample of their old insignia. MEMBERS OF THE 446TH BOMB SQ., RESERVE CORPS, JOHNSTOWN AIRPORT, JOHNSTOWN, PA.

LOOKING FOR SOMEONE? ANY ANNOUNCEMENTS TO MAKE? WRITE RENDEZVOUS AND RENDEZVOUS READERS WILL WRITE YOU.

MARTIN STARS *in Research*

ELECTRONICS

ROCKETRY

MARTIN U.S.A.

TRANS-SONIC SPEEDS

PLASTICS

ADVANCE DESIGN AIRCRAFT

JET PROPULSION

NEW HORIZONS . . . have been revealed by Martin research engineers. As in the past, Martin will continue to produce advanced-design aircraft and other specialized technical equipment for our Military Services. Look to Martin for great advances in rocketry . . . electronics . . . rotary-wing aircraft . . . jet propulsion . . . trans-sonic speeds . . . plastics . . . advanced-design aircraft . . . and in other far-reaching fields. The Glenn L. Martin Company, Baltimore 3, Maryland.

Martin
AIRCRAFT

Builders of Dependable Aircraft Since 1909

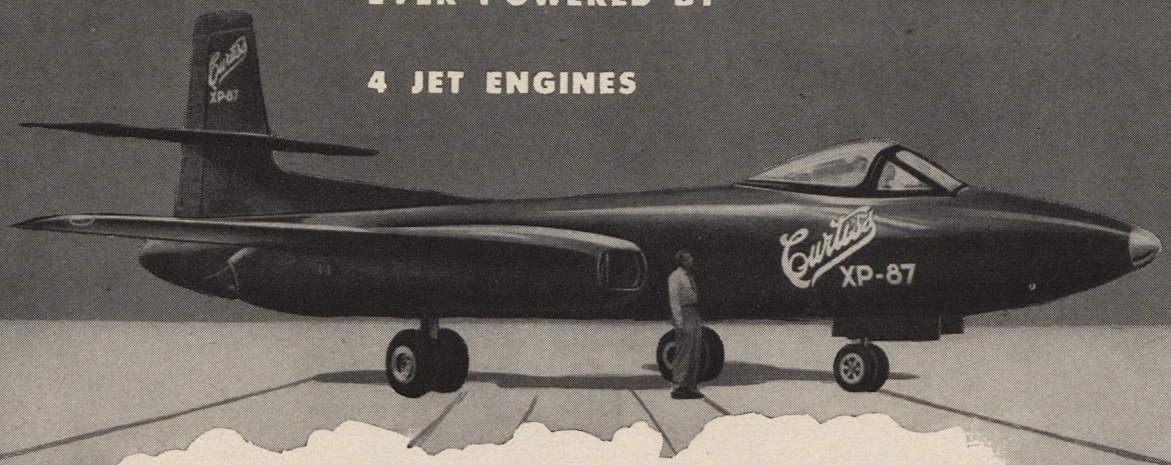
INTRODUCING...

THE CURTISS XP-87...

FIRST FIGHTER AIRCRAFT

EVER POWERED BY

4 JET ENGINES



▶ **Curtiss-Wright**—producer of many famous fighter airplanes, starting with the very first pursuit ship (P-1) and including the famed P-36 and P-40 Hawk series—pioneers again with the Curtiss XP-87, the first four engine jet-propelled fighter airplane for the U. S. Air Force.

▶ **One of the largest** fighter aircraft of its type built by any nation, with a wing span of approximately 60 feet and overall length of about 65 feet, the XP-87 is operated by a two-man crew and powered by four Westinghouse jet engines.

▶ **The Curtiss XP-87** is specifically equipped for operating under extreme weather conditions . . . it embodies the most recent advances in anti-icing equipment.

▶ **The new airplane** is now undergoing ground and taxi tests. At their completion, it will be taken to the Muroc Army Air Base, Muroc Lake, California for flight testing.

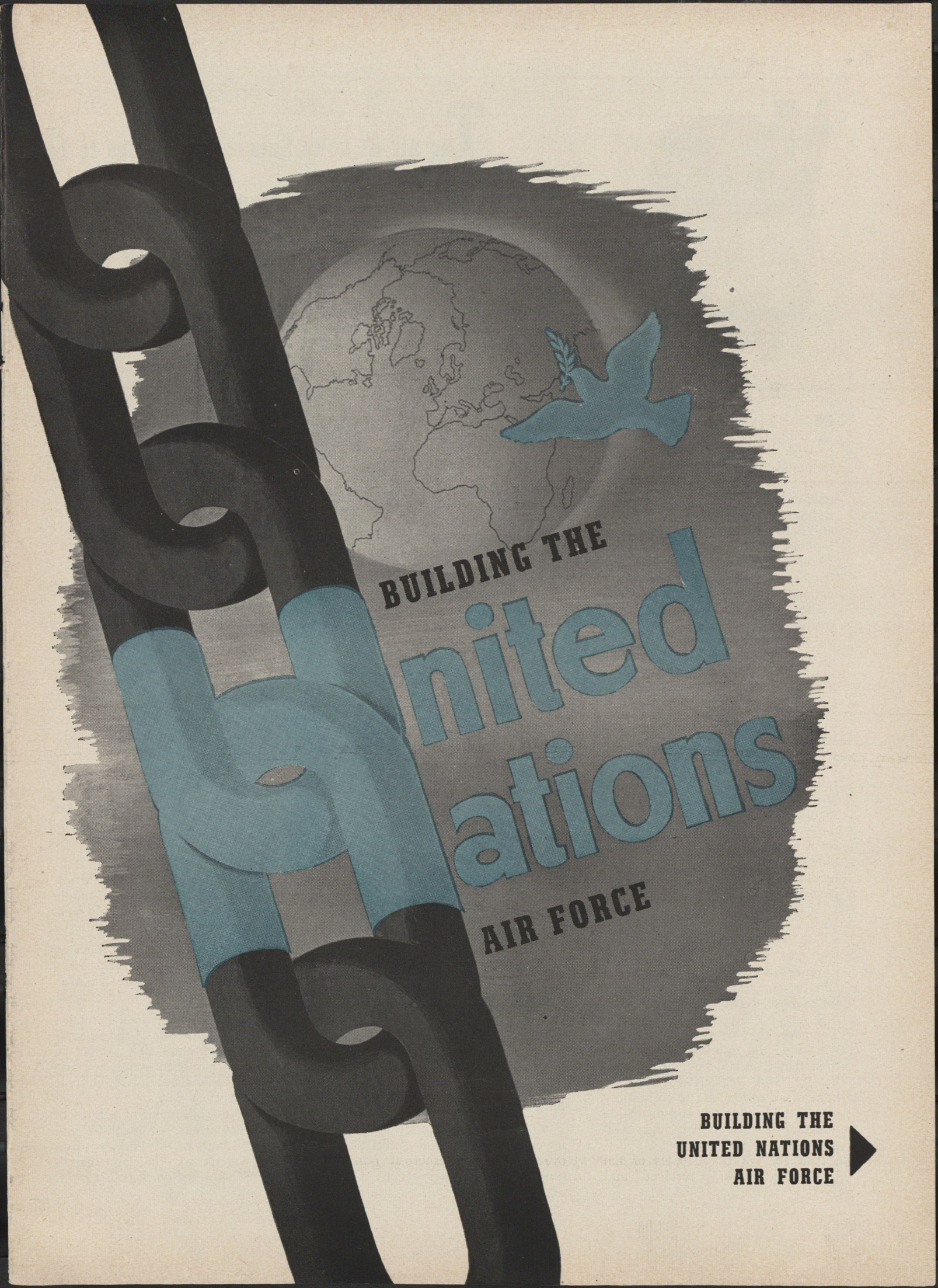
FIRST IN FLIGHT

CURTISS WRIGHT

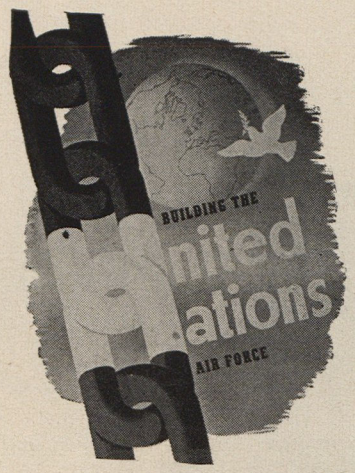
Airplane Division

COLUMBUS, OHIO

DEVELOPING FLIGHT TO MEET THE FUTURE



BUILDING THE
UNITED NATIONS
AIR FORCE



The air at Lake Success will have to be cleared of suspicion and misunderstanding before there will be room for UN planes

By Ned Root

This is the way the Charter of the United Nations begins: "We the peoples of the United Nations, determined to save succeeding generations from the scourge of war . . . to reaffirm faith in fundamental human rights . . . to promote social progress and better standards of life . . . have resolved . . ." And then there follow 19 chapters with such headings as Pacific Settlement of Disputes, International Economic and Social Cooperation, The International Court of Justice. In one place it says: "The purposes of the United Nations are . . . to achieve international cooperation in solving international problems of an economic, social, cultural, or humanitarian character, and in promoting and encouraging respect for human rights and for fundamental freedoms for all without distinction as to race, sex, language or religion. . . ." And in another place: "All members of the United Nations, in order to contribute to the maintenance of international peace and security, undertake to make available . . . armed forces, assistance and facilities, including rights of passage, necessary for the purpose of maintaining international peace and security." The framework for peace is good. The men of the 51 nations who met in San Francisco in the summer of 1945 to compose the Charter contemplated and provided for almost every conceivable contingency in international behavior. The paper they wrote is one of goodwill and high purpose, but more than that it is a document of practicality and realism — a realism born of an awakening to the futility of war, and of a deep and justifiable fear that another conflict might well put an end to civilization.

And so "we the peoples of the United Nations have resolved" and have built a framework. We have acknowledged that there is more to securing the peace than can be accomplished with ideals or a pen; that it also takes men, guns, tanks, ships and especially planes.

But building a framework is one thing. Completing the structure is something else.

Two years ago this coming January, the Security Council of the United Nations appointed a military committee composed of the Chiefs of Staffs of the five permanent members or their representatives to examine and make recommendations as to the composition of the military forces of the UN. It was an assignment that, in the reserved words of England's Sir Alexander Cadogan, was of "some importance."

Assuming that the committee could have tackled its job with only the peace of the world in mind, and without the monstrous handicap of having to consider the national sovereignty, pride, special interests and prejudices of each of the nations involved—assuming that the members of the committee could have made their recommendations as generals and admirals, free of political requirements, such a report should have been completed in short order. Two months maybe, three or four at the most. But unhappily for those who feel that the life expectancy of the UN is shortened by years every day it exists without military support, the admirals and generals—24 months later—*still* haven't reached agreement.

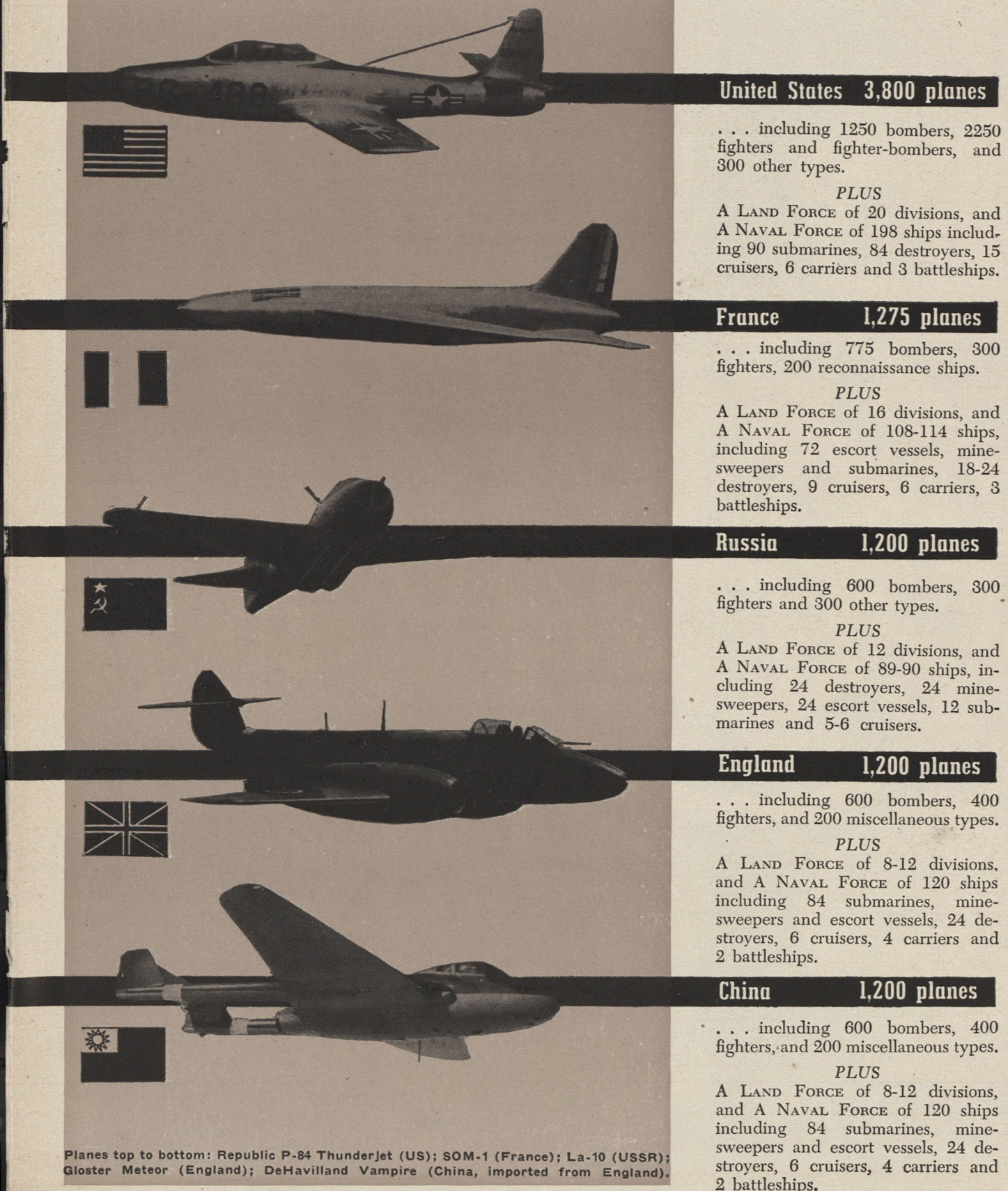
Taking the job out of the hands of the Military Staff Committee for a moment, we might assume that a world police force—idealistically capable of living up to the full obligations and responsibilities imposed by the UN Charter—would have to be built something as follows:

- It should be of a strength both in men and material sufficient to overcome in the shortest possible time any act of aggression in any sector of the world by any power or group of powers in the world.
- It should be so deployed that the whole globe is within range of its forces—both tactical and strategic.
- Its bases should be held in international trust by the UN, and unrestricted rights of passage to and from these bases should be granted to the police force by the countries whose borders they are within.
- Its equipment, contributed by member nations, should be standardized insofar as possible.
- World intelligence, reconnaissance, warning systems should be established under its jurisdiction.
- It should have free access to the military secrets of all nations.
- Its commanders should be elected by vote of the Security Council in consideration only of ability and experience.
- These commanders should prepare and have ready in advance all the battle plans necessary for the complete defeat of any aggressor.
- Its members should owe first allegiance to the United Nations, and, in conformity with their individual beliefs, be so sworn.
- Men of all nations should mix in its ranks. They should be taught a common language and should wear a common and distinctive uniform.
- At least its air forces, because of the particular reliance placed upon air power in the Charter, should be kept in instant readiness.
- It should be placed in action when a majority vote of the Security Council determines that an act of aggression has been committed and that measures short of armed force will not restore peace.

Is the establishment of a force of these dimensions too idealistic and fanciful? Perhaps so. Perhaps, even if it weren't for the fact that it

(Continued on page 13)

THE BIG FIVE RECOMMEND...



Planes top to bottom: Republic P-84 Thunderjet (US); SOM-1 (France); La-10 (USSR); Gloster Meteor (England); DeHavilland Vampire (China, imported from England).

United States 3,800 planes

. . . including 1250 bombers, 2250 fighters and fighter-bombers, and 300 other types.

PLUS

A LAND FORCE of 20 divisions, and A NAVAL FORCE of 198 ships including 90 submarines, 84 destroyers, 15 cruisers, 6 carriers and 3 battleships.

France 1,275 planes

. . . including 775 bombers, 300 fighters, 200 reconnaissance ships.

PLUS

A LAND FORCE of 16 divisions, and A NAVAL FORCE of 108-114 ships, including 72 escort vessels, minesweepers and submarines, 18-24 destroyers, 9 cruisers, 6 carriers, 3 battleships.

Russia 1,200 planes

. . . including 600 bombers, 300 fighters and 300 other types.

PLUS

A LAND FORCE of 12 divisions, and A NAVAL FORCE of 89-90 ships, including 24 destroyers, 24 minesweepers, 24 escort vessels, 12 submarines and 5-6 cruisers.

England 1,200 planes

. . . including 600 bombers, 400 fighters, and 200 miscellaneous types.

PLUS

A LAND FORCE of 8-12 divisions, and A NAVAL FORCE of 120 ships including 84 submarines, minesweepers and escort vessels, 24 destroyers, 6 cruisers, 4 carriers and 2 battleships.

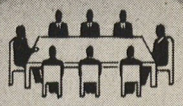
China 1,200 planes

. . . including 600 bombers, 400 fighters, and 200 miscellaneous types.

PLUS

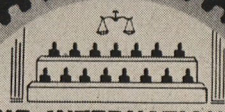
A LAND FORCE of 8-12 divisions, and A NAVAL FORCE of 120 ships including 84 submarines, minesweepers and escort vessels, 24 destroyers, 6 cruisers, 4 carriers and 2 battleships.

Big Wheels Of The UN



TRUSTEESHIP COUNCIL

Comprises all countries administering dependent areas, the Big Five, and others elected by the Assembly. However charter provides that in all cases half of members must be administering powers while the other half must have no dependent areas under them.



THE INTERNATIONAL COURT OF JUSTICE

Comprises 15 judges from different nations elected by the Assembly and Security Council. Settles all legal disputes between nations which are submitted to it. Gives advisory opinions to UN on legal questions. Permanent headquarters: The Hague, Holland.

MAIN COMMITTEES

ECONOMIC AND FINANCIAL

POLITICAL AND SECURITY

ADMINISTRATIVE AND BUDGETARY

SOCIAL, HUMANITARIAN AND CULTURAL

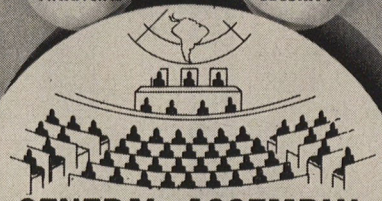
TRUSTEESHIP

LEGAL

GENERAL

CREDENTIALS

PROCEDURAL COMMITTEES



GENERAL ASSEMBLY

Fifty-five nations are represented on a basis of absolute equality. The Assembly, main body of the UN, meets annually, and in special sessions when required. It receives reports from all other UN branches. The Assembly has the right to examine and make recommendations on all problems pertaining to the maintenance of peace and the welfare of mankind. It is the great moral and political arbiter of the world.

ATOMIC ENERGY

REGIONAL ARRANGEMENTS

MILITARY STAFF

INVESTIGATION

CONVENTIONAL ARMAMENTS

SECURITY COUNCIL

11 members: 5 permanent (U.S., U.S.S.R., U.K., France and China); 6 non-permanent members elected by General Assembly. Paramount function: to preserve the peace. Can take direct action (diplomatic, economic, military sanctions) by a majority of 7 including the votes of all the Big Five.

COMMISSIONS

STATISTICAL

POPULATION

STATUS OF WOMEN

NARCOTIC DRUGS

SOCIAL

FISCAL

TRANSPORT AND COMMUNICATIONS

ECONOMIC AND EMPLOYMENT

HUMAN RIGHTS

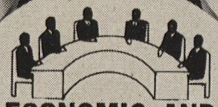
COORDINATION

ASIA AND FAR EAST

EUROPE

LATIN AMERICA

ECONOMIC



ECONOMIC AND SOCIAL COUNCIL

18 members elected by the Assembly. Studies and prepares recommendations on matters related to the welfare of mankind. Co-ordinates the activities of various specialized agencies and co-operates with private organizations.

DEPARTMENTS

SECURITY COUNCIL AFFAIRS

SOCIAL AFFAIRS

ECONOMIC AFFAIRS

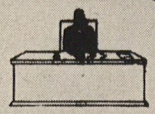
TRUSTEESHIP

LEGAL

PUBLIC INFORMATION

ADMINISTRATIVE AND FINANCIAL SERVICES

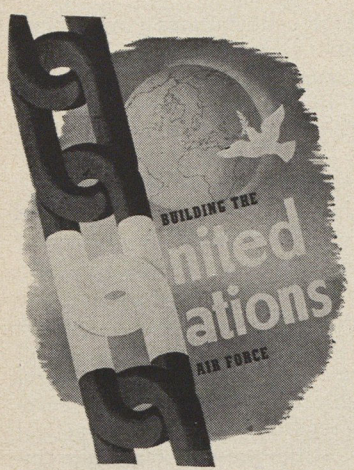
CONFERENCE AND GENERAL SERVICES



THE SECRETARIAT

Permanent international civil service. Major administering organ of the UN. Its head, the Secretary-General, is chief administering officer of the UN. He has the power to draw the Security Council's attention to any situation endangering international peace.

UNITED NATIONS WORLD Chart by James Cutter



CONTINUED

would necessitate the surrendering of national sovereignty, support of such a behemoth would seriously jeopardize the economies of the member nations. Perhaps, because of its size and power, it would become an instrument of world domination rather than world service.

But if this is the case, then what lesser power can we build and still insure the peace we seek? Let's pick up the Military Staff Committee again and study some of the preliminary reports it has made.

Strength

On the first and most important question—that of strength—the five delegations recently reached four different "provisional" conclusions, as indicated in the chart on Page 11. Roughly, an average of the 5 estimates would call for 1735 airplanes, 14 land divisions, and 127 surface vessels of all types.

Considering the fact that in World War II the US alone found it necessary to build an air force of 80,000 planes, a navy of 11,115 ships and an army of 89 combat division, it would seem that there is little hope —with such puny forces as proposed —of the UN's ever being able to overcome an act of aggression "in any sector of the world by any power in the world."

How does it happen that the forces recommended are so small? There are several reasons. In the first place, the UN police force was not designed to stop an aggression by any of the five big powers. It couldn't. Under the present Charter, decisions of the Security Council (including the decision as to whether or not an aggression has been committed) are made by an affirmative vote of seven of the eleven members, *including the concurring votes of the five permanent members.* All any one of the Big Five would have to do to stop the UN's forces from marching against it would be to vote that it had committed no aggression—"veto" they call it. As a result of this condition, the military committee probably reasoned that it need recommend only a military establishment large enough to quell disturbances of minor powers. Another reason might be that the committee, and indeed the world, has hopes that other divisions of the UN will outlaw atomic weapons (except perhaps for the police force itself) and bring about world-wide disarmament. Should these two things occur the need for a large standing force would be measurably lessened. Still another explanation for the highly "economical" force probably lies in the belief that future wars will be fought with fewer men and more complex instruments.

So, as it stands now, assuming that some sort of compromise as to strength is worked out, the best we can hope for is a UN military unit capable of (a) handling aggressions of minor powers, or (b) handling aggressions of major powers if and when the veto is revoked and if and when world-wide disarmament and the international control of atomic weapons are achieved.

Composition

According to Article 3, Chapter II, of the first reported study of the Military Staff Committee, the "armed forces made available to the Security Council . . . shall be composed of units . . . of national armed forces, land, sea and air, which are normally maintained as components of armed forces of Members of the United Nations"—a mouthful which simply means that the few planes, ships and divisions proposed by the committee will exist as an international entity only in case of emergency. The rest of the time they retain their positions as component parts of the regular military establishments of the contributing nations.

This, then, rules out the possibility of having battle plans prepared in advance, for if such plans existed they would soon be the common property of every military establishment that contributed part of its *own* component, making them useless. A general who served with the UN, for example, would be familiar with the latter's battle plans and would quite naturally put them at the disposal of his country in the event it was attacked by the UN.

(Please turn the page)

Maj. Gen. Hubert R. Harmon is representative of Gen. Carl Spaatz on United National Military Staff Committee.

Sitting on committee for General Eisenhower as representative of US Army is paratrooper Lt. Gen. Matthew Ridgeway.

United States Navy representative for Admiral Nimitz is Vice Admiral Henry K. Hewitt of No. Africa invasion fame.

CONTINUED

Standardization would also be ruled out, as would a common language and a common unform. Access to military secrets of all member nations could not be attained, or every country would soon learn the plans of every other. Nor could any member of such a force be expected to forsake allegiance to the country whose uniform he wore for allegiance to the UN.

Deployment

The matter of deploying the proposed police force is currently deadlocked. The USSR contends that troops of contributing nations should be garrisoned within their own frontiers except when employed in combat. The other four delegations agree generally that the location of armed forces should be such as to "enable the Security Council to take prompt action in any part of the world for the maintenance or restoration of international peace and security."

If the latter position were accepted, it would mean—theoretically at least—that United Nations units could be shifted from one area to another as seemed militarily necessary without regard to national borders. However, if Russia refuses to yield on its position it will become impossible to assemble a force of any size in any specified area except in case of actual employment.

Whether or not a compromise between these two diametrically opposed opinions can be reached without endangering the efficiency of the force is anybody's guess.

Readiness

Concerning the problem of readiness of the UN's air force, Article 45 of the Charter provides that "In order to enable the United Nations to take urgent military measures, members shall hold immediately available national air force contingents for combined international enforcement action. The strength and degree of readiness of these contingents and plans for their combined action shall be determined . . . by the Security Council with the assistance of the Military Staff Committee." On the same general subject, the military committee has proposed that the UN's force should be "either maintained in readiness for combat or brought up to readiness for combat within the time limits specified in special agreements." We are to presuppose, perhaps, that no aggressor will strike while the police force is mobilizing within its "time limit." It must be remembered that if the UN's police units are to be retained in peace as component parts of the forces of contributing nations it is more essential than ever that they be kept in instant readiness, for if they aren't, time is lost both in mobilizing them at home and again in mobilizing them for the UN.

Areas of Trust and Rights of Passage

So far, no concerted effort has been made to place UN bases in areas of international trust. The US has indicated that its Pacific bases would be available for any such arrangement, but in Article 27 of the report of the Military Staff Committee it advocated "A member nation will retain its national sovereignty, and control and command, over bases and other facilities placed at the disposal of the Security Council."

Generally speaking, all five permanent members of the Security Council are agreed that rights of passage should be granted the police force by member nations—when requested. The catch is that such authority must be requested. There is no provision for free and unlimited passage. Russia seeks to limit the privilege even further by its proposal to "indicate the duration and other conditions involved in the exercise of rights thus extended to the Armed Forces operating under the direction of the Security Council."

Contributions

Although it is primarily an administrative problem, another thing that is seriously retarding progress is the lack of agreement as to how member nations shall contribute to the UN force. China, France, England and the United States are agreed that "in view of the differences in size and composition of national forces of each permanent member . . . these contributions (from member nations) may differ widely as to the strength. . . ." On the other hand, Russia steadfastly maintains that contributions should be made strictly "on the principle of equality."

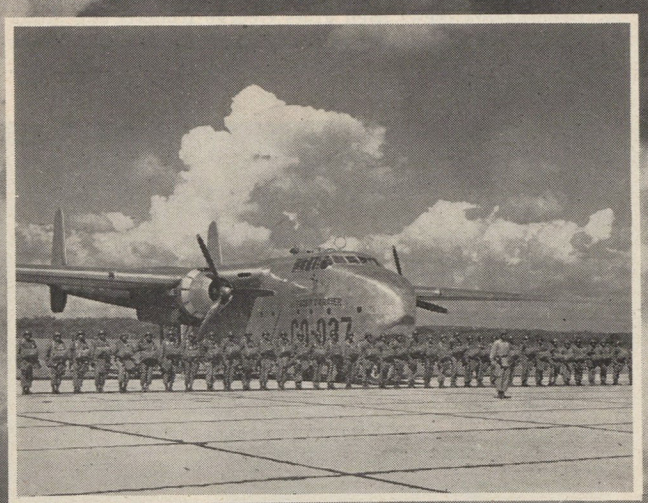
In support of the first proposal, the Chinese delegation has pointed out that "The military conditions of the permanent members differ widely from one another and the strengths of their three different services, land, sea, and air, are not of the same level. Hence . . . it would be highly inadvisable to allow scrupulous regard to an ideal impractical at least at the present stage to prejudice the efficiency and effectiveness of the international force. . . ."

In support of its contention, the Russian delegation has stated that "The overall size of the armed forces will not be too large. Therefore the five states can make armed forces available on the principle of equality; that is, they can contribute armed forces, land, sea and air, which would be equal in strength and composition. The principle of equality does not permit advantages in the position of any permanent member of the Security Council in the contribution of armed forces by that member." At the moment there is no apparent solution.

And so after two years at the conference table, our world police force has advanced little beyond San Francisco and the original UN "resolves." Last June the Commission to Study the Organization of Peace, headed by former Under Secretary of State Sumner Welles, stated that "had it not been for the United Nations, the relations between the great powers might well have deteriorated beyond repair." Perhaps this is the most generous thing you can say of the UN. Perhaps the only thing that will break the deadlock now is for the peoples of the world to impress their delegates at Lake Success with the fact that they are still as firmly behind their resolves as ever.

"The present discouragement, economic isolationism, and distrust between the great powers . . ." the Welles commission concluded, "is a betrayal of the men and women who died in the war. It is unworthy of the United Nations. (But) . . . even if the governments may be far apart, the peoples of the world long for peace and stability as never before. From that standpoint the deadlock is not as great as it appears. The power of this popular will for peace is the power which can and must break the deadlock." But the time is short.

Operation Combine



Black Panther Infantry is pre-flighted before Combine drop.

Deployment of Combine forces is checked on plotting board.

Not since 1812, when Andrew Jackson defeated the British at New Orleans with muskets, sabers, and match cannons, has the US been called upon to defend itself against an enemy power on native soil. For 135 years our shores have remained inviolate, partly because they were well protected—with the weapons of the day—and partly because of their inaccessibility.

But we are no longer inaccessible. Nor can we now hide behind muskets or match cannons or even battleships and feel secure. Granting that the US has become the world's No. 1 strategic target, there is ample reason to assume that if war flares anew the domestically tranquil years will end.

For five weeks ending last November 1, the Army and the Air Force pretended that just this had happened in a war game called "Operation Combine." Theoretically, a hostile nation, alert to US impotency, struck in the Caribbean area from bases it had built through a program of "friendly expansion" in small southern hemisphere nations. Within a few weeks the enemy had consolidated its forces and quickly overrun Florida, Georgia, and parts of Alabama and South Carolina. Operation Combine was a maneuver designed to check the advance and turn the invader back into the Atlantic. Feature of the operation was the mass air movement of infantry troops dispatched to the "northwest sector" in a deceptive end-around play. A total of 137 planes, including Fairchild C-82s, Douglas A-26s, North American P-51s, Lockheed P-80s, and Boeing B-29s participated in the event. The P-80s used live ammunition. On paper the operation was highly successful. The enemy wound up in the ocean.

There was only one thing wrong. In Operation Combine, an initially weak US was providently granted time to mobilize after the enemy landed. In real war it was doubtful that there would be any such make-believe.

battleground

These are some of the barriers to aerial progress in the vast unexplored region of the upper atmosphere. These are some of the reasons why we are still several years away from tactically-efficient supersonic missiles, why the air research program must have money and more money

Above 30,000 feet the sky becomes a purple canopy. Four miles above sea level a candle will not burn for lack of oxygen. From five to ten miles above the earth the air grows steadily colder and thinner, and masses of cold, dry air interact with masses of warm, moist air to breed storms and weather. From ten to fifty miles up the sun's ultraviolet light is so intense it might destroy all life on earth if it were not partially absorbed by an ozone layer; sub-Arctic cold is supplanted at greater heights by hotter than desert temperatures; shooting stars appear from the outer space, and clouds that shine by night are believed to be collections of dust from burned out meteors; man's blood would boil in the reduced pressure. Above 50 miles there are few molecules or particles of matter; here the atmosphere is filled with electrical phenomena, invisible radio-reflecting layers and visible auroras; atoms are inoized by ultraviolet rays, cosmic rays and particles from the sun; showers of these charged particles cause great glows as they collide with air particles in their dash toward the earth; long meteor trains burn themselves to bits during their fiery transit through the atmosphere at speeds up to 50 miles per second; cosmic rays represent energy transformations in the universe far greater in intensity than those associated with the atomic bomb. No one knows the exact figure, but the ocean of air surrounding the earth is estimated to be at least 600 miles in thickness or height.

From the earliest times, man has gazed at this still unexplored region of the upper air with awe and respect. Feeling strong powers above and beyond him, he has worshipped gods of the sun, moon, stars and the heavens, has lavished gifts on the gods he believed were directly responsible for his existence, comfort and security. This region of the universe has long aroused his curiosity, challenged his mental development.

The wartime use of German V-2 rockets—reaching hitherto unknown heights—prompted man, as never before, to turn his eyes upward toward new paths of travel, new ways of communication, new effects of weather, new effects of the atmosphere on human life and plant life. Realizing the importance of the upper air to national security and defense, he probes this region as a possible battlefield of the future.

All major powers of the world are at present working on projects to extend the range of their guided missiles, and to control them over their entire range of flight for the purpose of intercepting an enemy's weapon or for bringing their own weapon accurately down upon a particular target. The success of these projects is dependent, to a great degree, on learning the secrets of the upper atmosphere—the battleground for guided missiles—for these secrets are vital to the propulsion, guidance, control and design of the aerial vehicles of the future.

For the burning of fuel, turbo-jet, pulse-jet and ram-jet propulsion depend on the oxygen obtained from the relatively dense atmosphere up to about 15 miles altitude. Fuels used to operate vehicles at higher altitudes in the atmosphere, where the air is relatively thin, must be accompanied by an oxygen supply within the vehicle. We must discover at what altitude the oxygen in the air is sufficient for the fuel to support missiles using propulsion instruments such as turbo-jet and ram-jet engines. We know that the temperature and pressure existing at high altitudes effect the temperature and pressure in the fuel tanks and fuel lines of all types of guided missiles. But we have still to learn at what altitudes the fuel in the tanks and lines is affected, so fuel systems can be developed to withstand the conditions at those heights.

Missiles conventionally are guided by means of radio and its first cousin, radar. Radio-radar waves either break through the ionosphere into outer space or are reflected back toward the earth—depending on the radio frequency used and the conditions existing in the ionosphere at the time. Continued study must be made to determine the movements and ionozation in the ionosphere, in order to determine what frequencies will break through and what frequencies will be reflected back to earth.

When a missile approaches its target near the end of its run, it may be necessary to have it "home" on that target by electrical means. This involves more sensitive electronic studies of the air than those used for ordinary radio contact. Already we know that radio reception in the ionosphere varies with seasons, latitude and frequencies of energy waves, and that reception is poor when aurora borealis appear.

In our consideration of missile guidance by use of the earth's magnetic field, we know that the strength of this field varies greatly at different heights and at different latitudes of the earth's surface. But we do not know just where the variations occur. A compass or a more sensitive magnetic type indicator must be used for this kind of navigation, but in order to use the compass successfully we must have more complete knowl-

for guided missiles

By Lt. T. M. Thompson

edge of the magnetic lines of force in the upper atmosphere.

Control of a missile in dense air may be achieved with movable fins on the body of the vehicle. Generally speaking, in very thin air high speed missiles may be controlled by fins, while missiles with slower speeds cannot be so controlled. This problem directly affects the maximum altitude at which each specific type of missile can operate successfully, and the problem cannot be overcome until we find at what altitude such control can be maintained. Also, electrical control equipment undergoes a high voltage breakdown in operations at very high altitudes. Before we can install insulations to effectively prevent such breakdowns, we must first learn at what altitudes the breakdowns occur.

In the design of guided missiles we are confronted with the necessity for lightweight materials strong enough to perform at high altitudes, yet able to resist friction heat from fast travel through the atmosphere at varying temperature levels. We must determine the effects of explosions at high altitudes before we can design effective types of warheads and fuses for upper air vehicles.

Obstacles in the atmosphere threaten the performance of high altitude guided missiles. It is known, for example, that many meteors reach our atmosphere every day. Most of them burn up with friction as they pass through the outer part of the atmosphere. But it is possible that guided missiles could come in direct contact with such interstellar visitors. The presence of this solid matter in the upper atmosphere could be a severe handicap to flights of guided missiles, and a threat to the successful development of high altitude human travel.

Until about 25 years ago, scientists were greatly puzzled about sound waves. No reason was known why sound waves from gunfire or an explosion should not go straight up into the sky until they were lost in space. But experiments from the ground proved that sound waves could be picked up not only in the area immediately surrounding their place of origin, but also in an area beyond a "skipped zone" where they could not be heard. This led to the conclusion that at a height of 60 miles the temperature probably rose to about 130° Fahrenheit—heat sufficient to bend the sound waves and send them earthward again. A similar phenomenon was observed in connection with short radio waves. Radio signals were sent up into the ionosphere to measure ion density by finding out which wave lengths are reflected back to earth and which of them go on through the atmosphere into outer space.

Several years ago it was discovered that there appeared to be a definite relationship between the occurrences of solar flares, usually associated with active spots on the sun, and magnetic storms. During periods of intense sun spot activity, great electrical forces are released from the sun. Communications are disturbed. In fact, long range radio communications becomes practically impossible. During World War II constant studies of the sun were made at observatories in the US. Reports concerning flares and prominences from the sun were wired to Washington daily. Knowing that crippled channels of communications could be expected on earth one or two days after large flares appear on the sun, forecasts were made of the times when our communication channels might be faulty and, even more important, periods during which the enemy would be having communications trouble. Missions were planned in accordance with the information received through these studies.

An accurate method of determining the composition of any substance is to obtain a spectrum or a photograph of the light it emits when the substance is heated. This method of study has been used to determine temperature and movements of the sun and stars, meteor trails, and atmospheric gases. Only a small portion of the total basic spectrum, however, is useful for spectrographic studies.

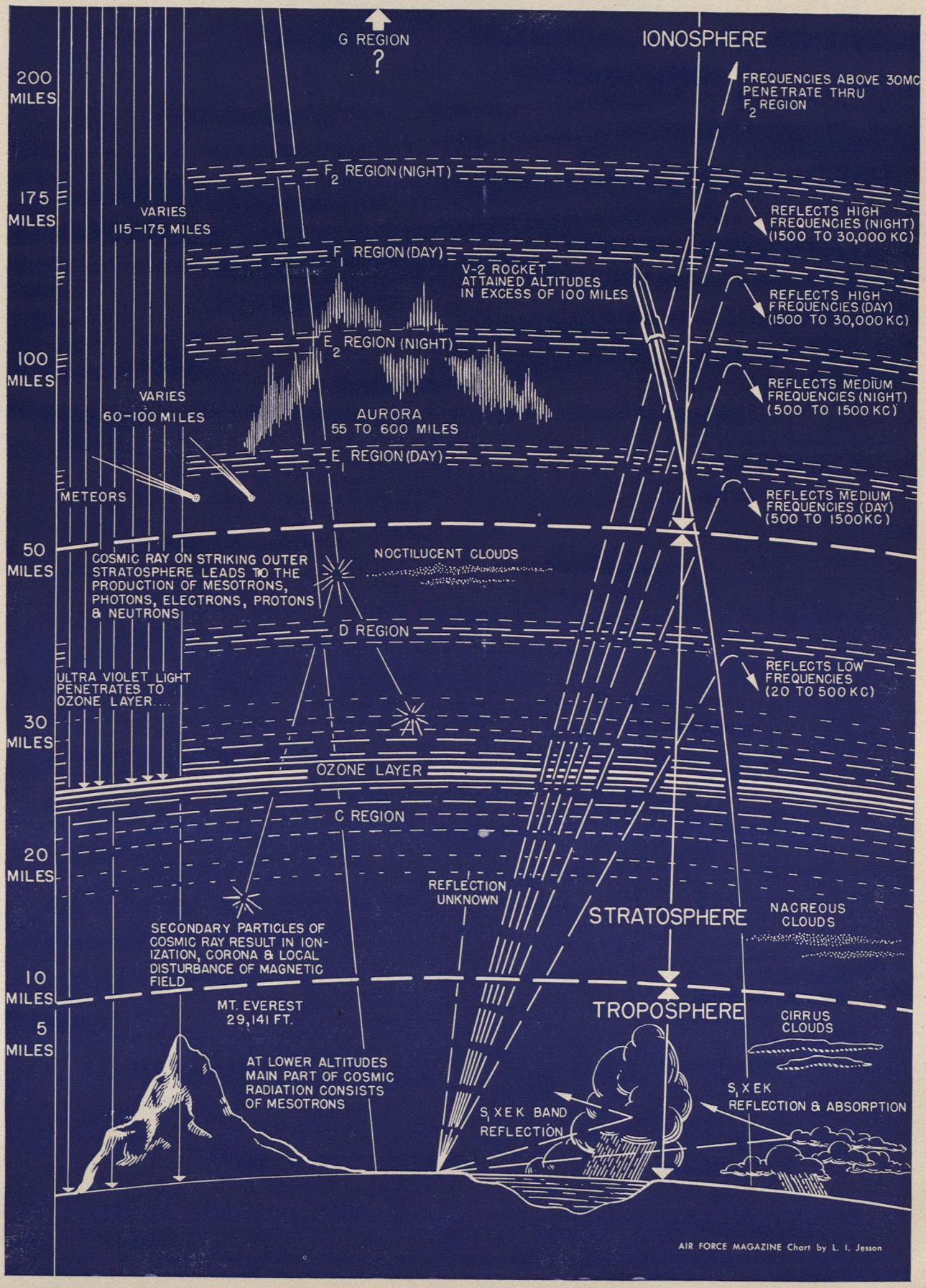
In our study of solar radiation, we have discovered the presence of helium gas—that some process on the sun changes hydrogen to helium gas through an atomic process presumed to be radically different from that of the Oak Ridge project and other Atomic Energy Commission projects.

Cosmic rays have been studied from the depths of the ocean and from the highest mountain tops with balloon-borne instruments and V-2 guided missiles. Today, B-29s are making a series of flights between the northern part of the US and the magnetic equator, carrying instruments to measure the intensity of cosmic rays at various altitudes. Still, the source of energy that creates cosmic rays has not yet been discovered; man has not yet found a way to produce these rays on the ground. In fact, little is known about cosmic rays except that they represent energy transformations far greater than the energy associated with the atomic bomb. And high altitudes remain the only known laboratories for cosmic ray information.

Many problems must be overcome before the secrets of upper air are made available to our scientists and military planners. These problems are of such scope and importance that they demand national interest and national effort. The work involved is too great, too expensive and too urgent for private individuals, institutions and companies to achieve the support required by military needs. It challenges national support, and the people of the nation are looking to our military forces for leadership in the research and exploration of the upper atmosphere.

In considering our investigations of the upper regions, it must be remembered that until recently it was not possible for any known vehicle to reach more than 20 miles above the earth. Then came the V-2. While the US and Great Britain were concentrating their wartime efforts on radar, atomic energy and other developments, the Germans pursued their long-time interest in the development of rockets. They developed

(Continued on page 21)


G REGION
?
IONOSPHERE
200 MILES
FREQUENCIES ABOVE 30MC PENETRATE THRU F_2 REGION
F_2 REGION (NIGHT)
175 MILES
VARIES 115–175 MILES
REFLECTS HIGH FREQUENCIES (NIGHT) (1500 TO 30,000 KC)
F_1 REGION (DAY)
V-2 ROCKET ATTAINED ALTITUDES IN EXCESS OF 100 MILES
REFLECTS HIGH FREQUENCIES (DAY) (1500 TO 30,000 KC)
E_2 REGION (NIGHT)
100 MILES
REFLECTS MEDIUM FREQUENCIES (NIGHT) (500 TO 1500 KC)
VARIES 60–100 MILES
AURORA 55 TO 600 MILES
E_1 REGION (DAY)
METEORS
REFLECTS MEDIUM FREQUENCIES (DAY) (500 TO 1500 KC)
50 MILES
COSMIC RAY ON STRIKING OUTER STRATOSPHERE LEADS TO THE PRODUCTION OF MESOTRONS, PHOTONS, ELECTRONS, PROTONS & NEUTRONS
NOCTILUCENT CLOUDS
D REGION
REFLECTS LOW FREQUENCIES (20 TO 500 KC)
ULTRA VIOLET LIGHT PENETRATES TO OZONE LAYER....
30 MILES
OZONE LAYER
C REGION
20 MILES
REFLECTION UNKNOWN
STRATOSPHERE
NACREOUS CLOUDS
SECONDARY PARTICLES OF COSMIC RAY RESULT IN IONIZATION, CORONA & LOCAL DISTURBANCE OF MAGNETIC FIELD
10 MILES
MT. EVEREST 29,141 FT.
TROPOSPHERE
CIRRUS CLOUDS
5 MILES
AT LOWER ALTITUDES MAIN PART OF COSMIC RADIATION CONSISTS OF MESOTRONS
S, X E K BAND REFLECTION
S, X E K REFLECTION & ABSORPTION
AIR FORCE MAGAZINE Chart by L. I. Jesson

The Upper Air

The periphery of our troubled planet is wrapped in a gaseous envelope whose structure is stratified in content and density. It is a thin layer. If the planet were represented by a one-foot schoolroom globe, the atmosphere would be scarcely thicker than the globe's varnish.

Nevertheless, in this narrow outer shell lies the great unknown, the frontier we must explore and study if we are to succeed in our determination to control the skies.

Ionosphere The outer layer of the atmosphere is known as the Ionosphere. This stretches from some undetermined point in interstellar space down to about 50 miles above sea level.

Conditions in this strata are not unlike those in a neon advertising sign. There are very few gas atoms here, and these are electrified or ionized by the ultra-violet rays and electrons hurled in from the sun.

Within the Ionosphere lies a series of layers which act as reflectors to radio waves. The Heaviside Zone (D and E Layers) turns radio waves below 1500 KC (the regular broadcast bands). Further up is the Appleton Zone (F1 and F2) which reflects short waves above 1500 KC. Because we hope to direct guided missiles by these electromotive impulses, study of this area is important.

Stratosphere The Stratosphere reaches from ten to fifty miles above the earth. Man is somewhat familiar with this level, having penetrated its lower reaches both by heavier-than-air craft and by strato-balloon. The important substance in this zone is a thin band of ozone which filters out the bulk of the ultra-violet light. Full penetration would destroy all life on the globe. Total filtering on the other hand would prevent the formation of necessary vitamin D.

Troposphere Eighty per cent of the atmosphere's weight is concentrated in the ten miles closest to the earth's surface, known as the Troposphere. Weather, violent changes in temperature, velocity and moisture occur here only. Even here we can survive without artificial help only at the bottom third of the layer.

BATTLEGROUND FOR GUIDED MISSILES *(Continued from page 19)*

the V-2 rocket, which reached an altitude of over 60 miles, for the purpose of furnishing a vehicle with the most efficient flight path while minimizing detection and destruction prior to reaching target. At the close of the war, the Allied Nations captured many of the German V-2s and took them, along with some of the German scientists who developed them, to Russia, England, the US.

In this country, military, industrial and scientific efforts have been coordinated to gain a thorough knowledge of the upper atmosphere through concentrated research and experimentation—and the Air Force has assumed joint responsibility in this overall program. With a number of US government agencies already embarked on individual programs in upper air research, the Joint Research and Development Board, a coordinating agency between the Air Force, Army and Navy Departments, has recognized the need for a combined organization to carry out this research, has instituted a Panel on the Upper Atmosphere under the Committee of Geographical Sciences. This Panel has called together all interested military and civilian agencies, has surveyed the entire program, and has listed all experiments required in general categories. The Panel, which is not an operating agency, surveys programs for duplication of effort, and recommends addition or deletion of projects.

The US Armed Forces have already fired 30 V-2 rockets at White Sands, N.M. Each of these rockets has been fired for specific agencies; in some cases, the agencies have been represented by civilian contractors. Allocation of V-2 firings are made by the V-2 panel, an informal committee composed of civilians working for the Armed Forces.

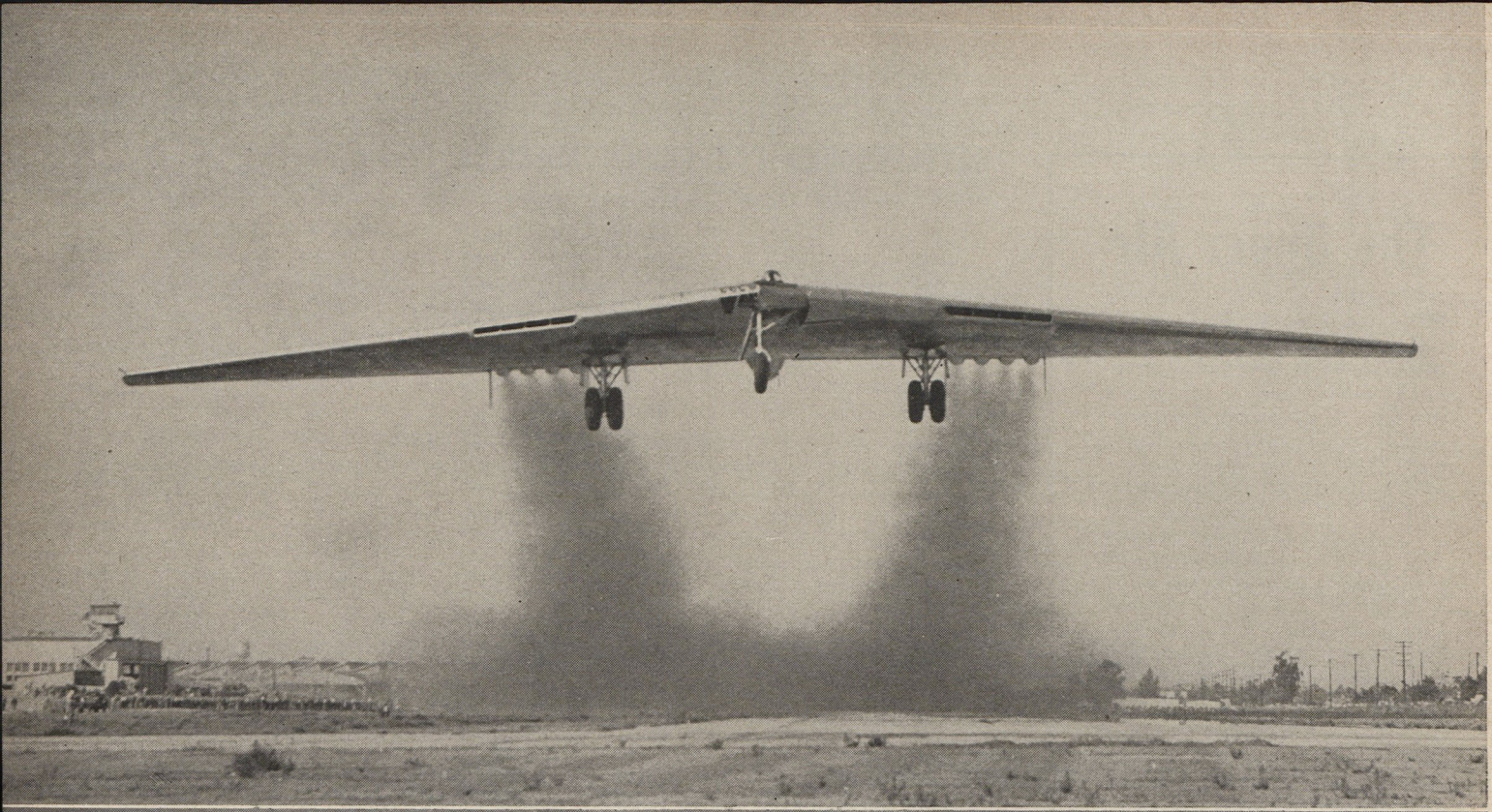
Under this combined program of the services, it is proposed to fire approximately 75 V-2s or other upper research vehicles per year during the next two years. Each V-2 rocket is loaded with scientific equipment for measuring the composition and properties of the upper air. Experimental equipment fills the warhead of the rocket, and some equipment is placed in other compartments within or attached to the rocket itself. A telemetering system located in the control section of the rocket relays all the measurements to the ground by radio signals. These signals are automatically recorded and by combining the records so obtained and the data taken previous to the flight, the exact measurements for various heights reached by the vehicles are determined for each experiment.

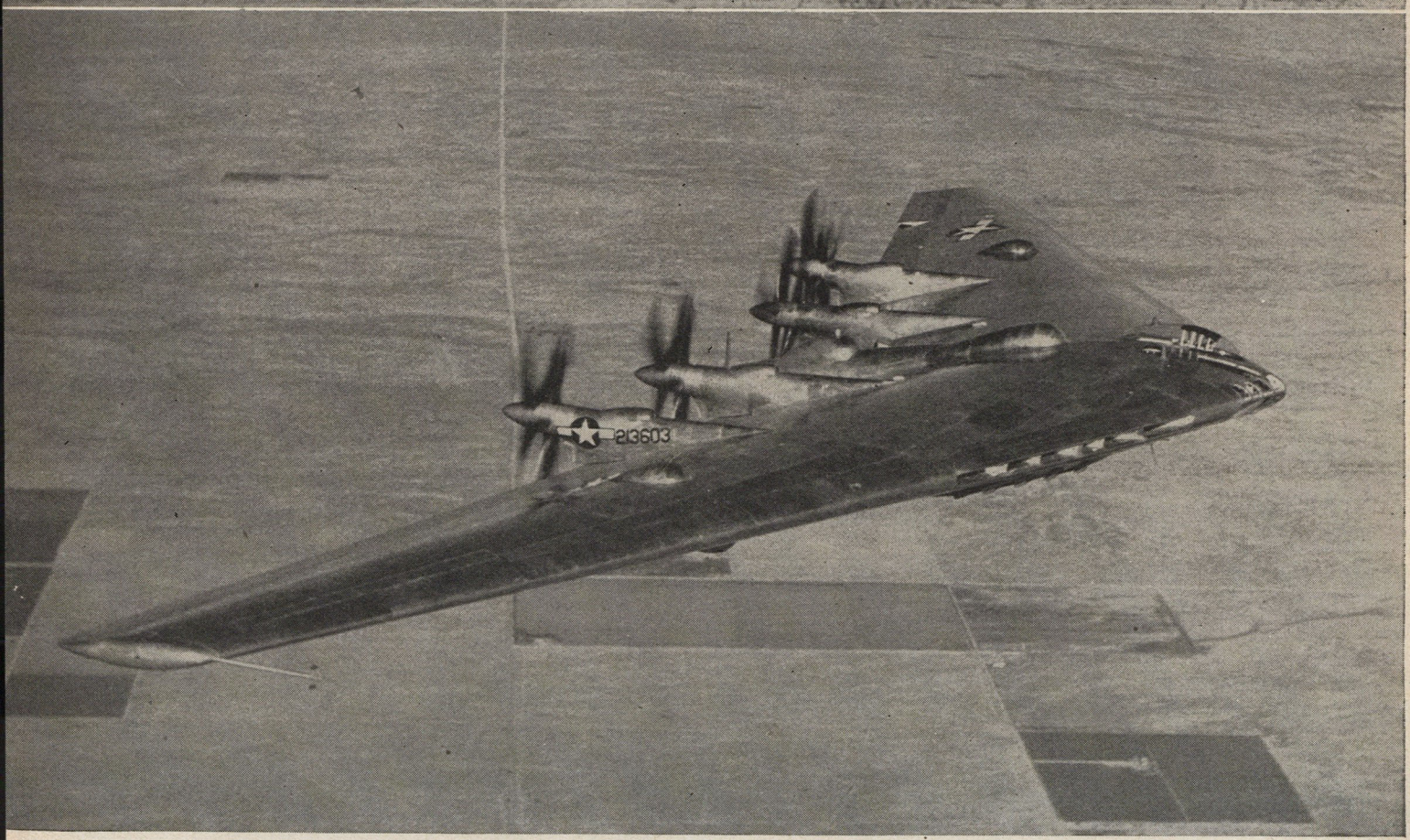
The Air Force is trying to reduce the cost of its experimental rockets and increase the amount of data recovered in each V-2 firing by installing parachutes to recover the intricate and costly scientific apparatus and associated valuable data. A mild bursting charge is installed in the rocket, pre-set to explode at a desired altitude. This method of instrumentation and data-recovery has come to be known as the Blossom Project. Prior to risking scientific instruments in Blossom Project, a parachute, 14 feet in diameter, brought an empty 290 pound WAC Corporal Rocket to earth from 19 miles altitude intact and undamaged. The second experiment with Blossom Project was even more successful; a modified WAC Corporal reached 34 miles altitude, where the nose of the rocket was blown off; the instruments descended by parachute to the ground undamaged.

After these two highly successful preliminary experiments, Blossom I, using a V-2 rocket, was tried. A load of less than 50 pounds was ejected at about 120,000 feet. This load consisted of a cannister containing a parachute, some fruit flies (to determine possible mutations in high concentrations of cosmic radiation), a beacon and a device to measure the shock of parachute opening. The beacon was successfully used to locate the cannister after it had fallen.

Yet, the V-2—largest rocket currently being used in these experiments—may be considered only a simple forerunner of the powerful missiles of the future which will fly to greater heights, and into interplanetary space, to help solve the secrets of our world and the secrets of other worlds.

We are striving to become the first to discover the secrets of the upper air so we may develop the necessary defensive weapons to withstand a possible invasion from any nation that might attack us. Meanwhile, if armed conflict can be eliminated, the present program in upper air research can result in vast increases in scientific knowledge, to the end that communications, transportation of personnel and supplies, and many other new facilities would be advanced far ahead of their normal rate of development.

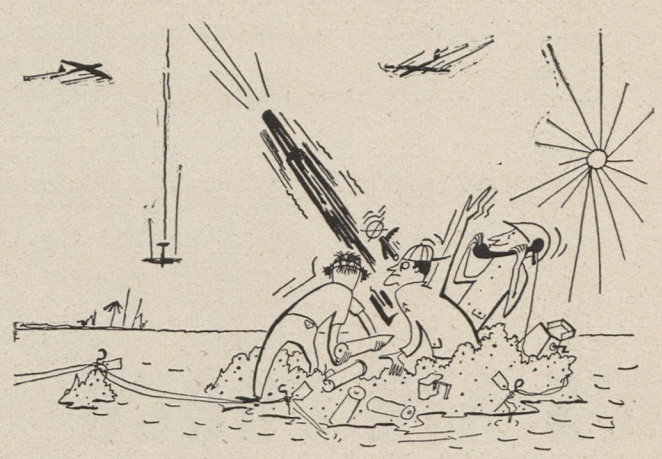




JETS VS. PROPS The cost of speed in jet aircraft has always been range. So great has the sacrifice been to date that even though there is a marked trend away from further development of reciprocating type aircraft, there are still those who doubt the tactical efficiency of the jet engine. Proponents of propellerless flight argue, on the other hand, that even if it were possible to build reciprocating craft of the speed of jets, they would be so heavy their range would be at least as limited and that the fuel consumption probably would be about equal.

In October, with the initial flight of the jet-powered Northrop YB-49 from Northrop Field to Muroc Air Base in California, proponents of both types of propulsion were afforded an excellent opportunity to compare performance notes point by point. The YB-49 was almost identical in configuration to the earlier prop-driven XB-35. Best bet was that the jet version of the Flying Wing would be about 100 miles an hour faster than the XB-35 but would lack the latter's range by a considerabe margin. Another good bet was that military security would keep the score from the public.

O'Halloran On Target!



His name wasn't really O'Halloran, but the rest of this Pacific classic is on the level

By Selby Calkins

O'Halloran's battery was never known as "Bucket," which was its code name, nor as "Battery B, Anti-Aircraft, Captain O'Halloran commanding," which was its official designation. It was known as "O'Halloran's battery"—just that—all over our hot little island.

Our island *was* hot, and no mistake. Hot because of the tropical sun, yes, but hot too because of the regular attention we got from the Nips. We were still fighting the underdog's way; we weren't on top yet as we

were later at Saipan and Tinian and Guam. The Japs still had plenty, and were giving it to us in large and frequent doses.

O'Halloran was an on-the-ball commander and his outfit was an on-the-ball outfit. O'Halloran never slept and O'Halloran could spot a bogey and O'Halloran could get three rounds away before AA Control got the island's AA defenses in gear. The Japs had plenty; but we had O'Halloran out on a little point of coral over which the Japs always came at us with that queer constancy so often characteristic of them.

So the Major running AA Control got used to hearing his "hot-line" phone to all batteries crack out: "O'Halloran on target! Three rounds away!" and "Blam! blam! blam!" as the three rounds got away. Control never doubted or got worried. They knew O'Halloran. Control just got the rest of the guns smoking and the Nips came in and bombed our field and we got some of them and the rest of them beat it and the next Radio Tokyo broadcast would tell us how we'd all been blasted to bits and all our airplanes had been destroyed and that was that. O'Halloran's battery would be cleaning up the guns.

We Air Force guys loved O'Halloran. He was our kind of people and his outfit was the kind which was very nice to have around. When we heard his 105s slamming away we knew it was for real and we could hunt our holes. "O'Halloran on target!" got to be a favorite toast as we drank our warm beer, chiseled from the Navy, in the shelter of the old bomber fuselage we laughingly called our Officers Club. Once in a while O'Halloran would leave his beloved battery long enough to come up and have a beer with us, though probably he'd steal a whole case of it as he left, to take back to his boys.

One dawn, though, O'Halloran found things had changed. We were alerted and the phone in Control cracked: "O'Halloran on target! Three rounds away!" and the three rounds went and the whole AA defense blasted into the chorus. Black puffs dotted the sky and three of the Japs spun blazing into the drink. Two of them were O'Halloran's. When the all-clear came, the hot-line phone in O'Halloran's hole buzzed.

"O'Halloran," the battery commander answered.

"Captain O'Halloran, this is Major —— at AA Control," said a voice strange to O'Halloran.

"Yessir," he acknowledged.

"Captain O'Halloran, I have just taken over Control and I am afraid I must correct your ideas of running a battery."

"I don't understand, sir," began OHalloran. "I . . ."

"Just a moment, Captain. I want to remind you that Control gives the order to fire. You will not fire until so ordered. And you will report as 'Bucket'—not as O'Halloran. We haven't come to naming our batteries for their commanding officers *yet*. Please act accordingly in the future. That's all." The circuit clicked closed.

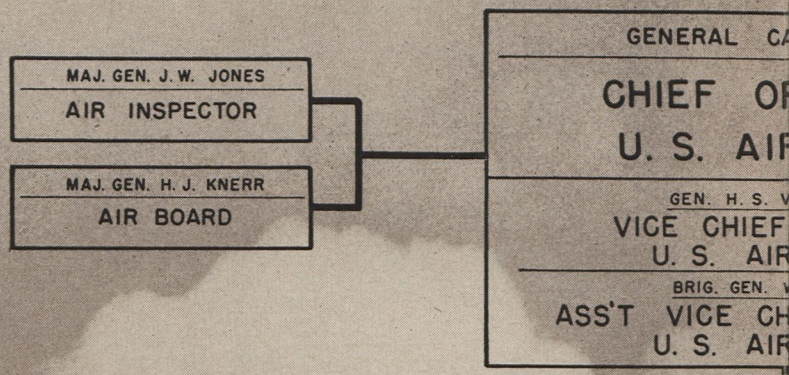
"Yessir," O'Halloran answered to a dead phone. He hung up slowly, and the air became smoky with old-fashioned artillery talk. Then he called a friend in another battery. Yep, the dope was straight. Control had a new boss—a Major fresh from the Three-A Command in Hawaii. "You'll go by the book now, O'Halloran," his friend told him.

O'Halloran simmered all day. Eve-

ning came, and so did the usual Tojo Express of nine Bettys. O'Halloran leaped to the hot-line as his razor-sharp crews swung their finders and crisply fed data to the directors.

"O'Halloran on target!" he shouted. "Three rounds aw. . ."

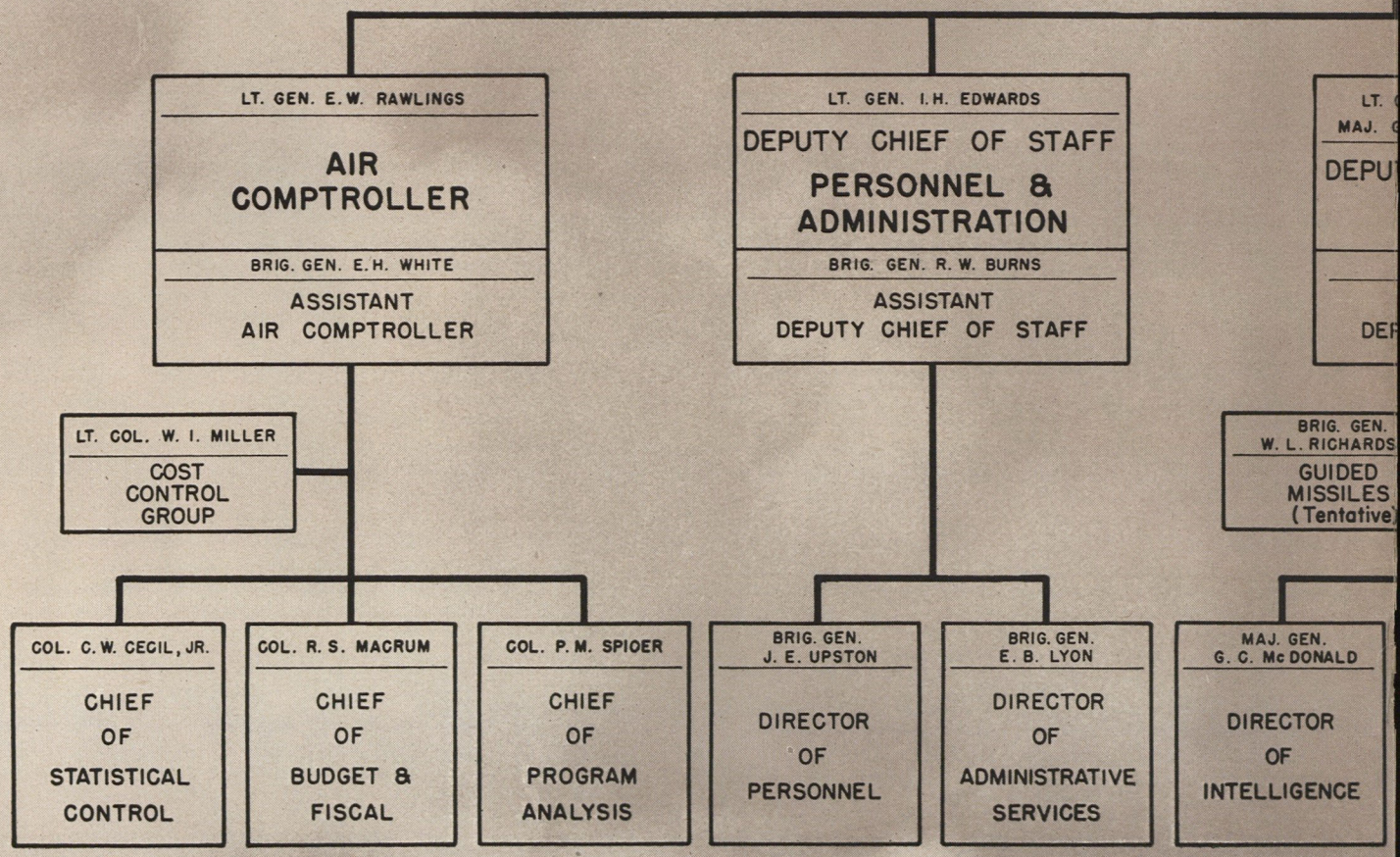
(Continued on page 46)

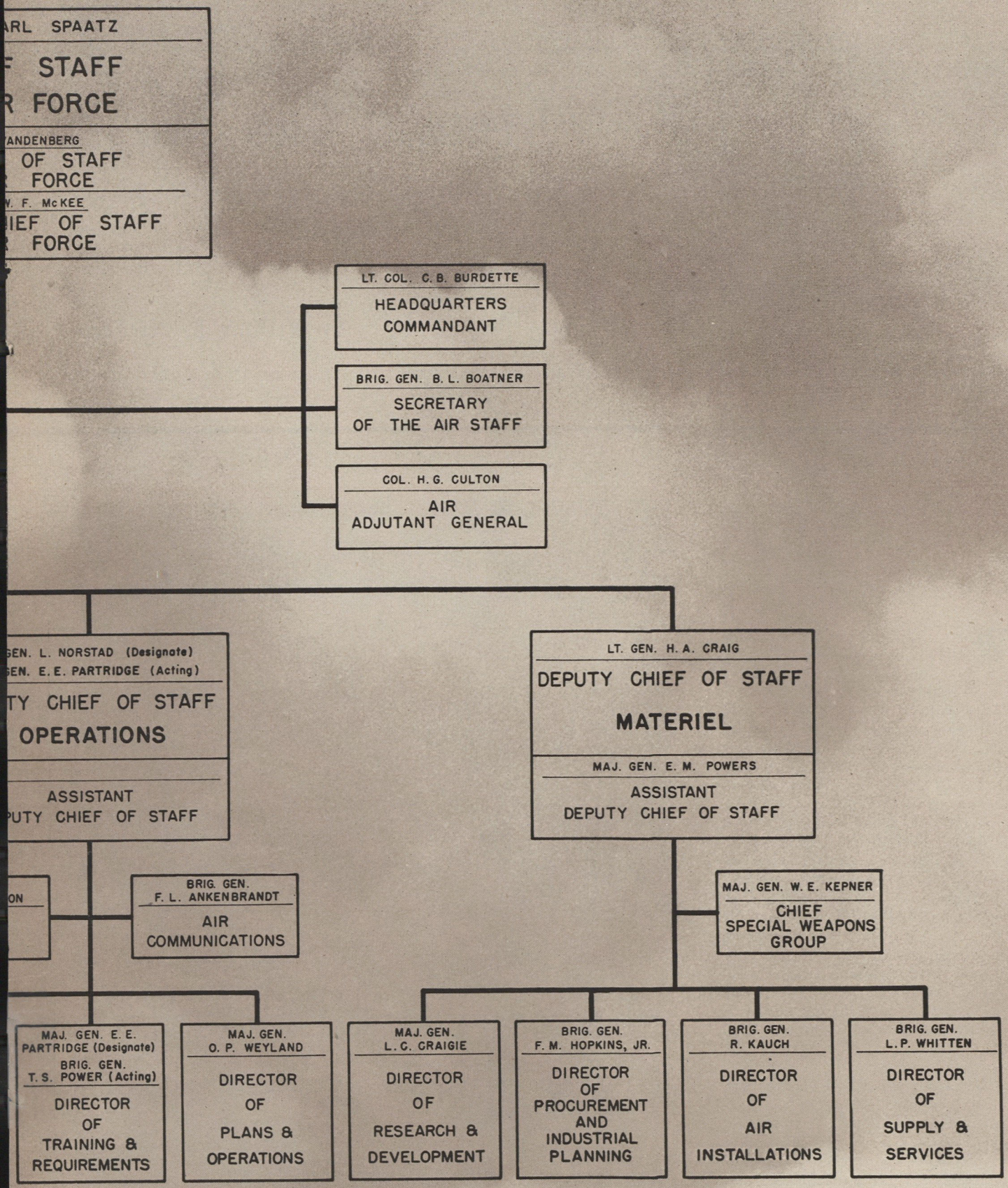


US AIR FORCE

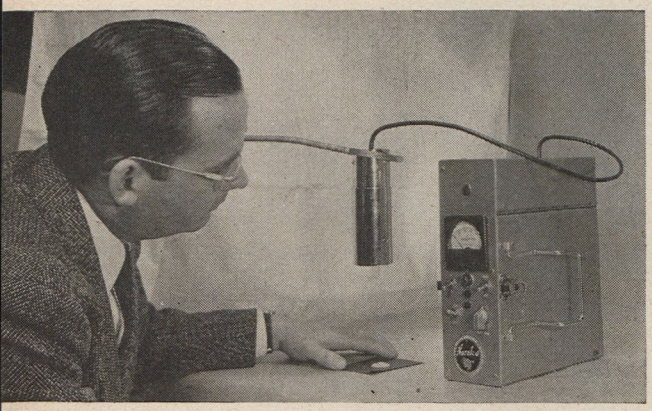
HEADQUARTERS ORGANIZATION CHART

As of December 1, 1947





AIR FORCE THE OFFICIAL JOURNAL OF THE AIR FORCE ASSOCIATION



Portable Geiger Counters are in commercial production and have varied uses. Here a detector unit is used to test mineral samples for traces of radioactive content.

Atomic Gas Mask

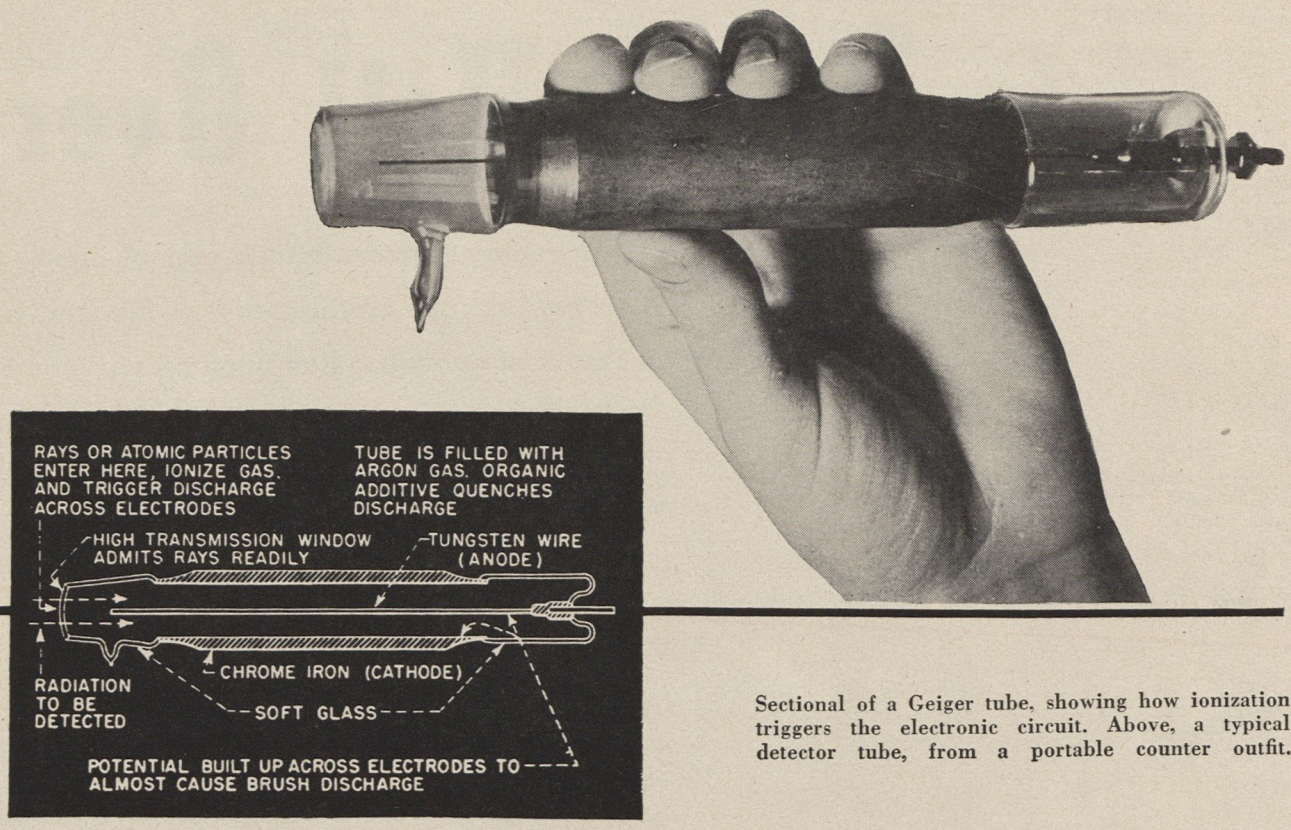
If an atomic war ever comes, Geiger Counters probably will emerge as vital personal equipment for soldiers and civilians alike

By William S. Friedman

When the first Yanks went into Hiroshima and Nagasaki after the war, they took with them a number of odd-looking boxes that clicked like a rattler's warning tail in areas that were infected with death-dealing Gamma rays. At Bikini the strange clicking boxes, carried stealthily by expert "scouts," were the first objects to enter any area, poking ahead of personnel and equipment to make sure the way was clear. Only a handful of people had ever seen or heard of the strange little contraptions at the time of the first two atomic blasts. But by the time Operation Crossroads was completed the Geiger Counter was the subject of world-wide household discussion.

The thing that makes the little box important today is the fact that in any future atomic conflict, the Geiger Counter is likely to become personal equipment for everyone—soldier and civilian alike—just as gas masks were in Europe in the last war. Engineers of the North American Phillips Co., large-scale builders of Geiger Counters, state that it is possible to build a machine hardly larger than a hearing aid, which could be carried on the body with ease. This could be a simplified instrument sensitive to only the deadliest and most penetrating of the emanations but it would be a workable danger indicator for the indi-

A GI with a Geiger Counter sat on the hood of the jeep that carried newsmen on a tour of Bikini Atoll six hours after the famed Baker Day explosion. This was typical of the caution that was exercised to prevent Gamma-ray contamination.



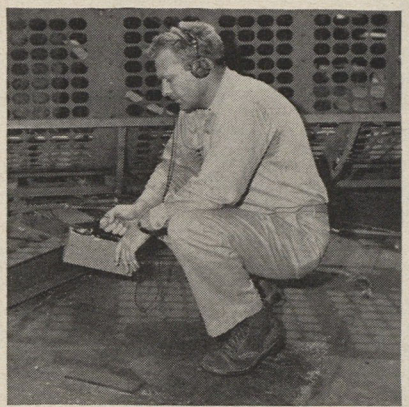
Sectional of a Geiger tube, showing how ionization triggers the electronic circuit. Above, a typical detector tube, from a portable counter outfit.

vidual moving around in the world of atomic war.

Back in 1908, Hans Geiger invented an electronic system for detecting the presence of radioactive materials and impulses to be used in connection with the work on X-rays and radium emanations. But up to the advent of Manhattan District Project, Geiger Counters were obscure laboratory tools, custom made in small shops. Now, since fission products such as radioactive isotopes have become popularly available for use in science and industry, Geiger Counters are being made commercially for use in medical research, mining and nuclear development.

The heart of the Geiger Counter is an electronic tube, specially designed to react to certain rays or atomic particles which are characteristic products of nuclear fission. The tube itself consists of a cylinder whose walls are a chrome iron cathode. A tungsten wire anode lies in the direct center of the tube. There is a "window" at one end of the tube whose composition determines to a great extent what particular ray the tube will detect. Like the filters used in photography, the "window" can hold out certain rays. To make the tube sensitive to the short Alpha rays, a mica window can be used, while the ordinary glass window will admit X-rays or Beta radiation. A brass cap placed over the tube will filter out all but the hard Gamma rays, the major damaging after-effect of atomic bombing.

The tube is filled with a gas such as argon, helium or krypton at a fraction of atmospheric pressure.



Following the Bikini blast, Dr. J. T. Nolan tried a Geiger Counter on the deck of the battleship USS New York.

Ethyl alcohol or some other organic vapor is usually added to make the tube self-quenching.

An electrical charge is built up in the tube to a pressure just about high enough to "jump the gap" like the spark that leaps between poles of a small battery. When the rays on atomic particles enter the tube, they cause a phenomenon called ionization. This means that a small portion of the gas in the tube is transformed into ions or charged atoms, which differ from ordinary atoms of the gas in that they become electrical conductors. This effect "triggers" the electrical forces in the anode and cathode, and there is a momentary glow inside the tube as the arcing occurs. The frequency with which this arcing happens depends on the quantity of rays or atomic particles entering the tube.

This arcing emerges from the tube in the form of a minus electrical charge. The pulse is fed into a conventional amplifier circuit and into an integrater, which can express the pulse audibly in a conventional headphone, visually in a flashing lamp or quantitatively in the form of a meter reading.

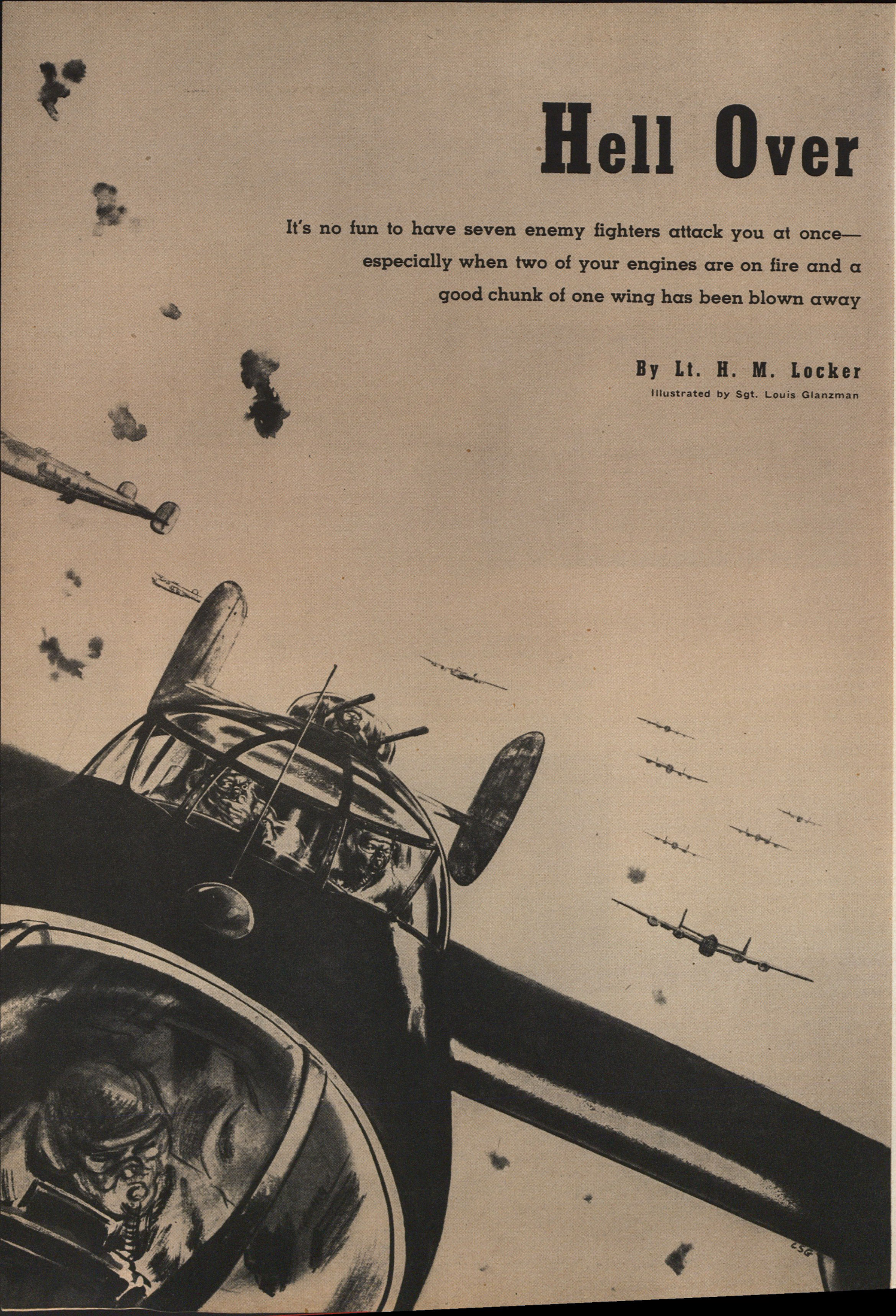
In examining recent claims of a Russian A-bomb, certain US nuclear scientists indicated that any major fission in the northern hemisphere could be detected by atomic listening posts, located in such strategic centers as Japan or the Aleutians. These, supposedly, would be equipped with fixed-type hypersensitive Geiger Counters, currently in commercial production on the assumption that the earth's rotation would rapidly carry signals to them.

Hell Over

It's no fun to have seven enemy fighters attack you at once—especially when two of your engines are on fire and a good chunk of one wing has been blown away

By Lt. H. M. Locker

Illustrated by Sgt. Louis Glanzman



Bizerte

December 1942: The North African campaign was only a month old. Lt. Gen. Carl A. Spaatz had just arrived to reorganize the Allied Air effort. Up in England the heavies of the 8th Air Force were concentrating on the U-boat pens at Lorient, France. Over in the Pacific 26 B-24s of the 7th Air Force flew 4300 miles (one stop) to pound Wake Island in a surprise midnight attack. It was the longest offensive massed flight to that date. Back in Africa, P-40s were just going into action for the first time, and this was also the month our B-24s attacked the Italian mainland for the first time. We were working on Bizerte too. . . .

It was the day after Christmas. . . . We took our regular place, number three in the last element of the formation, and off to Bizerte we went. We flew east past docks south of the town just far enough to miss the flak.

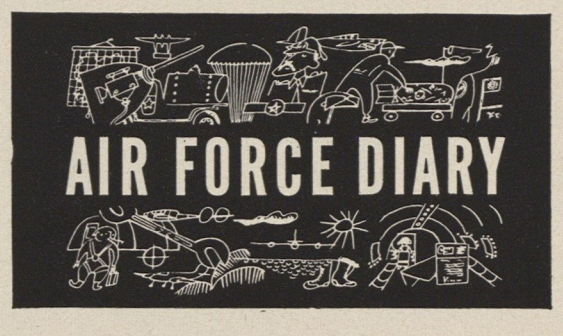
Swinging north and back west for our run on the target, we could see the flak hopping all around the planes in the first element. I knew it would get worse as element after element of three ships came up to the bomb release line. And our B-24 was the last of the group.

Every plane was leaving a beautiful vapor trail to guide the flak and fighters to us. Now we were in the stuff. It was bursting all around in those greasy black puffs. Many times the ship bounced from an explosion. Someone in the rear called out, "We're hit," but no difference could be felt on the controls, and Harry Lawrence and I were busy. It was time for the bombs to go. We were loaded with six one-thousand-pounders. I watched the bomb release light blink six times.

I turned then for a look at Tom Borders, flying number two in the Birmingham Blitzkrieg, to see his bombs go. I've always had a mania for watching those beautiful golden eggs come sliding out. This time I wish I had curbed my curiosity, for just as my eyes found him there was a blinding flash and the loudest explosion I've ever heard. I saw the tail of Tom's ship fly backward; then down toward the ground five miles below. It was the only visible piece of the ten-man crew and airplane. A direct flak hit in his bomb bay had set off three tons of TNT. When the flash and smoke cleared there just wasn't anything left.

But right now we were having our own troubles. I remember saying, "Poor boys, God bless them," and, in the same instant I saw our right wing tip curl up. About three feet had been broken off by the explosion. Number three and number four engines were just starting to burn. The rest of the formation turned north to avoid the flak, but we were too busy to turn and began to fall back fast.

Right down flak alley we flew. The constantly bursting shells and shrapnel hitting the plane reminded me of a sudden thunder and hail storm heard from the inside of a tin shed. I managed to get the fire out of number four but number three was stubborn and burned more fiercely. I finally feathered it. Number four still was running but it was not much use. The vibration shook the whole ship. The blaze coming out of the trailing edge of the wing grew larger and larger. I knew it was burning around the gas tank and would soon cause an explosion.



About that time all hell popped loose. All our guns were blazing at seven FW-190s that had just attacked right through the flak. Suddenly a hole about two feet square appeared in the wing where number three gas tank is located and flames shot out. It must have been a hit from the bottom because the fire in number three gradually dwindled to the burning oil. We called for the P-38s to come up and help us but the message probably never went through. Enemy fighters kept hitting us in the rear.

Harry hadn't said a word so I told the crew to put on their chutes and then go back to their guns. Just then one fighter got our instrument panel and windshields with a 20 mm shell. It exploded right in front of Harry and for a second I thought his face was bleeding as he looked toward me. I knew I was hit too because blood was running into my eyes and oxygen mask. I jerked off my glasses and threw them to the floor. I thought my right eye had been knocked out.

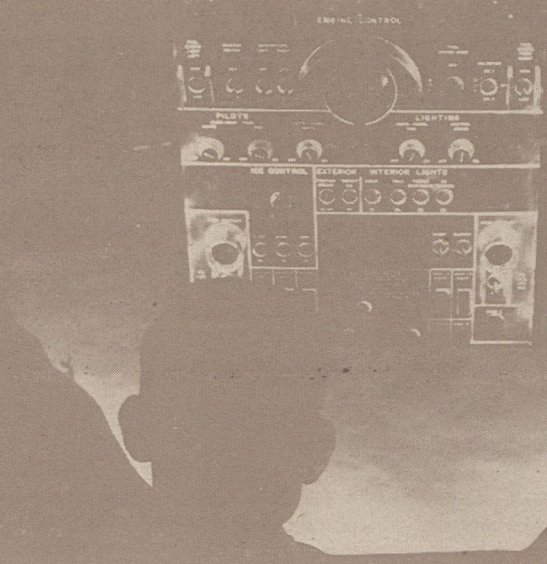
The same shot had shorted the parachute bell so Fozzy bailed out.

Someone called up and said we were afire in the bomb bay, radio compartment and in the waist. I told them to fight the fire but keep an eye on the 190s. Suddenly our aileron controls went limp and the tail dropped abruptly. I knew we had an elevator knocked off. Harry and I were shoving forward with all our might, making for the clouds still below us. Though our guns were going constantly, we were almost helpless. The fighters kept coming in raking the ship from one end to the other. But the flak had stopped. At last the mist of the clouds closed around us and the men were happy.

But instrument flying without instruments is no fun when you have only two engines and a rudder to help you. Somehow we came out below the clouds and were in a valley, limping on toward the sun.

Finally she quit flying. A mountain was coming up in front, we

(Continued on page 46)



PSYCHO-ANALYZING 460 ..... PILOT ERRORS

The gap between mechanical and human elements in the cockpit accounts for a shocking number of accidents. Here's what engineering can do about it

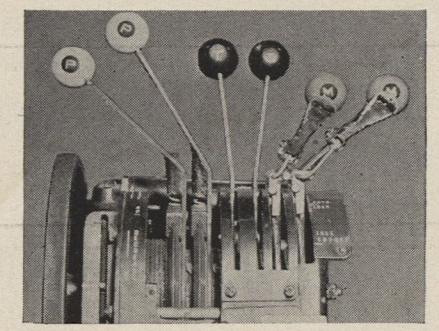
EDITOR'S NOTE: *This article is based on a report by Dr. Paul M. Fitts and Capt. Richard E. Jones, both of the Psychology Branch, Aero Medical Laboratory, Engineering Division, Air Materiel Command. It covers a recently completed study of pilot error which was initiated by this Wright Field unit in December of 1945. Information for the study was supplied voluntarily by Air Force pilots by means of individual discussion and group interviews and written reports, all referring to errors that occurred in military aircraft. To minimize the effect of personal opinion or preconceived ideas, the study was limited to factual reports of actual flying experiences. This article is concerned solely with one question in the study: "Describe in detail an error in operation of a cockpit control which was made by yourself or by another person whom you were watching at the time."*

Wright Field psychologists have facts to prove that practically all pilots, regardless of training, experience or skill, make errors in using cockpit controls. They know because they have classified and analyzed 460 detailed accounts of such errors reported by Air Force pilots throughout the country.

Explaining their study — certainly the most comprehensive of its kind ever made — Dr. Paul M. Fitts and Capt. Richard E. Jones, both of Wright Field's Aero Medical Laboratory, comment: "Aircraft accidents usually are classified as due to pilot error, materiel failure, maintenance, or supervision, with a large proportion of all accidents attributed to the so-called 'pilot error' category. It has been customary to assume that prevention of accidents due to materiel failure or poor maintenance is the responsibility of engineering personnel, and that accidents due to errors of pilots or supervisory personnel are the responsibility of those in charge of selection, training and operations. The present study was undertaken from a different point of view; it proceeded on the assumption that a great many accidents result directly from the manner in which equipment is designed and where it is placed in the cockpit, and therefore can be eliminated by attention to human requirements.

The "broad requirements" indicated by their analysis can be summarized in these terms:

▸ **Uniformity in location and operation.** The analysts conservatively estimate that more than half of all the errors made in using cockpit controls result directly or indirectly from lack of uniformity. Their conclusion: "The difficulties of achieving uniform cockpits are great, but the benefits in terms of human life and equipment will be tremendous. Uniform principles of arrangement and mode of action, together with a similarity in the pattern of control location, will achieve most of the benefits desired. It is obviously desirable to use the best arrangements and designs of controls. Therefore, standardization should not be so rigid in the beginning as to prevent future refinements."



C-47 throttles are in center, but propellers are left and mixture on right.

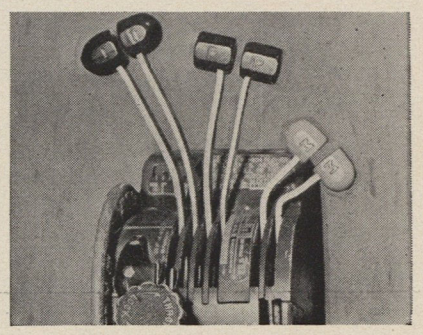
▸ **Speed and precision of operation.** "Aircraft controls should be designed to give the required speed or precision of action in relation to the functions which they perform. In some cases it is necessary to provide for both rapid adjustment and slower and more precise settings."

▸ **Simplification of sequential operations.** "Controls should be arranged so the steps of a complex procedure are minimized, so each operation follows logically after the preceding one. Whenever possible, only one control movement should suffice for any one operation such as lowering wheels or setting flaps."

▸ **Natural directions of movement.** "The direction of control movement required for effecting a desired response should be the natural or expected one, so that in an emergency the correct movement can be made rapidly without unnecessary deliberation."

▸ **Efficient location.** "Adequate location of controls requires consideration of maximum distance from the operator, adequate separation between controls, locations permitting most accurate grasping manipulating."

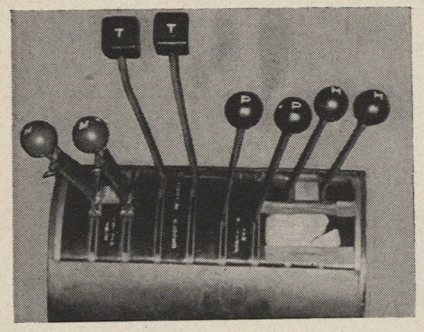
▸ **Automatic actuation.** "Too often in the past, whenever the technical solution of automatic or single-movement actuation has been difficult, the tendency has been to 'let the pilot do it.' In an ideal design the pilot should decide *what* he wants, and *when* he wants it, and should use the simplest and most direct control movement possible to achieve the desired result. The pilot's responsibilities are too great to burden him with unnecessary mechanical operations."



B-25 throttles are at left, propeller controls center and mixture at right.

For the analysis that led to those conclusions, the Wright Field psychologists found it necessary to develop a classification system. In their own words: "Errors were classified both with respect to underlying psychological similarity and with respect to specific controls involved." The categories finally developed are evi-

(Please turn the page)



C-82 engine console shows the lack of uniformity that exists in twin-engined aircraft. Throttles are in the center, propeller controls right and mixture on left. Laid out for mechanical convenience rather than uniformity, these variations from plane to plane have sometimes trapped even veteran pilots.

dent in the pilot error charts shown on these pages. An examination of the charts will reveal that each pilot error has been classified as one of six types. Within these six major categories, errors have been subdivided in terms of specific controls on which the errors were made. A report on each of the six follows:

Substitution Errors

Accounting for fully half of the 460 error accounts collected during the study, a substitution error occurs when a pilot grasps the wrong control and operates it, thinking he is activating some other control. Dr. Fitts and Captain Jones comment: "In any skilled motor activity, such as walking, driving an automobile or piloting an aircraft, the highest level of performance is reached when movements of the arms, hands and legs occur simultaneously or successively in coordinated patterns appropriate to the task at hand, with a minimum of conscious visual control over separate acts."

The analysts point to this requirement from *The Handbook of Instructions for Aircraft Designers*: "Insofar as possible, all controls shall be shaped and located so that a crewman reasonably familiar with their arrangement will be able to operate them without visual reference." In spite of this requirement, the study shows, Air Force pilots seldom are able to become sufficiently familiar with the location of controls in the cockpit of a particular aircraft to avoid occasionally operating the wrong control. This is particularly true of controls on the throttle quadrant and of wheel and flap controls. Here is the testimony of one pilot.

"This error occurred in a C-47 aircraft. After the usual procedure of lowering the gear and other landing checks, I turned on the final approach leg and reduced power. Shortly afterwards, I found it necessary to increase power to avoid under-shooting. *In reaching for the throttle, I grasped the propeller control.* Advancing the prop control, the engines sounded as if power were being applied. This occurred far enough out on the approach so that corrective action prevented an accident. However, had this error occurred closer to the ground, an accident might have occurred. I was familiar with the control panels of a B-25; hence, I automatically grasped the controls on the left."

SUBSTITUTION ERRORS:

50%

	Confusing one control with another, or failing to identify a control when it was needed.	*No. of Errors*	*% of Errors*
A.	Using the wrong throttle quadrant control (confusing mixture, prop pitch, throttle, etc.)	89	19
B.	Confusing flap and wheel controls	72	16
C.	Operating a control for the wrong engine (feathering button, ignition, mixture, prop pitch, throttle, etc.)	36	8
D.	Failing to identify the landing-light switch or confusing it with some other control	11	2
E.	Confusing other controls (alarm bell, bomb-bay door, carburetor heat, cockpit heater, droppable gas tanks, emergency bomb release, engine heat, intercooler, oil bypass, oil cooler, parking brake, pitot heat, radio tuning control, salvo switch, trim tab, wobble pump)	21	5
	Total	229	50

ADJUSTMENT ERRORS:

18%

	Operating a control too slowly or too rapidly, moving a switch to the wrong position, or following the wrong sequence in operating several controls.	*No. of Errors*	*% of Errors*
A.	Turning fuel-selector switch to the wrong tank	19	4
B.	Following wrong sequence in raising or lowering wheels	18	4
C.	Failing to obtain desired flap setting	17	4
D.	Adding power too suddenly without proper change in trim	9	2
E.	Failing to lock or unlock throttles properly	5	1
F.	Failing to roll in trim fast enough	4	1
G.	Failing to adjust other controls properly	11	2
	Total	83	18

FORGETTING ERRORS:

18%

	Failing to check, unlock, or use a control at the proper time.	*No. of Errors*	*% of Errors*
A.	Taking off with flight controls locked (aileron, elevator, rudder, or all controls locked)	16	4
B.	Forgetting generator or magneto switch	14	3
C.	Forgetting to make proper engine or propeller control adjustments (mixture, prop pitch, etc.)	11	2
D.	Forgetting to lower, lock or check landing gear	7	2
E.	Taking off with wrong trim settings	6	1
F.	Taking off without removing pitot cover	4	1
G.	Forgetting to operate other controls (bomb-bay doors, bomb-rocket selector switch, coolant shutter, flaps, auxiliary fuel pump, fuel selector, hydraulic selector, lights, PDI switch, pitot heat, tail-wheel lock)	25	5
	Total	83	18

REVERSAL ERRORS:

6%

Moving a control in a direction opposite to that necessary to produce a desired result.	*No. of Errors*	*% of Errors*
A. Making reversed trim correction	8	2
B. Making reversed wing-flap adjustment	6	1
C. Making reversed movement of an engine or propeller control (mixture, prop pitch, etc.)	6	1
D. Making reversed movement of some other control	7	2
Total	27	6

UNINTENTIONAL ACTIVATION:

5%

Inadvertently operating a control without being aware of it.	*No. of Errors*	*% of Errors*
(Brakes, carburetor heat, cowl flaps, wing flaps, generator, ignition, inverter, landing gear, lights, master switch, pitot heat, radio, supercharger)	24	5

UNABLE TO REACH A CONTROL:

3%

Accident or near-accident resulting from "putting head in cockpit" to grasp a control, or inability to reach a control at all.	*No. of Errors*	*% of Errors*
(Carburetor heat, fuel selector, hydraulic switch, landing gear, nose-wheel crank, rudders)	14	3

In analyzing this type of error, Dr. Fitts and Captain Jones make this observation: "It is believed that pilots with thousands of hours of flying time may be even more likely than less-experienced pilots to make such mistakes when they find themselves in a new aircraft, especially if most of their flying time has been gained in one or two older models."

The essential requirement in achieving uniformity is believed to be the overall pattern of control arrangement, not the precise location of any control. Specifically, the study cites the apparent need for maintaining uniformity of right-left and up-down relationships, and reports that rigid standardization of all dimensions is not absolutely necessary.

Other important factors in substitution errors include: inadequate spacing of controls, and lack of a coding system to provide positive identification of controls by the sense of touch alone. In commenting on control spacing, the psychologists state: "When a pilot reaches out to grasp a control without looking, he will not position his hand to exactly the same location on successive tries. Accuracy in locating a control varies with the position of the control, with practice, and with different individuals, but limits of accuracy can be established." In their analysis of control identification, the psychologists report, "It is believed that controls are often confused because pilots have no positive method of identifying a control by the way it feels without looking at it. This is especially likely to lead to an error during take-off and landing, during combat, during night flight, and at other times when the cockpit is dimly lighted or when the pilot does not want to look down into the cockpit." They add that most of the necessary research on shape-coding of controls has already been accomplished.

"Our B-25C with a full bomb and gas load was taking off from a 3500-foot strip with trees at both ends," reported one pilot. "We crossed the end of the runway at an altitude of two feet and were pulling up over the trees shortly ahead when I gave the 'wheels up' signal. The airplane mushed and continued to brush the tree tops at a constant 125 mph speed with T.O. power. *The copilot had pulled up the flaps instead of the wheels.*"

The study reveals that the proximity of the two controls is the reason frequently given by pilots for confusing wheels with flaps. Reporting that this source of error has now been corrected in most aircraft, the psychologists quote this requirement for new aircraft—"The flap-actuating control handle shall be located above and at least 12 inches from the landing gear control handle"—and they comment that this provision should materially reduce the incidence of confusing wheels with flaps.

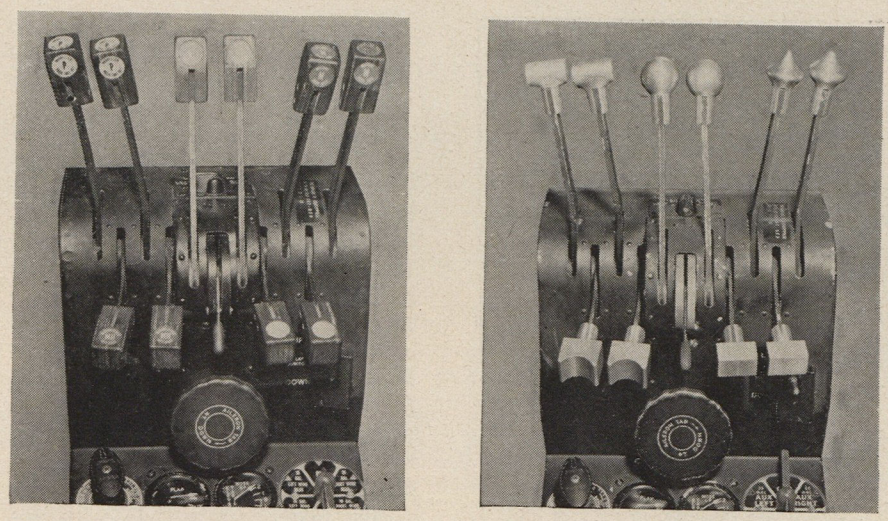
"On take-off in a C-47 with approximately 50 persons on board," said another pilot, "the right engine quit. The pilot and copilot both reached for the left feathering switch and finally got the left engine feathered. Neither one realized it in time to prevent this mistake."

Especially complex are the causes of errors involving the operation of a control for the wrong engine of a multi-engine aircraft. In training, it is explained, emphasis is placed on the necessity for "thinking before acting," but when an engine fails the urgency of the situation gives many pilots an urge to do something quickly, prompts "featheritis." In analyzing some errors, the psychologists report that it was not clear whether a pilot was confused as to which engine was out or which control should be operated for the engine that was out, or whether the pilot inadvertently pushed one feathering button when intending to hit another.

"When an engine goes out suddenly," they explain, "one of the first indications of trouble often is an increase in back pressure from the rudder on the opposite side to the dead engine. When the right engine goes out, for example, the pilot compensates with left-rudder pressure. It is believed that this may be a source of confusion, since the pilot may instinctively sense 'get rid of the drag on the left rudder,' and reach automatically for the left-feathering button. However, the writers have no direct evidence in support of the hypothesis that this sometimes happens."

In all of their recommendations concerning design changes to reduce cockpit control errors, Dr. Fitts and

(Please turn the page)



One approach to reducing engine console confusion is code-shaping control knobs. Above, left, is a conventional C-45 pedestal, with virtually identical knobs for all levers. Right, similar stand with specially-shaped knobs for each function.

Captain Jones make it clear that they do not claim credit for the ideas presented, that it is not possible to assign credit to any one individual or group. The proposals, they explain, include contributions from many different pilots, engineers and agencies (omitted are requirements already included in *The Handbook of Instructions for Aircraft Designers*). The following design changes are recommended for the reduction of substitution errors in the cockpit:

- Provide uniform pattern-arrangement of all cockpit controls, particularly of throttle quadrant controls.
- Provide uniform shape-coding of all control knobs which must be grasped quickly or without looking.
- Provide warning lights inside each feathering button to go on whenever the throttle for an engine is forward and engine torque falls below a critical value. Separate feathering buttons sufficiently to prevent unintentional operation of an adjacent button.
- Investigate the desirability of adopting wing-flap and landing-gear controls which have distinctly different modes of operation.
- Investigate the speed and accuracy of pilots in reaching for controls in different cockpit areas without the aid of vision.

Adjustment Errors

Included in the adjustment error category are a wide variety of experiences in which pilots do not adjust controls precisely enough, quickly enough or in the correct sequence. Common adjustment errors: turning the fuel-selector valve so it is half-way between the two tanks and leaving it in a position where fuel can flow from neither tank, or actually turning the valve to the wrong tank. In both these cases, the study explains, pilots usually are in a hurry and think they are turning the valve to the desired position. Here is a typical report:

"This was the first combat mission of this particular P-47 pilot. He had flown well and been OK all the way through the mission. However, about 15 miles from our home base in Burma he reported a fluctuation of his carburetor-pressure gauge. He grew very excited and tried everything he could think of: changed the prop to manual, put mixture on full rich, leaned the mixture out. He did everything but the important thing—he didn't switch gas tanks until told to do so by the flight leader. After switching tanks, he still reported the same trouble, and about eight miles out his engine quit. He was advised to jump by the flight leader; however, not wishing to tangle with the jungle, he decided to belly-in on a sand bar in a river below. The river banks were about 15 feet high. He misjudged the bank and stalled out so that his plane hit the bank with the tail, consequently nosing up and going straight down into the river. The pilot drowned. When we pulled the undamaged plane from the river we found the cause of the accident. *The switch lever on the empty tank had been turned toward the reserve tank, but not far enough to induce adequate gas supply.* It was half-way between the two. This accident was called 100 percent pilot error on the basis of the above. However, it seems to me that under the circumstances the pilot was not totally to blame. He was upset and excited because it was his first mission. He thought he turned the switch all the way."

Errors in adjustment of wheel controls on landing and take-off also are common, the study reveals, and can be attributed principally to the number of different steps required in some aircraft to lower, lock and check the landing gear. Explaining that "errors of this type are made most frequently by pilots not thoroughly checked out in the aircraft," the analyzing psychologists report that a substantial number of cockpit errors probably can be eliminated if the procedure for lowering wheels can be simplified.

"I took off in a B-25 with a student pilot on a 50-foot authorized low-level cross country mission," reported one pilot. "Since I intended to maintain 50 feet the entire mission, right after take-off I retracted the gear and flaps normally. However, being at a low altitude, I did not visually move the flap handle to the neutral position, rather placing it in neutral by feel. *In doing so I inadvertently placed the handle slightly beyond the neutral position toward flaps down,* at the same time making a medium bank to leave the traffic area. Being in a bank, I did not notice the flaps going down until a definite slowing occurred which affected the feel of the controls. As a result of improper movement of the handle in this manner, I found myself at this low altitude in a fairly steep bank with 120 mph airspeed."

The study also reveals that the present design of throttle locks contributes to several kinds of errors. "It is common practice," the report states, "for the copilot to operate the locks while the pilot keeps his hand on the throttles. The use of a second person is a cockpit procedure which sometimes contributes directly to an accident. Also, it is often difficult for the pilot to obtain the exact tension he wants. Serious mistakes in interpreting hand signals during take-off have been due directly to confusion accompanying efforts of a pilot to correct for inadequate throttle locks."

In analyzing the difficulty in adjusting trim rapidly, the psycholo-

(Continued on page 44)

who's who IN THE AFA

INTRODUCING B. E. "Shorty" Fulton

FRANKLY, Mr. Fulton, you are too old."

The Army personnel officer pushed some papers across his cluttered desk and looked out into the glare of a hot Washington afternoon. He was overworked, and he wished to hell that this little guy from Akron, Ohio, would push off. It was the summer of 1942, not many weeks after the first Tokyo raid, and everyone and his brother wanted to get into the act.

Facing the man in uniform, and looking as belligerent as a pit bull that had been well nipped on the rump, was a bald-headed, fiery-faced character only slightly over five and a half feet tall, whose two hundred pounds bulged in the right places. The irate civilian had been christened Bain Ecarius Fulton more than 50 years before, but was far better known in flying circles, in the Texas cow camps and oil fields, and around middle western automobile race tracks, as "Shorty."

Manager of Akron's Municipal Airport, which he had built out of an orchard on the outskirts of that city largely with vision, guts, and hard work, Shorty Fulton wanted to go to war. In fact he was insistent about it.

Sure, he admitted to all his years and was even proud of the fact that he was several times a grandfather, but he had established a personal enemy quota of "about a thousand" and no Pentagon Commando could tell him he was "too old" and make it stick.

Somehow, with help wherever he could enlist it, Shorty Fulton got a majority in the Air Force in spite of everything including regulations, medics, and personnel officers who took a very dim view of his ambitions.

After O.T.S. in Miami Beach, a short tour of irksome duty in Washington, and a longer hitch in Aden on the Indian Ocean, he went to England to fill his quota. He was on his fifth mission as an observer and waist gunner with the 486th Bombardment Group when flak tore up his B-17 over the target near Parchim, 90 miles northwest of Berlin.

What was left of the crew, including Shorty, bailed out at 15,000 feet. He was wearing a back pack chute and carrying his A3 bag in which he had stowed his beloved cameras. Jerking the rip cord at cloud base, after falling about 10,000 feet, he learned with some shock that he was still encased in a flak suit but he managed to untangle the pilot chute and with it went the unwanted suit and his A3 bag. "They left like a jet with a tailwind," he says.

It was no surprise to his friends, and they happen to be legion, that Shorty, slightly wounded, landed exactly inside the stockade of a considerably aroused German slave labor camp looking into the throats of three automatic rifles backed up ominously by grim and unfriendly guards. "Shorty" usually does things the hard way.

He will always get a chuckle recalling the startled look on the face of the German who jerked off his helmet, saw his bald head and apparently concluded that America must be at the very bottom of the manpower barrel to permit men so old in aerial combat. Total eclipse

(Continued on page 48)

This is end of the line for Shorty. One of the tiny dots under this flaming B-17 is actually B. E. Fulton bailing out on his fifth mission about 90 miles northwest of Berlin.

Two soldiers back in mufti, Fulton and Jimmy Doolittle get together after war.

tech topics

Ten-lane highways in the sky, three-service radar airways, and butterfly-tailed twin-quad transports star the month's progress

Airway Stretcher

A new device known as the B-D Computer should help solve the airways dilemma—choked traffic and time-killing stacking over airports under instrument conditions. This "electronic brain" by tight navigational computations may be able to turn our present single-track country-lane airways into ten-lane aerial superhighways. The computer was developed by the Minneapolis-Honeywell Regulator Co. under a contract by the Civil Aeronautics Administration, and is being tested at the CAA's Indianapolis experimental station.

The name B-D computer stems from the instrument's basic function, that of calculating the aircraft's bearing and distance from fixed positions on the ground. The instrument is designed to guide the plane irrespective of wind and visibility, along an exactly determined path, with sufficient exactness to enable a minimum of ten planes to fly the same route at the same time.

This airborne instrument operates through a combination of ground radio stations and receivers. In use, it tells the pilot, within one-tenth of a mile, his position in relation to a known ground station, the distance of the plane from its destination, and its time of arrival at its landing strip. Because static does not seriously affect the radio channels used by the instrument, it is reliable under all weather conditions.

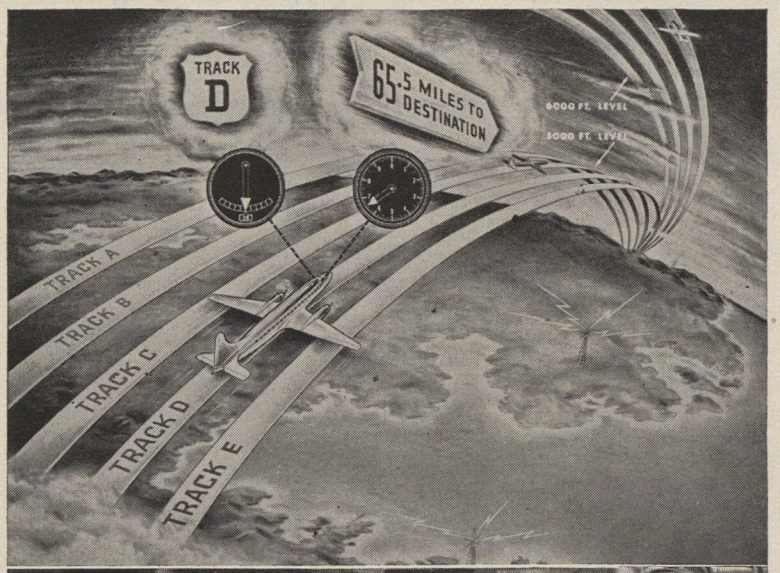
The computer takes in two kinds of radio signals, one from a standard omni-directional range, and the other from a distance-measuring transmitter. The latter is an offshoot of SHORAN, used during the war for measuring the distance between a plane and fixed ground stations. The omni-directional range transmits a signal in all directions.

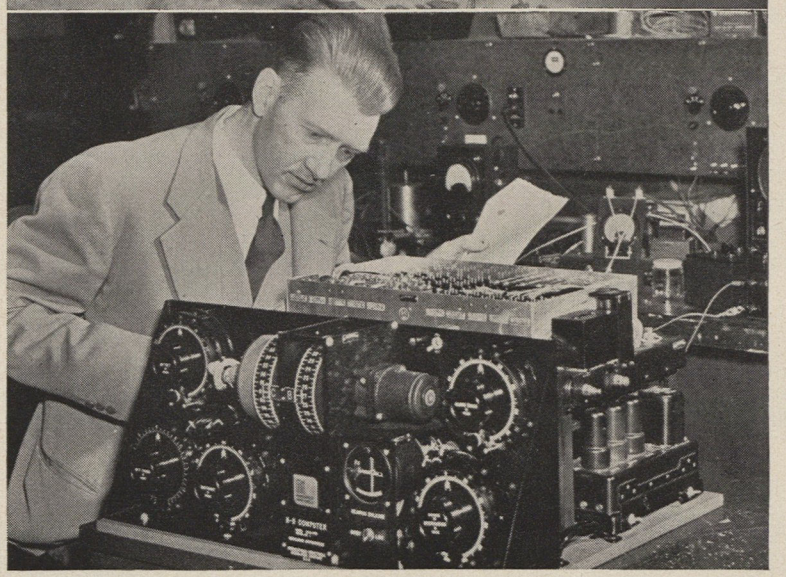
In this system, the stations do not have to be located on the airway. A hundred stations could cover the US and work for all the major traffic routes. B-D permits automatic switching from one station to another so that a plane can make a continuous cross country flight in a straight line.

Most of the work in setting up the computer is done before take-off. The pilot draws a straight line on a standard sectional chart from point of departure to point of arrival. He draws a line measuring the perpendicular distance from the flight course to the transmitting station,

Britain's Fairey Gyrodyne is a cross between a helicopter and an autogiro. It applies power from the 525 hp Alvis engine to the rotor for take-off and hovering and to the asymetrical propeller for cruising while the main disc autorotates.

Beechcraft's new Twin-quad twenty-place short-haul transport features the "butterfly tail" used on the Bonanza, and a unitwin power system using two opposed engines buried in the wing. In case of power failure, either engine can turn the propeller.





By the use of the Minneapolis-Honeywell B-D computer, a single-beam conventional airway can be turned into a ten-lane superhighway. Above, a schematic rendition of how the instrument's constant and accurate bearing and distance indication permits this airway widening. Below, Hugo Schuck, M-H's chief aero-engineer, with the computer installation.

which need not be located on his course at all but at any convenient distance right or left of the flight path. He also measures the distance from the intersection of the two lines previously drawn to his destination. This is called the on-track distance. Then he measures his angle relative to north. This gives him three numbers, two indicating miles and one degrees. The pilot then sets these figures up on the computer's dials and turns on the automatic pilot. This also turns on the computer. The computer is then receiving the two radio signals.

In flight, a cross pointer instrument gives the flier the off-track information, while a separate dial indicates the distance to destination. The pilot can either fly the airplane manually or he can switch to automatic control, so that the computer can fly the craft by means of the automatic pilot.

Multiple use of a particular track can be achieved by laying out additional tracks on either side of a center line established between two points. By means of these tracks, ground control can have a pilot fly at a set distance on either side of the center line. The pilot merely sets a track into the computer. Thus the single airway can be widened by keeping the planes spaced in distance from the center line and variations in altitude.

The coupler that connects the B-D computer with the automatic pilot is also used in automatic landing. When the ship approaches the landing strip, the pilot throws a switch so that the autopilot receives the signal from the landing rather than the navigational beam. The same cross pointers that operate for the navigational phase of the instrument can be used for landing.

The Twin-Quad

Additional information has been released on the new Beechcraft Twin-Quad, the light cargo transport which is currently being flight tested at Wichita. The new design incorporates many radical features, including the first transport application of the butterfly tail which proved so satisfactory on the famed Bonanza. Power is furnished by four flat-opposed type engines geared to turn two propellers. The power plants are completely submerged in the wing, decreasing frontal area and the accompanying drag.

The gearing system delivers power to the propellers at a slow rpm which not only effects greater cruising efficiency but, combined with exhausts that emerge above the wing, results in low sound levels both inside and outside the cockpit.

The Twin-Quad was designed for low cost operation from small fields. It carries 20 passengers with baggage, as well as mail and cargo.

Racon Airway

A combined Air Force-Navy-Coast Guard operated transcontinental radar airway is now virtually in full operation. The new system consists of a chain of 50 Racon stations which extend up and down the East Coast and across the southern transcontinental ferry route to the West Coast. These are the routes used most frequently by military and naval aircrafts.

The term Racon is derived from the words radar and beacon. It is a system of short-range aerial navigation. Radar impulses transmitted from the aircraft in flight "interrogate" the Racon which responds with a coded signal. This signal appears with considerable intensity on the radar scope in the aircraft from which the bearing and distance from the plane may be read.

CROSS COUNTRY

AFA Unit Backs Air Course

Out in Arizona where flying seldom takes a back seat to the weather, the Phoenix Squadron of the Air Force Association is participating in one of the most modern and progressive high school flight programs in the country. About one year ago AFAers decided to offer scholarships to students who were financially unable to enroll in the laboratory flight course at Phoenix Union High School. The Arizona Squadron was particularly interested because everyone in the class gets to fly.

The whole thing started in September 1946 when the high school, under the direction of school instructor and private pilot Raymond V. Zegers, organized a laboratory flight course in aeronautics in recognition of the profound effect that the airplane has had and will have on our social political and economic life. Not until this year was the lab flight course integrated into the regular curriculum. It's an advanced subject under the Science Department and a student must be a junior or senior to enroll in the course. The class is open to both boys and girls and two girls are enrolled this semester out of a class of twenty-seven. Eight of these enrollees are sponsored by the Phoenix Squadron because they were unable to produce the necessary $24 annual fee required for the course. One of the AFA-sponsored students is an ex-GI, Earl H. Burros, who flew during the war as a crew member on one of our bombers. Now he's learning the elementals of flying his own plane.

Some of the aeronautics students also belong to the high school Flying Club, which was organized for the purpose of promoting economical flight instruction and flying time for regularly enrolled students of the high schools who meet the CAA and high school requirements. Myer Wilson, member of the Phoenix Squadron, is one of the instructors in the club. An extra fee, of course, is charged to belong to the group, which includes students from North Phoenix High School. The Board of Education purchased an Aeronca Champion for the club from a special aviation fund derived from non-tax sources. The plane is kept at Sky Harbor, the Phoenix municipal airport. During the year members of the Phoenix Squadron address the club on various phases of aviation and their experiences during World War II. By joining the Flying Club, high school students are able eventually to obtain private licenses and experience has proved that young men of this age are good pilots.

There are five classes a week in the aeronautics course, consisting of a ground course, flight experiments, and ground and lab experiments carried on in the school laboratory. In ground school training the fundamental subjects are: Learning to Fly, Aerodynamics; Avigation; Meteorology; and Aids and Safeguards. All maneuvers learned in class are demonstrated by a CAA flight instructor in the air. Each student takes four half-hour flights a semes-

Gordon Scott, fifth from right, former Commander of the Phoenix, Arizona, AFA squadron, hands a check to R. V. Zegers, Director of Aeronautics, Phoenix Union High School. Money is to cover enrollment fees for eight of the class' 27 students who couldn't otherwise afford to take training. Course is primarily ground study and air demonstration.

afa news

ter, of which there are two. Air demonstrations include functions of controls, effect of throttle, inherent stability, relation between angle of attack and air speed, wind effects, forward and side slips, cross wind take-offs and landings, and other maneuvers, including stalls and spins. Visits to the control tower, workshops, hangars, weather station, and commercial airlines are part of the course. Performed in the physics lab are experiments in aerodynamics, power plants, avigation, communications, and meteorology.

No prerequisites are necessary to enroll in this class but it's advantageous to the student to have had considerable math and physics.

Thus, the Phoenix Squadron and Phoenix Union High School seem to have taken a step in the right direction toward what very well might be one way of solving the nation's problem of air preparedness. If schools throughout the country would follow the same example,

(Continued on page 40)

Connie Sechler, Aeronautics student at Phoenix High School, is checked out in Aeronca by instructor R. V. Zegers.

Key figures in California Wing of AFA are, left to right, first row: L. W. Sweetser, Jr., J. F. Turner, F. E. Spaniel (Secretary), A. F. Kelly (Commander), W. J. Thompson. Back row: E. R. Redgway (Vice Commander), J. O. McReynolds (Commander L. A. Sq. No. 2), G. D. Mantell (Commander East Bay Sq.), Stuart Purcell (Commander Santa Monica Sq.), Claude Kenner (Vice Commander L. A. Sq. No. 1), Bert Lynn (Wing Secretary-Treasurer). Shot was taken at recent California state meet.

CALIFORNIA

Arthur F. Kelly of Los Angeles has been elected Wing Commander of California. Now Assistant to the President of Western Airlines, Inc., Kelly served with the AAF as Deputy Chief of Staff of the European Division, Air Transport Command. He has been active in the AFA since its inception.

Other new officers of the California Wing: Deputy Commander, Thomas F. Stack, San Francisco, Commander of the San Francisco Squadron; Deputy Commander, Stuart Purcell, Santa Monica, former Commander of the Santa Monica Squadron; Secretary-Treasurer, Bert D. Lynn, Los Angeles, Deputy Commander of the Santa Monica Squadron.

California now has nine active Squadrons in the following cities: San Diego, Los Angeles (two), Santa Monica, San Francisco, East Bay area (Richmond-Oakland-Alameda), Bakersfield, Stockton, and Sacramento. Plans drafted by the newly elected Wing officers call for the extension of organizational activity and the formation of new Squadrons in virtually every city in the state.

East Bay Squadron began its first year under permanent officers at an "open house" meeting October 15. Heavily attended by AFAers and guests, including wives and girl friends, the meeting featured the installation of newly elected officers, presentation of the Squadron's charter, and presentation of Victory and American Defense medals to all AAF veterans who showed their discharge certificates.

The incoming officers were installed by Reiland Quinn, retiring member of the national AFA Board of Directors, who also presented the charter, approved on September 22, to George D. Mantell, Commander-Elect. Other officers are: James F. McNeill, Vice Commander; Robert Egenberger, Acting Secretary; Jerome P. Tebble, Treasurer.

Before taking office, Mantell outlined the Squadron's accomplishments during its three-month organization period recently ended, and all attending received a mimeographed two-page summary report. It was announced that the

(Continued on page 41)

CROSS COUNTRY

many thousands of private pilots could be turned out every year, giving a tremendous boost to aviation.

Myron Drake
Phoenix, Ariz.

Still Their Fathers

Early this year Capt. Elestherious (Teddy) Vangos of Old Greenwich, Conn., received a letter from a Frenchman who had been a member of the French Assistance Group for Allied Flyers during the war. Michel E. A. Degremont's English wasn't so good but that didn't matter a lot. "Dear Captain," he said. "By this letter I would like to express you my deep gratitude and that of all my companions of the 'Reseau.' You had only one word to say and we were all arrested and executed, but you did not fail, even in the tortures of Gestapo. . . .

"None of us will forget your valiance before the enemies. I have asked my Government to grant you a citation. I hope you will not wait too long till you receive it. It will be a very poor thing near what you have done, but it will remind you that it is thanks to you if some French children have their fathers."

Not long after, Teddy Vangos received the French Legion of Honor, one of the highest awards that is bestowed by the French government.

At 3 p.m. on the 7th of October, squadron comrades of Capt. Teddy Vangos gathered together at Old Greenwich, Conn., to pay final tribute to their courageous fellow pilot who had died the previous Saturday.

In 1944, while performing one of many P-47 escort missions in the ETO, Vangos was brought down by flak. He suffered only minor bruises in the crash landing and was soon picked up by Degremont's group. After he had left the French Underground, however, and while he was on his way through the Pyrenees into Spain, the Gestapo got him.

Realizing that Captain Vangos knew the names and addresses of the men working with the Assistance Group, the Gestapo subjected the flyer to severe torture. He was beaten by fists, clubs and a hose. He was placed in front of a firing squad. He was held in solitary confinement for over six months—all in an effort to get him to tell what he knew. Vangos refused to give in.

Finally set free by the advancing Allies, Vangos was given preliminary medical treatment and sent home. At the time of his liberation he weighed only 85 pounds and was suffering from a fast-spreading leg infection. In an attempt to ward off further infection, American doctors amputated, but it was too late.

Captain Vangos left a mother and father, Ethel and Alexander Vangos of Nashua, N. H. Several thousand miles away in France he also left a few French children "who have still their fathers."

Military Equipment

A contract totalling $15,000,000 has been awarded Republic Aviation Corporation for P-84 Thunderjet fighters, bringing the total order to 550 planes. The new contract followed a series of tests to prove serviceability of the craft under field conditions and consistent firing at over 600 mph. Tests proved that the fully-loaded Thunderjet can attain a level speed of 620 mph.

In the meantime, the first group of production Consolidated Vultee L-13s has been delivered to the Air Force. Seven pilots, officers and noncoms, ferried the planes from the plant at San Diego to March Field, headquarters of the recently activated 7th Liaison Squadron. Another

1. Air Rescue Detachment No. 4 at Selfridge Field has answered 80 alerts this year, all but four civilian. Above, a base helicopter demonstration, lowering the rescue chair.

2. After helping "injured" person to the pickup site, the attendant, who came down from the 'copter in rescue chair, seats him and supervises transfer up to hovering craft.

afa news

plane, modified for winter operation, has been ferried to Eglin Field, Fla., for Arctic testing in the giant cold weather hangar.

Where's The Crew?

Snatched from the hot oblivion of the scrap-heap after 129 runs over Europe, the B-17 "Milk Wagon" has ended one career and started another as the decorative facade of a lawyer's building in Kingman, Ariz.

Now the lawyer-hero of the rescue, E. Elmo Bollinger, wants to know, "Where's Poppy Jim and Gloomy Gus?"—the crew members whose monikers decorate the Wagon's nose, in company with a fabulous cow and 129 milk bottles.

Only meager information is available to assist Bollinger in his search and the Air Force is no help at all, since they dealt only in such prosaic things as airplane serial numbers. Poppy and Gloomy, more imaginative, considered it of greater importance to record the missions of their B-17 than to preserve serial numbers; so the Wagon's official identification is hidden under Bossy and the bottles.

Bollinger discovered the Milk

(Continued on page 42)

3. The special winch-crane permits crew to take their "patient" aboard without getting him out of the seat.

Squadron's program of activities for 1947-48 would begin with a membership drive in the East Bay area.

Prospective members of the East Bay Squadron are urged to write to George D. Mantell, 2807 Windsor Drive, Alameda, or Ray Beeler, 4538 Reinhardt Drive, Oakland, for more details.

San Francisco Squadron in late October held the first general election of permanent officers since it was chartered. Thomas F. Stack, now a deputy commander of the California Wing, was reelected Squadron Commander; Zel L. Conn was named Vice Commander; R. James Disher, Secretary; and Eldridge Huber, Treasurer. Tom Stack was recently selected to represent Jimmy Doolittle and the National AFA at the docking of the Honda Knot, carrying the first remains of the World War II dead to be returned to the US, and the subsequent memorial ceremonies held in San Francisco. The Squadron has had one special activity each month. The next scheduled event is a Christmas party for under-privileged children. All former Air Force men in the San Francisco area are urged to contact Commander Stack for further details about the Squadron. His address: Mills Tower, 20th Floor, San Francisco 4.

Los Angeles Squadron No. 1 announces that its new address is the Hollywood-Roosevelt Hotel, and invites all AFA members and other former Air Force men in the area to drop a note to the Squadron for information about future meetings. Last month, William L. Berry, a chief engineer at Hughes Aircraft Corporation, explained the characteristics of the H-4 plane.

Santa Monica Squadron has elected Joe Nadel as its new Commander, replacing Stuart Purcell, who is now Deputy Commander of the California Wing. Other officers: Harry Myers and John Manning, Vice Commanders; Bill Pailing, Treasurer. At its last meeting Gene May, a test pilot at Douglas Aircraft, described his recent test flights of the Skystreak and revealed that his unofficial speed record is 669 miles per hour. All former Air Force men in the area are invited to contact Joe Nadel at 1941 Euclid Street, Santa Monica.

HAWAII

The First AFA Wing and Squadron organization to be completed outside the continental limits of the US was accomplished on October 26. Working in conjunction with Maj. Gen. Ralph H. Wooten, Commanding General of the 7th Air Force, a novel system of rendezvous was planned for four islands in the Hawaiian Group. Sunday, October 26, was designated as "Air Force Rendezvous Day" by Wing Commander Roy J. Leffingwell, who is establishing AFA Squadrons in the Islands. Through the Reserve training program of the 7th Air Force, Leffingwell, in a five hour period, was able to visit groups of former Air Force men on four different islands and bring them the story of the AFA. Islands visited by Leffingwell and other Wing officials included: Kauai, where Gordon Kelly is temporary Squadron Commander; Oahu, where Estes Evans is temporary Squadron Commander; Maui, where Henry Dolim is temporary Squadron Commander; and Hawaii, where William Dahlberg, temporary Membership Chairman, called the meeting. In the Islands, Walter H. Dillingham is Deputy Wing Commander and Ross Haynes is Secretary-Treasurer.

INDIANA

Like other AFA units throughout the nation, the Evansville Squadron has taken the lead in activating the Reserve Training Squadron in its area. Here the AFA has had a primary interest in activating the 81st Troop Carrier Squadron and has worked closely with Air Force officers in helping to establish the reserve activity. A Hallowe'en party and dance were held October 31 by the men of the AFA Squadron and the 81st Troop Carrier Squadron. Commander of the Evansville Squadron is Oliver K. Loer, who is veterans' counselor in the psychology department of Evansville College. The Squadron address: Charles Huppert, Secretary, AFA, 825 South Elliott St., Evansville 13.

MARYLAND

Riall Jackson was named Commander of Baltimore Squadron No. 1 at the annual election on October 20. Son of a former Baltimore mayor, an ex-AAF pilot, and prominent in civic affairs, Jackson succeeds John R. Mitchell.

Other officers of the Squadron: Stanley Fisher, Vice Commander; Charles W. Hammond, Corresponding Secretary; James W. Blackhurst, Recording Secretary; and Samuel M. Hecht, who was elected Treasurer.

MASSACHUSETTS

At the end of its first year of successful operation, the Worcester Squadron has

(Continued on page 43)

CROSS COUNTRY

Wagon languishing in the clutches of the Air Conversion people near Kingman and destined for a smelter. Intrigued by the wonderful artistry and the 129 missions, he wangled the nose as a gift. He's retouching Poppy, Gloomy, Bossy and the bottles; will then shellac them and affix the relic on the front of his stone building for the passing world to see and photograph.

The Milk Wagon is believed to have been one of the B-17s assigned to the 301st, one of the units of the 8th Air Force. Mr. Bollinger would like to know the names and addresses of the crew members and the history of the airplane.

He appealed first to Senator Carl Hayden who tossed the ball to the Air Force. The hunt has been futile and now the readers of AIR FORCE are called upon to help answer the query, "Where's Poppy Jim and Gloomy Gus?"

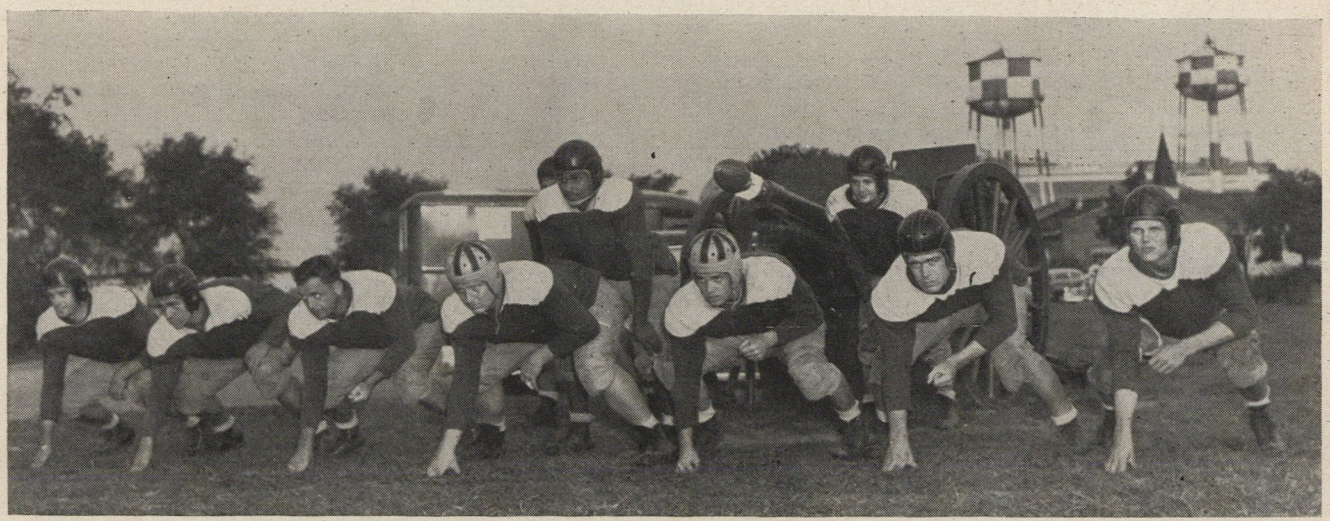
Back in North American snow, George Truman of Los Angeles and Clifford Evans of Washington, D. C., taxi their Piper Cubs to parking strip at Anchorage, Alaska, after having put 20,000 miles behind them in their round-the-world pilgrimage.

New Directory

Fifty-one different models of aircraft, including four helicopters, currently are being offered on the civilian market by twenty-five American manufacturers, according to the 1947 directory of US civil aircraft performance specifications issued by Aircraft Industries Association. A directory issued in 1946 listed 29 companies offering 47 models.

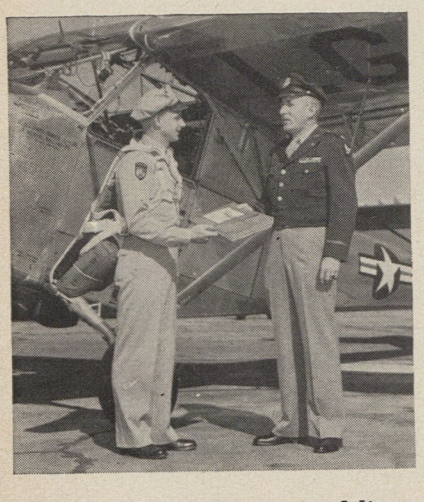
In number of models, the US is believed to outstrip any other country. However, many countries, among them Britain, Canada, France, Russia, Czechoslovakia, Italy, Denmark, Sweden, the Netherlands, Belgium, Uruguay, Peru, and Brazil, have developed new civilian models in the last two years. A 1946 directory from Britain disclosed 14 British manufacturers had announced 28 post-war models.

The new AIA directory shows nine US companies offering eighteen different multi-engine models, including two cargo designs. Ten of these models will cruise at better than 300 mph, seven at better than 200 mph. Sixteen of them have



After losing the first two games of the season, the Scott Field Flyers decided it was time to call in the artillery. Weak in passing, the boys decided to use a three inch gun as fourth man in the backfield to do the pigskin firing.

afa news



Lt. R. C. Good (left) receives delivery papers on USAF's first winterized L-13 from Lt. Col. K. S. Brown, San Diego.

ranges above 1000 miles, eight topping 4000 miles, and one having a 5600-mile range.

Eighteen companies are producing twenty-nine single engine-models, including ten four and five-passenger designs. In addition, as the directory went to press two companies were about to announce specifications on two new four-passenger models. These 29 single engine planes vary in range from 220 to 1619 miles. Seventeen of them have better than 400-mile range. Cruising speed of US single-engine 1947 models varies from 91 mph to 203 mph, most of them cruising well above 100 mph.

The directory shows two companies marketing helicopters, which range in weight from 2160 lbs. to 4985 lbs. Three of them will top 92 mph and one is listed at 110 top speed. Their ranges run from 200 to 245 miles.

Luscombe Price Announced

Luscombe Airplane Corporation has announced a retail price of $6,995 for its new Silvaire Sedan, making this ship the lowest priced four-place all-metal craft in production.

Powered by a 165 hp flat-six Continental engine, the ship has a cruising speed of 130 mph and a range of approximately 500 miles.

announced the election of officers. Robert F. Kirkpatrick was named as Commander to succeed Harold Fink; Joseph Samra was elected Vice Commander; Robert Miles, Secretary; and Robert Mee was reelected Treasurer.

NEW JERSEY

At the October meeting of the Hudson County Squadron of Jersey City, these officers were elected for the coming year: George I. Sweeney, Commander; Leonard L. Ciaccia, Vice Commander; Miss Mary Donovan, Secretary; George S. Kessler, Treasurer. Further information about the Squadron may be obtained from the Commander at 474 Bramhall Avenue, Jersey City.

NEW YORK

Manhattan Squadron No. 1 is the newest AFA unit to be formed in New York City. Chartered on October 7, the list of officers includes Jackson Matthews, Commander; E. H. Hassemer, Vice Commander; Burton E. Donaghy, who is a national Director, Secretary; and Carl H. McClure III, Treasurer. Information about the Squadron may be obtained from Burton E. Donaghy, 270 Park Avenue.

New York City WAC Squadron No. 1 now has its own newsletter, designed to keep its members informed of new projects and gain increased support for the many projects of the organization. The Squadron's program of entertaining veterans at Halloran General Hospital, started six month ago, is continuing to gain steam and the last party was a Barn Dance held on October 25. The latest edition of the Newsletter reports that 13 members of the Squadron were present at the AFA National Convention in Columbus.

Staten Island Squadron No. 1 has elected Eric A. Stuve its commander. Other officers: Francis X. Scott, Vice Commander; Bernard F. Cherer, Secretary; John H. O'Hara, Treasurer. Commander Stuve invites other former Air Force men in the Staten Island area to contact him at 10 Bayview Place, Staten Island 4.

Times Square Theatrical Squadron, under Bill Roach, has formed a "Show Business" squadron in Manhattan. The Squadron will limit its membership to present and former Air Force men and women who are identified in any way with the entertainment business—the stage, motion pictures, radio, television, stage managers or hands, or the many other jobs which make up show business. The Squadron is to contain eligible persons regardless of the locality in the Greater New York area. Interested persons are asked to contact Bill Roach at Wisconsin 7-5128 or write to him in care of O'Brien, Driscoll, Raftery & Lawler, 152 West 42nd St., New York 18.

OHIO

Always an active AFA state, Ohio comes forward with a new Squadron at Washington Court House, where Victor W. Smith is Commander; Richard L. Barger, Vice Commander; Maurice B. Hopkins, Secretary; and Forest E. Cubbage, Treasurer. The Squadron, which was organized just prior to the National Convention, had 50 members, and is still growing rapidly. Commander Smith has asked all former Air Force men in the area of Washington Court House to contact him at 515 W. Elm Street, if they wish to become active in the local Squadron.

Marian Squadron, chartered in May, has elected the following permanent officers: James C. Sloan, Commander; Donald Sims, Vice Commander; Willis Stewart, Secretary; George Flood, Treasurer. Squadron address is 520 East Center Street.

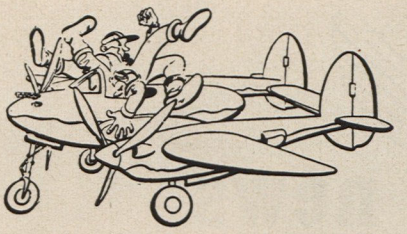
PENNSYLVANIA

The Harrisburg Squadron became the ninth AFA organization to present Victory and American Defense Medals to its membership at a regular Squadron meeting. This medal presentation ceremony has resulted in attracting many former Air Force men to meetings.

Drexel Squadron, located at the Drexel Institute in Philadelphia, began regular meetings again with the opening of the fall term of school. The new slate of officers for the coming year: William G. Foster, Commander; Jack Muchnik, Vice Commander; and Carl C. Shoemaker, Secretary-Treasurer. First Commander and organizer of the Drexel Squadron was Ben Ostrofsky.

WEST VIRGINIA

The Kanawha Valley Squadron, which was organized last summer in Charleston, was chartered on October 23, with 48 charter members. Officers of the Squadron: William G. Snyder, Commander; Patrick A. Haley, Jr., Vice Commander; Jerry T. Lambert, Secretary-Treasurer. Commander Snyder urges former Air Force men to contact him at 620 Kanawha Blvd., West, for information about the organization.



PLANE BONERS

Analyzed by Veteran Pilots

While flying P-51s in formation, the wingman found it necessary to cross over during turns in order to keep the sun to his rear. During a turn to the left, the wingman's right wing collided with the tail section of the leader's plane. Both P-51s went out of control and both pilots received major injuries during the bailouts.

Comment: Although the crash was the result of poor formation flying, both pilots might have escaped injury if their chutes had been fitted properly. In each case, the chest strap struck the pilot's chin when the canopy opened. Make sure your parachute is fitted properly by a qualified chute technician to avoid disaster.

After the pilot started the engines of a B-25, the wheel chocks were removed and placed in the rear of the fuselage. While the crew chief was assisting a radioman to put some equipment aboard, the pilot signaled a man near the wing to remove the chocks. When the man signaled back that the chocks had been removed, the pilot interpreted this as an ALL CLEAR signal. He started to taxi out and the two men beat a hasty retreat to the rear. The airplane rolled about 10 feet and ran into another B-25 and both planes received minor damage.

Comment: A series of errors were committed that could easily have resulted in a tragedy. The wheel chocks were removed without the pilot's knowledge and before he signaled for them to be removed. Improper hand signals were used between the pilot and an unauthorized ground crewman. The pilot started taxiing without the crew chief aboard and without knowing where he was. The crew chief and radioman attempted to open the forward hatch with both engines running and without the pilot's knowledge. The pilot attempted to taxi without wing walkers and with very little clearance. A little coordination of effort certainly would have prevented the accident.

A pilot of a P-51 landed hot and, as he approached the taxi strip at the end of the runway, attempted a right turn. He was moving too fast and the plane started to groundloop. He applied brakes and the airplane nosed up, causing major damage.

Comment: Taxiing too fast always brings trouble. Slow down, and you roll safely.

A command pilot with a green instrument card cleared himself IFR for a cross-country flight in an A-26. When he arrived at his destination, the field was socked in. He held over the range for an hour and was advised to start his descent. He made two unsuccessful attempts to land by GCA, but his third approach appeared normal. When he was one mile from the end of the runway, GCA advised him that he was 150 feet above the glide path and told him to pull up and go around. The call was never acknowledged and the pilot broke clear and proceeded to land. Touchdown was made two-thirds down the runway. When he realized he would not be able to stop, the pilot attempted to groundloop the airplane. When this failed, he cut the switches and the A-26 plowed into a revetment off the end of the runway.

Comment: On all IFR flights an alternate destination must be selected. This is not just to satisfy regulations, but is to be used when weather at the destination closes in. If the pilot had gone to his alternate and landed, or pulled up and made a go around when called by the tower, this accident might not have occurred.

PREPARED BY THE FLYING SAFETY DIVISION, FIELD OFFICE OF THE AIR INSPECTOR, LANGLEY FIELD, VA.

PSYCHO-ANALYZING 460 PILOT ERRORS

(Continued from page 34)

gists point to the fact that in rolling in a large change in trim it is necessary in many aircraft to turn the trim wheel part of a revolution, then remove the hand and "hitch" it to a new position before turning the wheel again. "In a number of situations," they explain, "such as when an engine cuts out, a pilot may want to grasp the trim control quickly and to change trim rapidly. This difficulty becomes more serious when a pilot cannot compensate for the incorrect trim by one-handed operation of the stick or wheel."

Dr. Fitts and Captain Jones make the following suggestions to reduce the probability of errors in adjusting controls:

- Make all fuel-flow control automatic (with manual override for occasional use in combat) so that the pilot will be relieved of this responsibility and will not be able to make errors in selecting fuel tanks.
- If the technical problems of obtaining automatic fuel-flow control cannot be solved, fuel valves should be redesigned to give positive selection so it becomes impossible to leave a valve inadvertently in an intermediate position where no gas will flow, and some type of indication should be added to fuel gauges to indicate the tanks that are feeding the engines.
- Simplify the procedure for lowering wheels so only one step is required of the pilot.
- Design the flap-actuating control to provide indication of flap position both by direct vision and by feel of the control, and eliminate the use of a "neutral" position, thus reducing flap adjustment to a single operation such as moving a lever-type control to one of a small number of detent positions.
- Locate the trim controls where they can be grasped quickly and provide for continuous operations—avoid the necessity for shifting the hand during operation, so that moderately rapid change in trim can be secured when desired.
- Design new type throttle locks that can be operated by one hand simultaneously with the throttles.

Forgetting Errors

"Forgetting some part of a well-established habit is a psychological phenomenon that occurs for a variety

of reasons," explain the psychologists. "In most cases well-established habits enable a pilot to carry out cockpit procedures more or less automatically with little thought or deliberation. Forgetting may occur when something unusual happens to interrupt or momentarily distract the pilot from his normal routine. Even cockpit routines that have become entirely automatic may be disrupted in this manner by seemingly unimportant stimuli. Sometimes a special effort to be more careful than is one's habit may unexpectedly turn out to be a distracting or disorganizing influence. No one is entirely free from these seemingly stupid forgetting errors."

Most critical forgetting errors cited in the study are those which are impossible or difficult to remedy in flight. Example: Taking off with controls locked in an aircraft whose controls can only be unlocked on the ground or when there is little pressure on the flight surfaces.

Said one pilot: "We were headed overseas in a B-24, taking off at night. There were other planes taking off ahead of us and it was a fairly windy night, so I locked my controls. The runway was rather short. We turned on the runway with full power and started down with the wind taking us off to the left. *I tried to use my rudders and found they were locked.* For a second I thought it was the wind. I tried them again, then tried the aileron, and found it was locked. So I had the copilot unlock them. By that time we were going about 50 or 60 mph, but we finally got off OK."

The study cites the need for improvement of warning devices and for more effective use of such devices. "The relative attention-getting value of visual versus auditory warnings, of steady versus intermittent signals, and of still versus moving indications should be investigated from a psychological point of view," the analysts report. "Methods of attaching meanings to warning devices, methods of alerting the pilot without creating unnecessary tension, and the optimal number of warning signals, all should be studied. Some experimental investigations of this problem already are underway, but many questions pertaining to the effectiveness of warning devices still remain unanswered."

In recommending design changes to reduce forgetting errors, Dr. Fitts and Captain Jones explain: "It will never be possible to design equipment and train pilots so well that human operators will never forget. However, the following suggestions, which have been collected from various sources, appear to be ways of reducing the frequency and seriousness of such errors." Their recommendations follow:

- Design aircraft so that it will be impossible for a pilot to advance the throttles and start the take-off run if any essential step in the cockpit check, such as unlocking flight controls, removing pitot-tube cover, uncaging gyros, turning on generators, or adjusting trim for take-off, has been forgotten.
- Until the preceding goal is achieved, design or modify aircraft having internal control locks in such a way that control surfaces can be freed quickly under any condition.
- Design all types of toggle switches with a uniform "off" position (as recommended in Engineering Division Report No. TSEAA-694-4F) in order to increase the accuracy and ease of checking switch positions.
- Investigate the usefulness and practicability of a mechanical abbreviated check list for use before take-off and landing to indicate which items have still to be checked.

Reversal Errors

"The mistake of moving a control in the direction opposite to the appropriate one," the study reveals, "is closely related psychologically to reversed interpretation of an instrument reading. Such errors occur when the control movement required for a particular purpose is the reverse of what is most "natural" or "expected" or when the direction of control movement conflicts with habits which have been established in flying other aircraft. Errors occur frequently when there is a conflict between the responses required in operating different controls. Such a conflict in direction of movement relationships requires the pilot to change his mental set each time he goes from one task to the other." Here is a typical example of a reversal error, as reported by a pilot for the study:

"During a demonstration flight of single-engine procedure in a B-25C type aircraft it was necessary to make the rudder adjustment using the rudder-trim tab on the floor between the pilot and copilot seat. To make this adjustment I had to take my eyes off of the instrument panel and bend down to reach the trim-tab control. The trim-tab control trims in the opposite direction for which the correction is desired. Be-

(Continued on page 47)

HELL OVER BIZERTE *(Continued from page 29)*

were losing altitude and we didn't know our speed. Suddenly a little patch of plowed ground came into view. I grabbed for throttles and switches and let her hit. We made it.

We all got out by various means and began looking for wounds. Most everyone had a few scratches and bruises. Harry and I were shot in the legs, arms and face. Vandergriff had a couple of holes in his arms. Later we were able to chuckle over several incidents.

After Fozzy bailed out, Buck was going to follow, but with his broad beam and seat-pack chute he couldn't quite squeeze through the escape hatch. He tried so desperately, however, that he almost couldn't get back in.

Incidentally when Fozzy landed in his chute three Arabs came forward. Two wanted to take him to the Germans and one to the English. The one fortunately prevailed after Fozzy had given him his knife as a present. Fozzy learned from the British that he had landed in a "No Man's valley"—the Allies were on one ridge and the Axis on the other.

At one point Whimpy decided things were getting so hot he had better come out of the tail and put on his chute. When he got back one of his guns had been blown off and there was a gaping hole where a seat was supposed to be.

When Gowan was trying to put out the flares which had caught fire, he exhausted his five extinguishers with no apparent results. So he tossed burning flares into the empty ball turret and poured water on them. That did the trick.

When they were ordered to put on their chutes and return to gun positions the whole crew complied except Francis, who was firing so many rounds he figured if he left the gun to get the chute they would get him before he got back. One death looked as good as the other to him so he stayed and kept his turret going.

Vendy ran out of ammunition so he went to the backdoor and thumbed his nose at the attacking 190s. He figured this was the least he could do.

From AIR FORCE DIARY, *edited by James H. Straubel and published by Simon and Schuster, $3.75. Copyright, 1947, by Army Air Forces Aid Society.*

O'HALLORAN ON TARGET

(Continued from page 23)

"Hold your fire," the phone shouted back, "We're expecting a flight of friendly planes. Control will let you know . . ."

"But I'm certain, sir," O'Halloran said in agonized tones.

"Hold fire," came the answer. "Friendly planes ——"

About then our airfield began jumping up and down from the impact of Jap 500 pounders. We scrammed for our holes and wondered what the Hell had happened to O'Halloran.

When the dust had settled and the all-clear sounded, Control picked up the hot-line phone in answer to an insistent buzzing. It was O'Halloran.

"Sir," said his voice, heavy with disgust, "Were those f r i e n d l y bombs?"

We Air Force guys cooled the Major off with some of our warm beer, chiseled from the Navy, in the shelter of the old bomber fuselage we laughingly called our Officers Club. O'Halloran came in. The Major acknowledged the introduction quietly, and then proposed a toast.

"O'Halloran on target!" he said.

PSYCHO-ANALYZING 460 PILOT ERRORS *(Continued from page 45)*

cause of the design of the trim tab, *opposite trim was put in, giving the aircraft a tendency to snap roll.* An accident was narrowly averted."

In suggesting design changes to eliminate reversal errors, Dr. Fitts and Captain Jones comment, "The *Handbook of Instructions for Aircraft Designers* now prescribes uniform direction of movement relationships for nearly all cockpit controls, and specifies that 'forward' correspond to increased speed, and 'backward' to decreased speed. Observance of these requirements should eliminate most reversal errors as soon as all aircraft in use become uniform in this respect." They state the "general requirement" as follows:

● Design controls so that the relationships between all control-aircraft indicator movements are the "natural" or "expected" ones, and no mental process is required between comprehension and response. Where necessary, conduct research to determine the optimal direction-of-movement relationships.

Unintentional Activation

By "unintentional activation" the psychologists refer to such errors as a pilot unknowingly catching the sleeve of his jacket on a toggle switch, or unintentionally moving one control while concentrating on another control.

"Reduction of this type of error," they explain, "should result from development and careful testing of functional cockpits before aircraft go into production. It is believed that the only satisfactory way to minimize unintentional activation of controls is through continued modification of cockpits on the basis of pilot error experiences involving inadvertent control activation. Since this is a slow and costly procedure if accomplished separately for each type of aircraft, it is concluded that the most practical alternative is development of uniform 'ideal' cockpits which can be thoroughly service-tested before actual use in new aircraft. This general approach to development of uniform cockpits is now being followed by the Aircraft Laboratory of the Air Materiel Command." The study provides a typical pilot report on this type error:

"While flying through a cold front at night in a C-47, icing conditions were encountered and it was necessary to apply carburetor heat to the right engine. *While handling the carburetor heat controls the copilot unknowingly moved the right-engine gas selector switch out of its proper position.* The gas-selector switch vibrated around to the 'off' position, and approximately two minutes after the carburetor heat had been adjusted, the right engine cut out. A possible tragedy was averted by the quick thinking of the engineer, who turned his flashlight on the gas-selector gauge immediately. The engine caught again as soon as the selector switch was returned to its correct position. The rest of the flight was uneventful."

Dr. Fitts and Captain Jones suggest the following design changes to reduce unintentional activation.

● Subject the "ideal" cockpits now being developed by the Aircraft Laboratory to extensive cockpit-procedure checks and, if possible, to actual flight tests in order to discover and correct tendencies toward unintentional activation of controls.

● Accelerate the present program to "clean up" the cockpit through such means as the use of consoles, flush mounting and smooth edges. Enclose all connecting tubes and cables. Provide sufficient separation of controls so that any control can be operated independently without the probability of hitting an adjacent switch or lever, even if the pilot is wearing gloves.

Unable to Reach Controls

Pilots reported to the psychologists that sometimes they were unable to reach a control at all, or have to bend down so far into the cockpit to grasp it that they cannot fly the aircraft safely. Here is a typical report:

"This is an experience I had flying a P-51 in Germany. On this particular mission we had gotten a little bit off course and flew directly over a large city in the overcast. They shot up some flak at us. In breaking away I ran out of gas in one of my drop tanks. *Reaching down to change over to an internal tank, I stuck my head way down in the cockpit* and at the same time I leveled out of my turn. Unconsciously I must have pulled back on the stick, because the next time I looked out of the cockpit I had come up right beside another P-51. I was inches from hitting him. Just had my head down in the cockpit and wasn't watching what I was doing."

The psychologists comment: "Anthropological data collected by the Aero Medical Laboratory indicate

(Please turn the page)

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUGUST 24, 1912, MARCH 3, 1933, JULY 2, 1946.

OF AIR FORCE, published monthly at Richmond, Virginia, for October 1, 1947.

State of New York } ss.
County of New York }

Before me, a Notary Public, in and for the State and County aforesaid, personally appeared James H. Straubel, who, having been duly sworn according to law, deposes and says that he is the editor of Air Force and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946 (section 537, Postal Laws and Regulations), to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business manager are: Publisher, Air Force Association, 1616 K St. N.W., Washington 6, D. C.; Editor, James H. Straubel, 485 Madison Ave., New York 22, N. Y.; Managing Editor, Charles E. Root, 485 Madison Ave., New York 22, N. Y.; Business Manager, Helen Whyte, 485 Madison Ave., New York 22, N. Y.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) Air Force Association, 1616 K Street, N.W., Washington, D. C., a nonprofit corporation having no stockholders.

3. That the known bondholders, mortgagees, and other security holders, owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

JAMES H. STRAUBEL, Editor.

Sworn to and subscribed before me this 30th day of September, 1947.

(SEAL) MARGOT WILLIAMS.
(My commission expires March 30, 1949)

PSYCHO-ANALYZING 460 PILOT ERRORS

(Continued from page 47)

that if it is desired to design aircraft so that pilots can grasp a control without moving their eyes from the normal position, it is necessary that controls be located no farther than 28 inches from the point of rotation of the arm using it. This reference point is approximately seven inches to the side of the mid-line of the body. The distance can be extended for a few inches directly ahead of the pilot if he is free to lean forward." Dr. Fitts and Captain Jones suggest the following design changes to eliminate errors:

- Locate all controls and switch panels that must be used during take-off, landing and other critical maneuvers within 28 inches of the point of arm rotation at the shoulder. This is particularly important for controls located near the floor.

This study of pilot error does not claim to cover all human problems in the design of controls; some difficulties, for example, are not reported by pilots because they are not recognized as problems, or because they are accepted as a normal part of flying. And the analyzing psychologists acknowledge that a number of the errors analyzed were made with equipment that has since been improved through modification, and that many of their design suggestions have already been generally recognized and accepted.

But Dr. Fitts and Captain Jones reveal conclusive evidence that human error in the cockpit can be reduced substantially by greater emphasis on designing controls and cockpits in relation to human requirements. "Not only should it be possible to reduce pilot-error accidents by designing equipment which is more functional," they report, "but it should be possible to increase the over-all performance of aircraft through proper consideration of pilot comfort and efficiency."

WHO'S WHO: SHORTY FULTON

(Continued from page 35)

newest Kriegie was much too old for the Luftwaffe.

Civilians gave "Shorty" a hard time, broke his ribs, his upper plate and his nose and after a second interrogation in the burgemeister's office the citizenry wanted to hang him. Some German airmen, for reasons known only to themselves, halted that project by loading him and the wounded pilot in a truck en route to solitary. They were then taken to Stalag 1, in North Germany at Barth. After the Russians stormed in, less than a month later, Shorty got to Rheims.

Today Shorty is back at his prewar stand in Akron running his airport and skippering the Air Force Association and Air Force Reserves.

Shorty Fulton was born in 1892 on a farm near Kenton, Ohio.

Since then he has worked at many things in many places and has yet to experience that fabled bed of roses.

In 1911 he became interested in aviation and in 1923 he deserted his favorite vehicles of that period—a motor-cycle and a "souped up" automobile—long enough to teach himself to fly, usually with one wing low, using an airplane he had rebuilt from the debris of a full spin that terminated in a grape arbor.

He knows only one speed—"wide out"—in anything he is propelling. No sane person rides with him.

Just before World War II he convinced the community of Akron that it needed a modern municipal stadium. By badgering WPA and anyone else who would listen, he finally obtained funds and directed the building of one of the finest athletic plants of its kind in America, seating 35,600. Under his vigorous stewardship the "Rubber Bowl" was a financial success and became a civic monument.

Major local figure in the annual running of the National Soap Box Derby on Derby Downs, which he caused to be built near the Stadium, Shorty is known to thousands of boys from coast to coast.

Violent and explosive as his life has been, Shorty at home with his quiet, devoted wife, three married children, and four grandchildren throttles down a little and even cleans up his language noticeably.

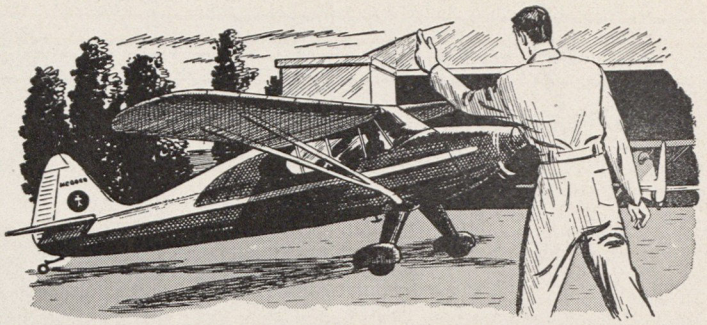
His son, Bain Jr., or "Bud" who has been his almost constant companion since he was able to hang onto the back of a motor-cycle or perch in the seat of an airplane, was a flight officer in the Air Force and is an active member in AFA.

CREDITS

Cover—Northrop Aircraft; Page 9—Official United Nations; Page 11—Rudy Arnold, European, Sovfoto, British Information Services, De Havilland; Page 12—United Nations World; Page 13—Press Association (2), Wide World; Page 15—Fairchild, Wide World, Fairchild; Pages 16-17—Ross-Pix; Page 22—Northrop; Pages 24-25—USAF; Page 26—Acme, North American, Philips Co.; Page 27—North American, Philips Co.; Pages 30-34—USAF; Page 35—USAF, B. E. Fulton; Page 36—British Combine. Beech; Page 37—Carl Byoir; Page 40—USAF; Page 41—AFA, USAF; Page 42—USAF, Press Association; Page 43—Consolidated Vultee.

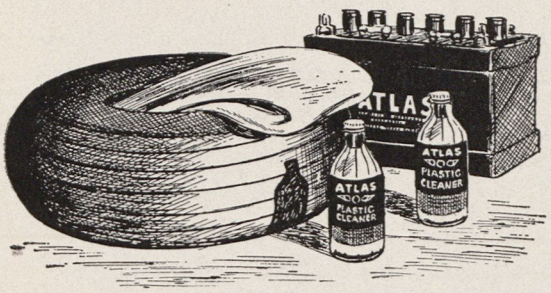
Standard of California's

PLANE FAX



A page of service tips for private flyers and fixed-base operators

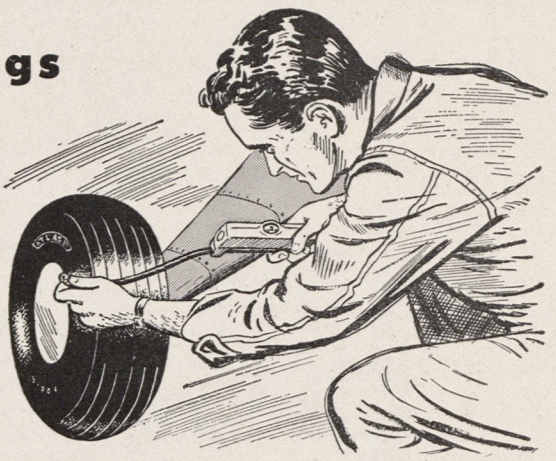
Airport dealers to carry new accessories



As an additional service to flyers, Standard Airport Dealers are now adding a complete new line of top quality aviation supplies. With everything from tires and tubes to flashlights and plexiglass cleaner, in the nationally famous Atlas line. Standard Airport Dealers now offer complete, one-stop service. For cross-country flyers the availability of these new supplies is a sure time- and money-saver, as Atlas Aviation supplies may be purchased on Chevron National Credit Cards.

Check tires for safer landings

Plane tires don't have far to roll, it's true, but it is still important to keep them up to snuff. And it's too late to check your tires when you're circling to come in. Watch for bruises, small cuts, and make sure of *proper inflation* before taking off. If a new tire is in order, your Standard Airport Dealer can now supply you a superior quality Atlas Aircraft Tire. Their "safety factor" and durability is due to the engineering which produced the best for military planes.



How to reduce pre ignition danger

Proof of a good spark plug is in its capacity for operating at high engine output without overheating or causing pre ignition. Long life is another merit to be looked for in spark plugs. These three characteristics are all found in Atlas Champion Aircraft Spark Plugs. The Atlas Champion's resistance to pre ignition is made possible by a special insulating material, the finest known to ceramic science. Your Standard Airport Dealer can tell you the full story of Atlas Champions.

Chevron National Credit Cards Available

For private flyers, good at airports throughout the United States, Canada and Alaska. If you reside in the West, write Standard of California, 225 Bush Street, Room 1618, San Francisco 20, California or ask the Standard Airport Dealer at your field for an application blank.

CHEVRON AVIATION GASOLINE

RPM AVIATION OIL

Famous Standard of California Products

The Sperry A-12 Gyropilot on executive planes . . .

As the human pilot's automatic "co-pilot" on one-man operated executive aircraft such as the Grumman-Mallard, the Sperry A-12 Gyropilot eases the strain and fatigue of long flights . . . facilitates flying accurately by dead reckoning when busy executives must fly off the regular airways to visit out-of-the-way plants.

provides smoother flight with less pilot effort and greater safety

With the Sperry A-12 Gyropilot and Gyrosyn Compass supplying complete gyro-stabilized control and accurate directional indications under all flight conditions . . . the pilot can do his job better and with less effort than by manual control.

and with greater comfort and relaxation for executives

Passengers land completely relaxed and refreshed from the smooth ride made possible by the A-12 Gyropilot. Its precise automatic control eliminates over-control, "hunting" and "wallowing," holds the aircraft level and comfortable regardless of air turbulence.

• • •

AND IN THE MARINE FIELD, Sperry Gyro-Pilots, linked with Sperry Gyro-Compasses, are providing automatic straight line steering.

Sperry Gyroscope Company, Inc.

EXECUTIVE OFFICES: GREAT NECK, NEW YORK • DIVISION OF THE SPERRY CORPORATION

NEW YORK • CLEVELAND • NEW ORLEANS • LOS ANGELES • SAN FRANCISCO • SEATTLE