

MARCH 1957 / 35c

AIR FORCE

• THE MAGAZINE OF AMERICAN AIRPOWER

The Last Flight of the X-2

By Clay Blair, Jr.



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AIR FORCE

THE MAGAZINE OF AMERICAN AIRPOWER

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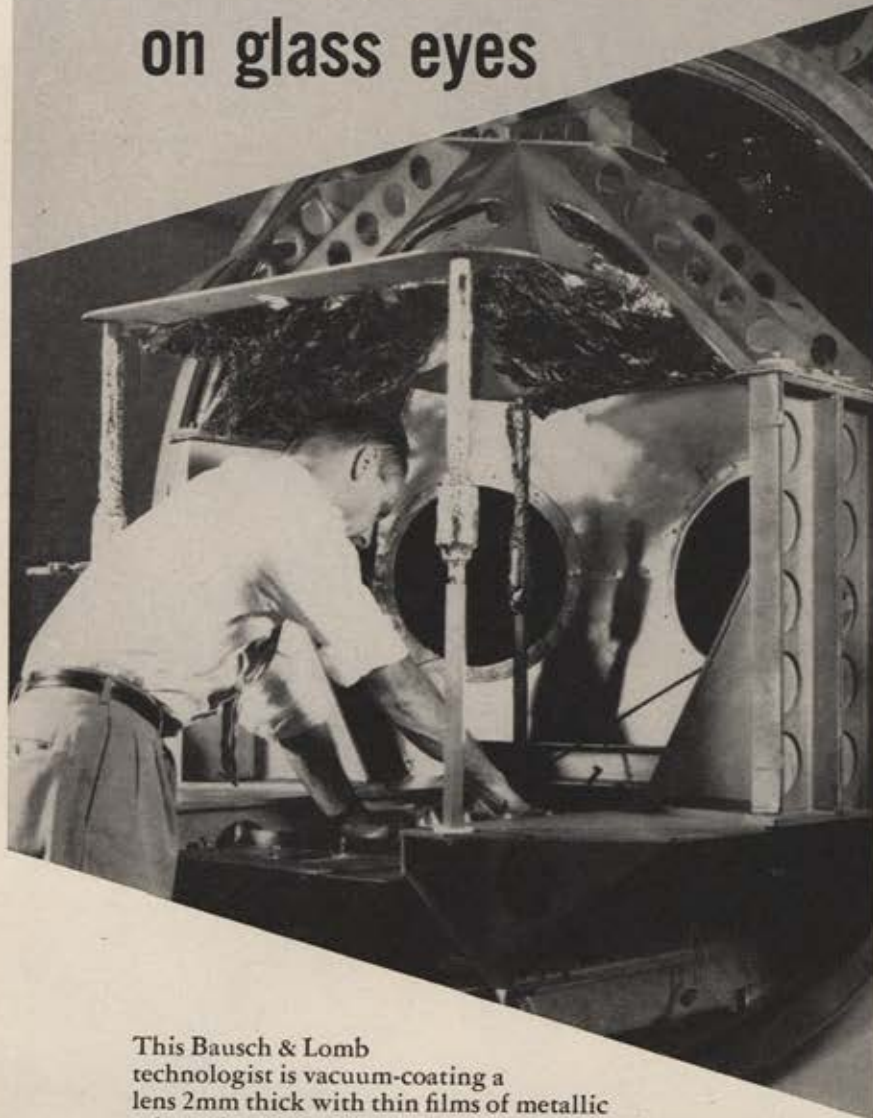
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Grafting metal skin on glass eyes



This Bausch & Lomb technologist is vacuum-coating a lens 2mm thick with thin films of metallic salts to increase control of light and color. If the lens were enlarged to the height of Mt. Washington (6,288'), the lens coating would be equivalent to a four-inch transparent layer. This submicroscopic surfacing method, developed by B&L, makes possible miracles in selective reflectance and transmittance of light of any specified wavelengths. Practical applications range from color TV to directional control of guided missiles. How does this kind of advance technology fit in with your contract plans?

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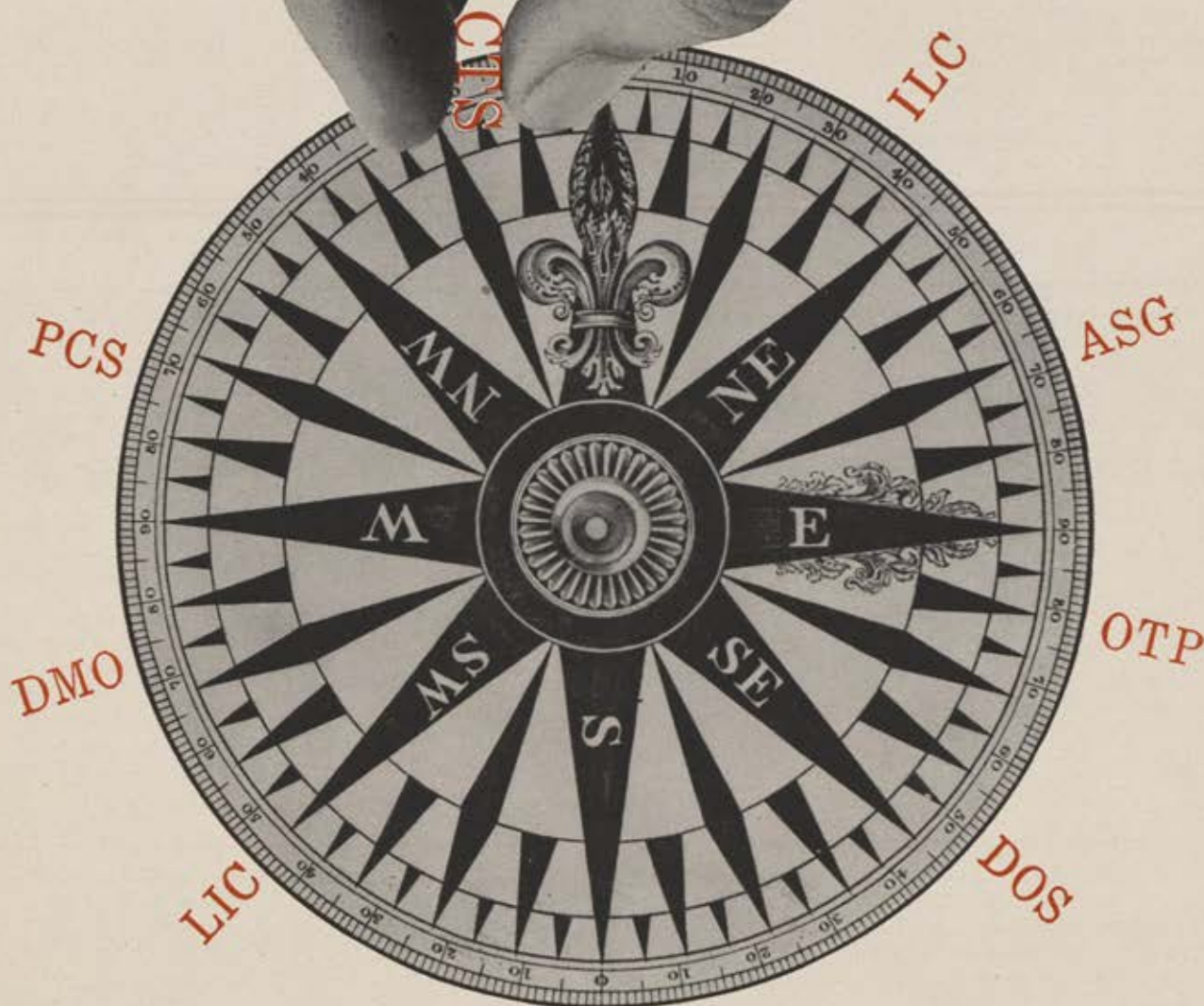
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air mail

A Boon to Safety

Gentlemen: The Air Force Association plan for Flight Pay Protection has my most hearty approval and support. Having spent my entire professional career with the Air Corps and Air Force as a flight surgeon, I am well aware of the reluctance rated personnel have in voicing physical complaints to a physician if they have any reason to suspect they will be grounded as a result of consultation and physical examination. This reluctance is based on two factors: first, the love for flying; and second, the loss of flying pay. The loss of flying pay is quite a severe shock to the family budget, and your plan provides an adequate period of financial readjustment in case an individual is grounded for some physical defect.

This plan will be a great boon to our flying safety program, since rated personnel with physical defects which may disqualify them for flying duties are a definite hazard to flight safety. In your article "Flight Pay Protection Pays Off," January 1957 issue of AIR FORCE, Lieutenant Nigri brings out this point by remarking: "Now you don't have to worry about hiding anything from the flight surgeon when you take a physical."

I would like to have your permission to reproduce this article in our AMC Surgeon's Information Bulletin, which is disseminated to each of our command field installations. It is my intention to urge flight surgeons, flight safety officers, and operations officers to make all rated personnel aware of the advantages of the plan, both to the individual and to the AF.

Brig. Gen. Edward J. Tracy
Surgeon, Air Materiel Command
Wright-Patterson AFB, Ohio

• *Anyone who wants more information on our Flight Pay Protection plan may write AFA Hq., Mills Bldg., Washington 6, D.C.—The Editors.*

Historian's Eagle Eye

Gentlemen: First of all, I should like to go on record as stating that AIR FORCE is the finest airpower publication I have ever read.

Secondly, however, I am forced, as

an aviation historian, to tweak the editorial noses of your art advisors because of the illustration that accompanied the fine story on Raoul Lufbery in the January issue.

The aircraft shown as Lufbery's, and from which he jumped, is illustrated as a Nieuport type XVII, whereas, in actuality, "Luf" was flying one of the recently received Nieuport XXVIIIs, when he met his death.

By the same token, the wing of the German Albatros machine bears the old-style curved side cross, whereas the Germans had long since ceased to employ this type of marking, having resorted to the straight-sided cross effective January 1, 1918. By the time Lufbery was killed, all old-style crosses had been painted out, and the new form stenciled on the wings and fuselage.

Maj. Kimbrough S. Brown
Ft. Walton Beach, Fla.

Understandable Misinterpretation

Gentlemen: I have just finished reading the January 1957 edition of AIR FORCE Magazine, and now, I wish to disagree with part of an article under the heading of "The Ready Room," by Edmund F. Hogan, page 82. He states: "In addition, the Guard took delivery of Republic RF-84F aircraft, the first time in history that ANG units had received aircraft direct from the production line."

In late 1948 and early 1949 the ANG received from Lockheed Aircraft Corporation here at Van Nuys, Calif., the first jets to be delivered direct to the units. Our wing, the 146th Fighter Interceptor Wing, under command of then General Thomas, helped to deliver the aircraft by performing the production test flights under the direction of Col. (now Brig. Gen.) C. A. Shoop and Maj. (now Lt. Col.) Robert DeHaven of the 146th F-I Group of the ANG and Hughes Aircraft, respectively.

One of the units to receive the jets was one of our own squadrons, the 196th FIS now stationed at Ontario, Calif. They flew the Korean policing action in the birds.

The above I believe to be true, since I helped clear the flights from

Van Nuys Base Operations. I've been an air technician since 1946 and have seen quite a few F-80Cs delivered to the ANG.

M/Sgt. Vern Armstrong
Van Nuys, Calif.

• *It would have been more accurate had we said "the first time in history that ANG units had purchased aircraft direct from the production line. The word received, as we had intended it, meant direct procurement.*

The aircraft to which the writer refers were procured by the USAF for the active Air Force. A cutback in AF wings made them surplus to the needs of the active AF before they could be delivered. General Finch, then head of the Air Force Division, NGB, stepped into the breach and arranged with the AF to have the aircraft delivered to ANG units.—The Editors.

For Master Sergeants

Gentlemen: I would like to congratulate M/Sgt. Bill O'Keeffe on his article "Let's Hold on to That 'Out-At-Twenty' Man," in the December '56 issue of AIR FORCE Magazine. He expressed the opinion of a good majority of the AF master sergeants and hit the nail right on the head.

He stated the problem correctly, but the solutions he proposed were too much along the line of token gestures. I can't speak for all master sergeants, but the majority I know and respect do not have their hands out for money. They want to enjoy a status compatible with their ability and experience; they want recognition; and all of them want to be rewarded for merit.

Having been a member of SAC for a number of years, naturally I'm biased. But I know SAC is sincerely interested in taking care of its people. They are continuously analyzing such problems and doing their best to make the Air Force career more attractive. I say I know because I was lucky enough to hear a briefing presented to our NCO Academy students by a representative of SAC's Directorate of Personnel. The briefing hit

(Continued on page 9)

**KAMAN
HOK-1
SHOWS ITS
MUSCLE**



Undergoing U. S. Army evaluation tests including airlifting externally slung cargo, this Marine Corps HOK-1 demonstrates its ability. Shown here carrying a 2500 lb. jeep, it also takes artillery pieces, gas drums, ammo cases and other bulky materiel in stride.

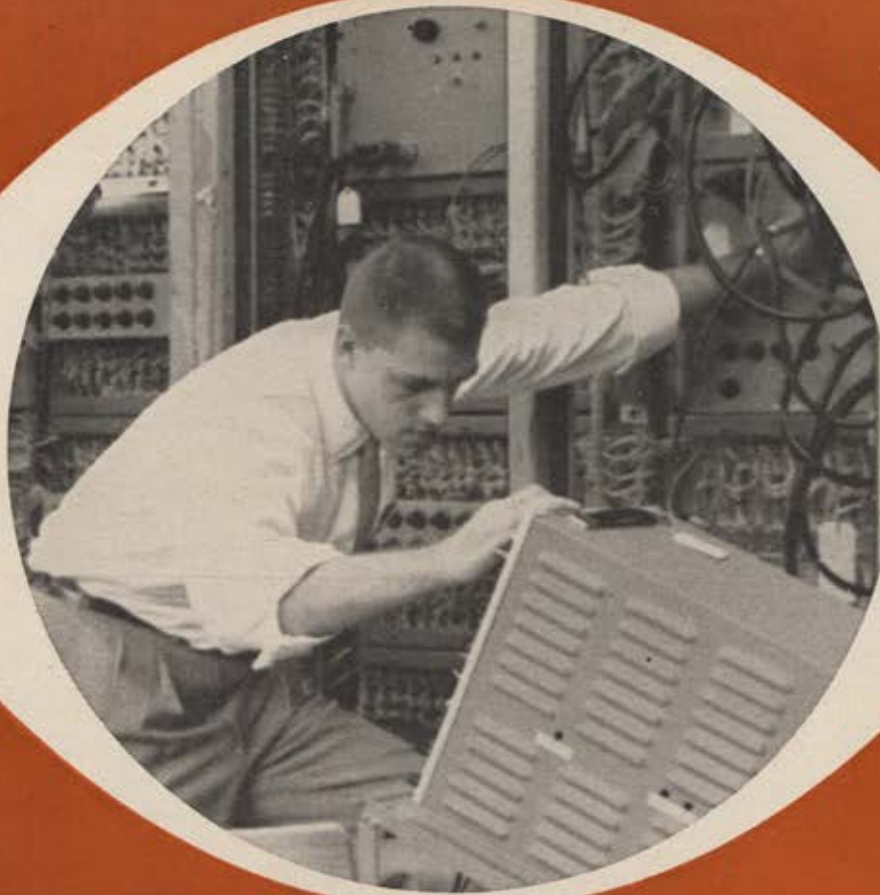
HOK-1 general utility helicopters are already in service with the U. S. Navy and Marine Corps where they are used extensively for search and rescue missions, medical evacuation, personnel transport and cargo carrying.

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right at the heart of the problem. SAC has a plan that cannot help but appeal to all master sergeants and airmen in the Air Force.

SAC proposes establishing a Specialized Duty Officer Program that will provide an avenue for motivating qualified master sergeants to progress from enlisted to commissioned ranks. Their definition of the Specialized Duty Officer Program is "A select group of motivated career-minded specialists who have progressed from enlisted to commissioned ranks by virtue of their technical and professional ability."

The actions they propose are:

- Establish Specialized Duty Officer as a category;
- Phase out the Air Force Warrant Officer Program;
- Authorize Specialized Duty Officer spaces on percentage of enlisted by career field; and
- Publish and distribute the ground rules of the program to all NCOs.

What impresses me is that their plan benefits both the Air Force and the individual. Certainly, such a program would have a terrific impact on improving the morale and prestige of the master sergeants of the Air Force. As I see it, the young airman would have stronger reasons for staying in and striving for NCO grade because of the avenue for further advancement. Then, too, it would stimulate many of our coasting master sergeants into action when they see that such action would have a beneficial payoff.

It looks to me like SAC has the plan that will get the job done. I for one sincerely hope that it is implemented, because it is the best move yet to make the Air Force career more attractive and live up to the old recruiting standby, "The Air Force Offers Opportunity."

M/Sgt. James Lovejoy
Barksdale AFB, La.

Compliments of a Friend

Gentlemen: I was highly impressed with Lt. Col. Clarke Newlon's article on Dave Schilling [December '56]. He was one of the outstanding officers in the Air Force, and the author has done an excellent job in presenting some of the more important highlights of his Air Force career. It would be impossible, of course, to give Dave the true recognition that he, as one of our greatest airmen, so deserved. I feel that had such an article been published earlier, it would have had a direct effect on the Promotion Board meeting in Washington and perhaps

Dave would have been a general today.

It is extremely unfortunate that his loss to the Air Force and to his many friends came at such an early age, but I feel that Dave, while he lived, was an invaluable asset to the service, and has left for future generations a legacy of courage and determination and a great belief in the future of the United States Air Force.

Col. Francis S. Gabreski
Myrtle Beach AFB, S. C.

Not So Silent After All

Gentlemen: I was quite interested in the follow-up by Capt. James Sunderman to my "Silent Service" article [December '56]. The man makes some good points, and it is heartening to know that AF people are taking up the pen. As I pointed out, it's about time. My object was to fan the fire and apparently I did, for the good captain leaped to his typewriter and fired back even before the echoes of my own blast were stilled. The captain trots out an impressive formation of statistics which attempt to prove that the boys in blue have surged ahead of other services' writers. Tain't so—what his figures indicate to me is an increase in writing activity—which I recommend—but we still have a long way to go.

I think the major part of my article was on the "how to do it" side and after it was done, how to get it cleared and headed for a publisher. In this I hope I've done some good—even if it means added competition.

M/Sgt. Frank J. Clifford
APO, N. Y.

Weekly Pay Check?

Gentlemen: One of the fundamental foundations for our day-to-day living and business relations is the familiar word "money." In order to increase the circulation of money in our country today, I suggest that the Finance Office of Hq., USAF, look into the possibility of meeting pay schedules on a weekly basis. Not only would this increase the supply of money in circulation for daily business and living, but it would assist its members in "stretching" the cost of meeting its obligations.

The cost of checking accounts could be a savings to the AF member since the present two-week period is considered a long way off from one pay period to the next. Let's think about this: To keep costs down pay cash. The cost of money by its interest rate does not serve the member whose credit costs are actually additional to the borrowed money or purchased

small articles. The value of money to the AF member may be increased by a weekly pay check—and of course the community and local business would be better as a result.

Our day-to-day living is based on a weekly period and as such a weekly pay period to AF members would stabilize our living.

CWO John A. Casey
APO, San Francisco, Calif.

Another Job for the Squadrons

Gentlemen: In January "Air Mail," George L. Setman points out that AFA could do more toward promoting aviation among teen-agers, and suggests, "... why couldn't AFA give a few high school scholarships at local airports. . . ." Mr. Setman is getting at the root of our aviation problem—interesting our young people in flying.

May I point out to Mr. Setman, and to the other members of AFA, that there is currently an organization primarily engaged in this endeavor—the Civil Air Patrol. The CAP cadets consist of boys and girls fourteen to eighteen years old who meet weekly to learn about all phases of aviation.

At present CAP can use all the help they can get. They need good leaders, qualified instructors, and more publicity. Also, they are always looking for sources of flight scholarships for the most qualified cadets.

Mr. Setman, and the other members of AFA, would be doing a great service to the youth of the country if they would contact their local CAP squadron and ask, "How can I help?" If a squadron has not been formed in your particular area, sponsor the formation of one. Further information may be gained by writing to National Headquarters, Civil Air Patrol, Bolling Air Force Base, Washington, D.C.

To show that a precedent has been established, may I cite our local case where the Fairfield CAP Cadet Squadron membership has increased by fifty cadets since the North Bay Squadron of AFA began sponsoring them three months ago. But to reach the national goal of 100,000 cadets, this needs to be repeated many times throughout the country.

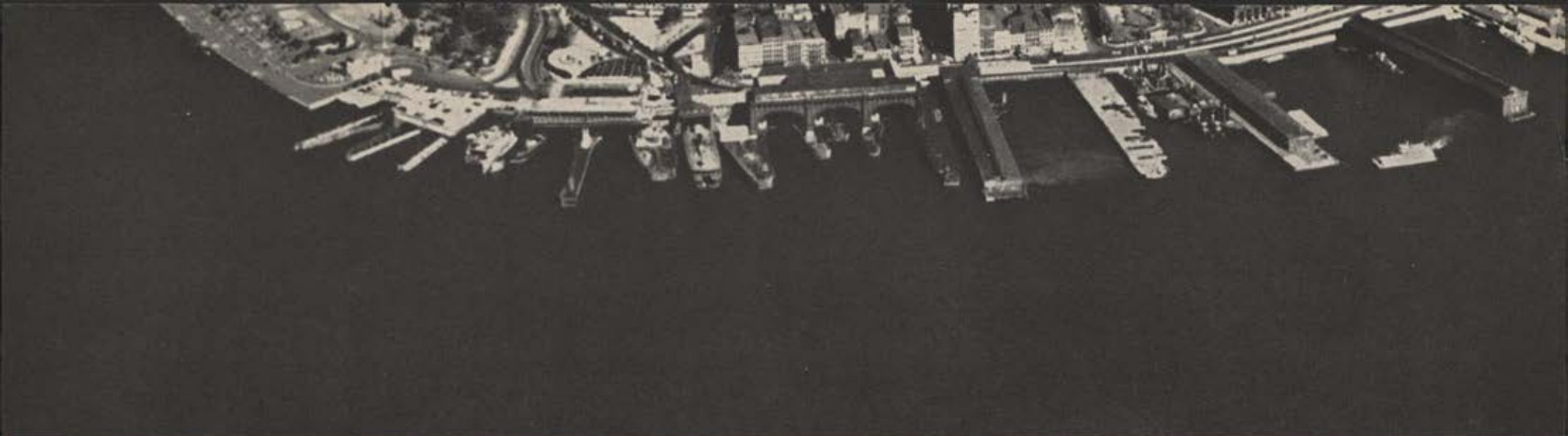
1st Lt. William H. E. Doole
Travis AFB, Calif.

January Issue

Gentlemen: Your January '57 issue, with Edward Teller's story, was an all-around good one. Dr. Teller's words were particularly timely.

Louis Alexander
Bellaire, Tex.





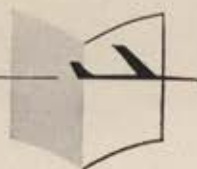
Manhattan Island, 22.3 Square Miles in Surface Area

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— — — — —

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airman's bookshelf

Saburo Sakai, Japan's top living air ace, with sixty-four confirmed victories, is today a print shop owner in Tokyo. Though Japan's surrender ended his flying career, his story lives on in *Samurai* (E. P. Dutton, \$4.95). The title means Warrior, from the name of the once privileged Japanese ruling class into which Sakai was born. In *Samurai*, Sakai, with American author Martin Caidin and Japanese newsmen Fred Saito, tells a story most American readers will find somewhat disturbing. It's sobering to get a first-hand version of how easily this skilled Japanese airman, in his then superior equipment, prowled the skies and met and destroyed the best America could put into the air in the early days of the Pacific war.

Sakai's star was brightest over the Philippines, New Guinea, and Java. But it was in combat over Guadalcanal that his most harrowing experience occurred. The canopy of his Zero was shattered. With his right eye blinded, and streaming blood, his body half paralyzed, he managed to fly the 300 miles back to his base at Rabaul.

In 1944 he returned again to combat at Iwo Jima. With only one eye, he still out-flew and out-fought the best he met. But the tide of war had turned. Japan had suffered irreplaceable air losses, and superior American equipment and numbers were pouring across the Pacific. When Saipan fell and B-29s, P-51s, and P-38s appeared in large numbers, Sakai knew it was just a matter of time.

The book contains an allegation of American miscalculation in grand strategy. After Saipan, Sakai says, Iwo Jima lay undefended, "dazed and helpless. . . . There remained on hand to defend the vital island . . . less than a battalion of Army troops. . . . These men walked about in shock, stupefied by the terrible bombardment. . . . Their brains were addled; they spoke incoherently." A handful of US forces, says Sakai, could have easily taken the island. Sakai, who was then on Iwo, and the other defenders stoically waited for the invasion that didn't come. Instead, the Americans turned to the Philippines.

But the invasion of Iwo eight months later was a blood bath. Of the 75,000 Americans who were involved, 5,324 died and 16,000 were wounded. Though more than 1,100 US fighters and bombers and scores of warships supported the attack, the eight months had given Japan time to fortify Iwo with more than 17,500 crack troops and 6,000 naval personnel. And frantic Japanese construction had turned Iwo into a "mighty fortress, buttressed with pillboxes, powerful cave defenses, elaborate tunnels."

If, as Sakai claims, strategically located Iwo could have been taken eight months earlier without such a price, a tragic military blunder was made, and some day history must surely point the finger of responsibility.

If this book leaves you with one feeling, it is that the Pacific air war was a turkey shoot for the Japanese. This was certainly not the case. Sakai's story is deceptive, since he himself was far from a typical fighter pilot. Even in the early days, the ratio of air combat kills was three to one in favor of the American forces. But the scope of the Japanese defeat in the air doesn't emerge from Saburo Sakai's book, which is understandable since it deals strictly with his own stellar performance. In all fairness to Sakai, it must be said the Japanese lacked a hard core of pilots between Sakai's level and the poorly trained novices who were sent, relatively unprepared, into air battle. These fell by the hun-

dreds to American air aces. Upon this group rested the eventual decision in the air.

Samurai reads like a novel—a credit to Martin Caidin and Fred Saito. It's a book we hope all thinking Americans will read, as a sobering lesson on World War II.

Those interested in the Pacific war will also find informative and useful a recent English translation of the *General View of Japanese Military Aircraft in the Pacific War*, compiled by the staff of the Japanese aviation periodical *Aireview* (Kanto-Sha Co., Ltd., Tokyo, \$6.35). This Japanese publication is distributed in the USA by Hampton Books, Hampton Bays, N. Y. It comes in a two-volume package—the original Japanese language edition (which contains photos, cutaways, and three-view silhouettes of all aircraft produced and tested in Japan in World War II) and an accompanying English translation of the Japanese text.

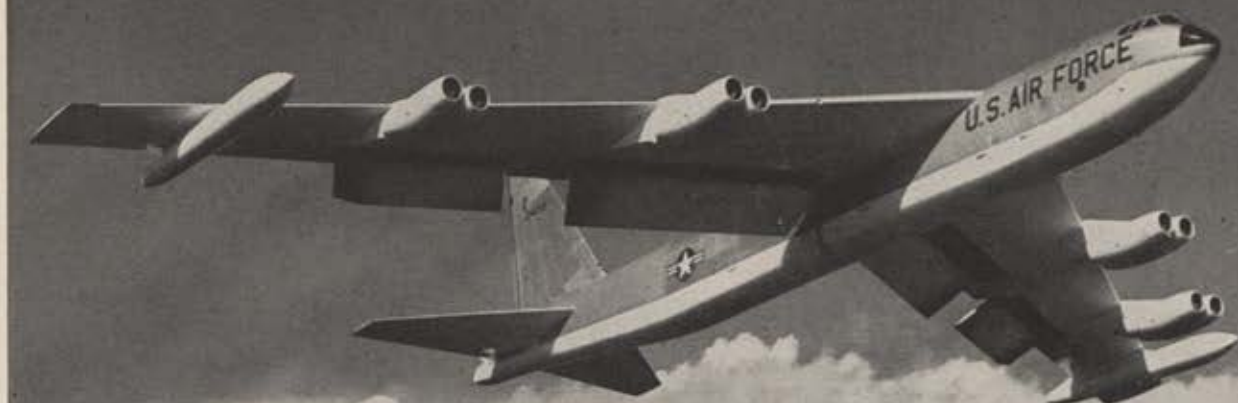
Maj. Robert E. Fuerst, an Air Force meteorologist and *AIR FORCE* Magazine author (see page 109), has written an extremely interesting and informative little book called *The Typhoon-Hurricane Story* (Charles E. Tuttle Co., \$2). Major Fuerst divides his story into two parts: "The Elements Attack" and "Man Fights Back." In the first, he describes how storms form, where and when they strike, and what damage they do. Part two is a combination of "you-are-there" and "how-to-do-it." Here he explains how AF weather aircraft explore storms, how radar tracks them, and how they are interpreted for the layman.

Public interest in the launching of the earth satellite and in the approach of space flight has spurred the publication of a number of books based on scientific fact and informed speculation. These books are valuable because they translate technical matter into non-technical language. One new one is *A Space Traveler's Guide to Mars*, by Dr. I. M. Levitt (Henry Holt, \$3.50). The author is Director of the Franklin Institute's Fels Planetarium, in Philadelphia. Another such book is *Earth Satellite*, by Patrick Moore (W. W. Norton, \$2.95), which gives an excellent over-all view of the satellite program and goes into the practical uses of satellites in space travel, research, and military operations. The book is profusely illustrated with sketches by Irving Gels.

Admirers of the French airman-poet Antoine de Saint-Exupéry will want to read *The Winged Life*, by Richard Rumbold and Lady Margaret Stewart (David McKay, 1955, \$3.50). The authors, both British and flyers themselves, bring to this life story the warm feeling of kinship only a colleague could experience and portray.

Every American boy and girl should know the story of Charles Lindbergh—a story of how courage and vision led young Lindbergh to perform one of the great pioneering feats of modern history. This story is well told for the very young set in *Ride on the Wind*, by Alice Dalgliesh from Lindbergh's own book *The Spirit of St. Louis* (Charles Scribner's Sons, \$2.95). Basically a picture book, with magnificent illustrations, this book will capture the imagination of children of all ages, from four to eighty.—END

BULLETIN FROM **BOEING**



AMERICA'S RETALIATORY "REACH" was demonstrated when a Boeing B-52, refueled in flight, recently covered 16,000 miles, non-stop, in 31½ hours. The B-52, along with other Boeing Stratofortresses, wheeled

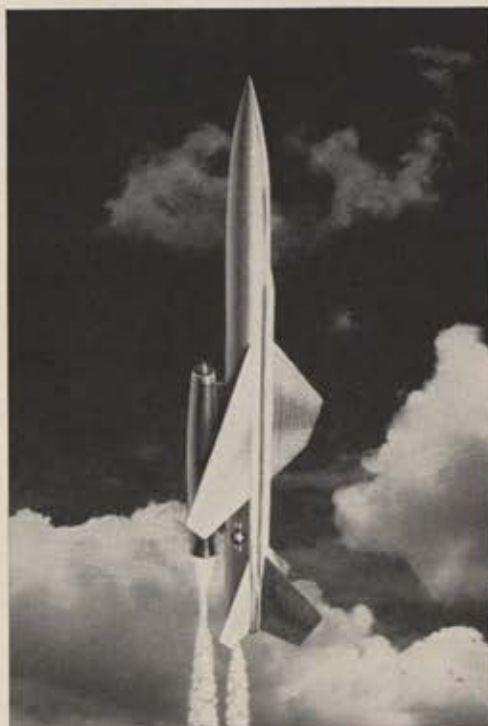
over the North Pole, and circled the perimeter of most of Canada and the United States. Fully loaded for simulated bombing runs, the Boeing B-52s flew at speeds up to 650 mph, and at altitudes up to 50,000 feet.



WINGED REFUELING STATIONS, jet-powered KC-135s, are moving off Boeing production lines on schedule. In service, KC-135s will add thousands of miles of reach to jet-powered bombers and fighters, refueling them at speeds and altitudes best suited to jet operations.

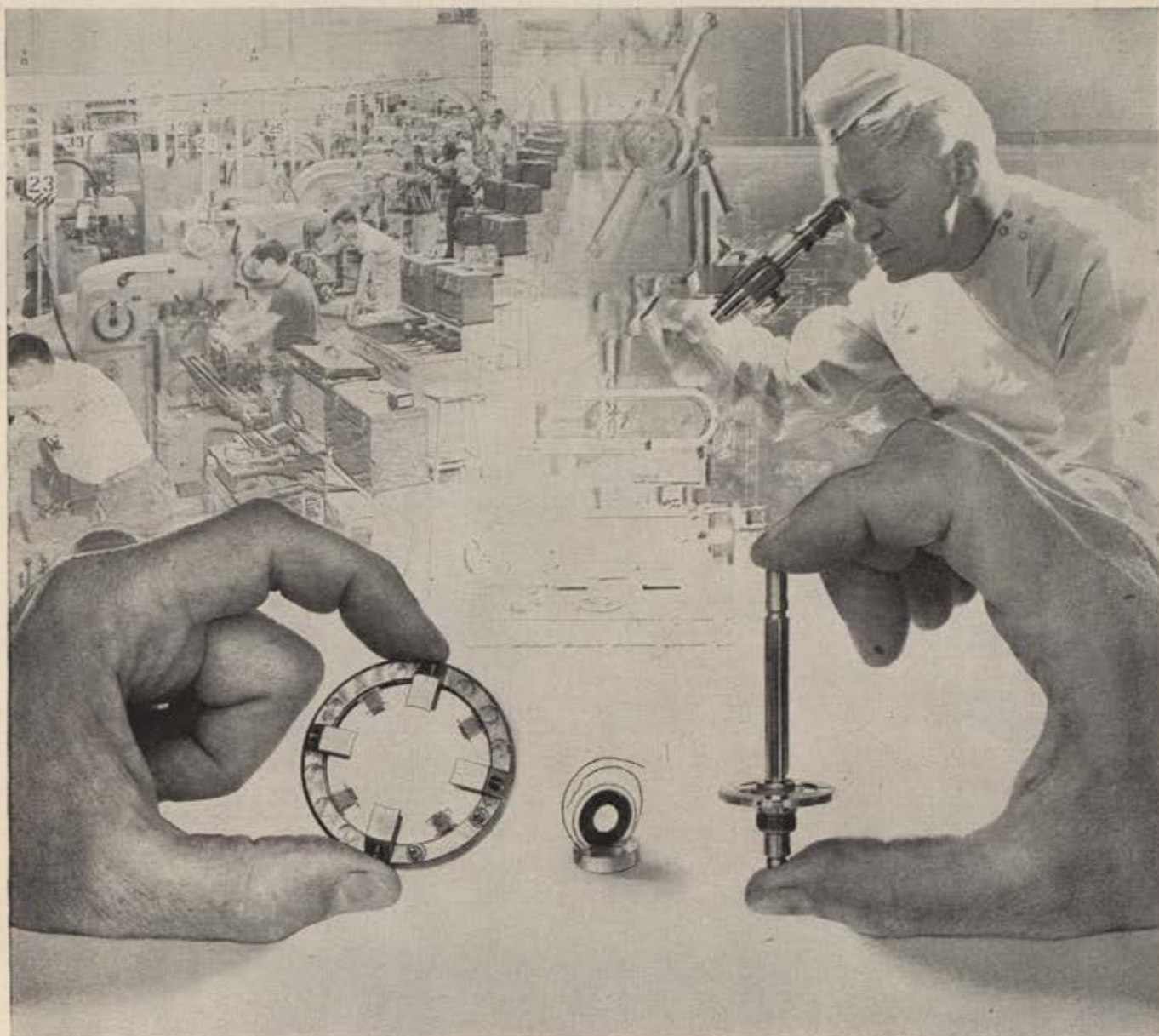


AMERICA'S ONLY JET TRANSPORT, the Boeing 707, parks at Los Angeles airport after flying Civil Aeronautics Board officials down from Seattle. Return flight carried International Air Transport technicians, reached Seattle in 1 hour 50 minutes. The 707 is helping officials work out procedures and rules for commercial jet flight in the U. S.



BOMARC. Boeing's Pilotless Aircraft Division is conducting successful firing tests of supersonic defense missiles. Boeing's BOMARC guided missile assignment includes development of electronic guidance, launching means, bases, supplies and maintenance.

BOEING



Now Autonetics brings laboratory precision to the assembly line

...with quantity production of electro-mechanical brains, nerves and muscles

Automatic flight control or guidance systems must operate as dependably as the human faculties they supplement. Compact enough for the sleek confines of a jet or missile... yet rugged enough for environmental phenomena that defy description... they must be machined and assembled with a precision as exact as diamond-cutting. To make just *one* is a technological triumph—but the need is for *thousands*.

That's why AUTONETICS' quantity production of these electro-mechanical stand-ins is a new milestone in American manufacturing. It has, in fact, meant turning production into an exact science... with techniques that rival those of an operating room... with tools that synthesize and multiply the skills of the master craftsman.

In a business where even a thumbprint could cause intolerable inaccuracies, mechanisms are assembled in special dust-free rooms... by technicians as immaculate as surgeons, and with the

same scalpel sureness. Production tolerances have been reduced to millionths of an inch.

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Today AUTONETICS is one of the few companies in the world that can produce in quantity the electro-mechanical products it designs: autopilots, auto-navigators, armament controls, computers, and other complete systems for the military and industry.

For detailed information, write: AUTONETICS, Dept. F-72, 12214 Lakewood Blvd., Downey, Calif.

Autonetics



A DIVISION OF NORTH AMERICAN AVIATION, INC.

AUTOMATIC CONTROLS MAN HAS NEVER BUILT BEFORE

wing tips

By Wilfred Owen

Two out of three people traveling between the United States and foreign countries go by air.

A million people are expected to fly across the North Atlantic in 1957.

There are now eight cities in the United States that generate more than a million air passengers a year. They are New York, Chicago, Los Angeles, Washington, San Francisco, Miami, Detroit, and Atlanta. The last two joined the list in 1956.

Washington, D. C., will have "helicab" service beginning in mid-1957. Pilgrim Helicopter Service will start with charter and contract services, and plans to add scheduled operations over a sixty-mile radius in Maryland and Virginia.

The aircraft industry leads all other US industries in numbers of persons employed. Aircraft workers averaged 800,000 during 1956 compared to a 750,000 average for the automobile industry.

The plane carrying an experimental nuclear reactor, in connection with the development of an atomic airplane, is accompanied on its flights by a C-97 transport loaded with armed paratroopers. Their purpose: to protect the flying laboratory in case of a forced landing.

The Portuguese province of Mozambique, on the eastern shore of Africa, is among the world's most air-minded nations. It has eight flying clubs with thirty-two aircraft and 1,000 members. If New Jersey were proportionately



as air-minded, it would have 430 flying clubs with half a million members.

The world's scheduled airlines hit a new high of 78,000,000 passengers last year, and it is now estimated that 1958 will see 100,000,000 flying customers.

In 1956, for the second year in a row, US and foreign air carriers ordered more than \$1 billion worth of jet and turboprop transports. The year-end backlog of orders was close to the \$3 billion mark.

MAIL YOUR RESERVATION REQUEST NOW!

AFA National Convention & Airpower Panorama

WASHINGTON, D. C. ★ JULY 30-AUGUST 4, 1957

Since more than 3,000 delegates and guests will attend the Convention, everyone cannot be accommodated at the Sheraton-Park and Shoreham, headquarters hotels. Therefore, rooms

and suites at the Sheraton-Park are restricted to AFA delegates and Industrial Associate companies. The number of suites at the Shoreham is limited, but is not restricted. The

hotels below are listed in the order of their distance from the Sheraton-Park, with the Shoreham nearest, etc. The Continental is suggested for Panorama exhibit personnel.

AFA Hotels and Room Rates

HOTEL	SINGLE	DOUBLE	TWIN
Sheraton-Park*	\$ 9.50	\$13.00	\$13.00
Shoreham*	9.00	14.00	14.00
Windsor-Park*	9.00	12.00	12.00
Dupont Plaza*	9.50	12.50	12.50
Woodner*	None	13.50	13.50
Mayflower*	9.00	14.50	16.50
Statler*	11.50	15.00	16.50
Lee House	8.50	12.00	12.00
Burlington	7.50	10.00	10.00
Ambassador	7.50	11.00	12.00
Hamilton	7.00	10.50	10.50
Continental	7.00	9.00	10.00

* Suites available—one bedroom, \$25; two bedroom, \$40. Above rates are averages—lower and higher rates are available.

Mail to:

AFA HOUSING OFFICE
Convention & Visitors Bureau
1616 K Street, N.W., Washington 6, D. C.

DATE _____

NAME _____

ADDRESS _____

CITY & STATE _____

HOTEL _____
FIRST CHOICE SECOND CHOICE THIRD CHOICE

TYPE ROOM _____ () Low () Average () High
DESIRED RATE

ARRIVAL DATE & HOUR _____

DEPARTURE DATE _____

OTHERS IN ROOM _____

■ The death last month of Atomic Energy Commissioner Dr. John von Neumann reduced to three the group known in scientific circles as "the Martians"—the incredible four-some of Hungarian-born scientists whose migration to the US has resulted in so many contributions to modern machines and weapons. The remaining "Martians" include nuclear physicist Dr. Edward Teller; Dr. Theodore von Kármán, dean of aeronautical scientists; and Dr. E. P. Wigner, a pioneer design of nuclear reactors. Dr. von Neumann, 53, died of cancer at Washington's Walter Reed Army Hospital. He was born in Budapest, the son of a city banker, and at the age of thirteen was already recognized as a mathematical genius. He is best remembered for his work in helping devise the first giant electronic brain, which was desperately needed to work out theories that contributed to the H-bomb. Dr. von Neumann also pio-



First photo of the Bell GAM-63 Rascal guided missile, a supersonic, rocket-powered, air-to-surface missile for AF use, shows Rascal with its ground handling equipment. The missile has been undergoing tests at Holloman AFB, N. M.

neered in the field of theoretical meteorology, and his formulas are still used by the US Weather Bureau. He came to this country in 1930 to join the faculty of Princeton University, and later was a member of Princeton's famed Institute for Advanced Study. He became an Atomic Energy Commissioner in 1954. The following year he received the Air Force Association's Science Trophy at the San Francisco Convention. He was cited for his contributions in "the field of 'high-speed digital computation, which has become vital to further progress in all phases of military technology, particularly thermonuclear weapons and intercontinental missiles.'" Dr. von Neumann had also been a member of the Defense Department's Technical Advisory Panel on Atomic Energy; the Weapons System Evaluation Group; the USAF's Scientific Advisory Board; and a consultant to the Armed Forces Special Weapons Project. American airpower is the poorer for Dr. von Neumann's passing, since few men of science possess his understanding of its implications.

■ At his farewell press conference before returning as Chancellor of the University of Buffalo after serving fourteen months as Assistant Defense Secretary for research and development, Dr. Clifford C. Furnas predicted that

man could fly to the moon within the next twenty-five years "if there were some reason to do so." He made it clear, however, that the Defense Department now has no specific project for such a trip to the moon. In the news conference, Dr. Furnas also confirmed earlier reports that there has been a slow-down in the development of an atom-powered airplane. He attributed the slow-down to technical problems rather than to a shortage of research funds. This statement conflicted with testimony from Lt. Gen. Donald C. Putt, the AF's DCS/Development, who told the Symington Subcommittee investigating airpower that the AF had asked for \$112 million for the A-plane but been granted only \$20 million.

■ **AIRCRAFT . . .** Because it can "find no other use for them," the Air Force says it will junk about \$1 billion worth of obsolescent B-36 intercontinental atom bombers, long the mainstay of SAC's retaliatory striking force. The huge Convair planes are being replaced by all-jet, eight-engine Boeing B-52s, which cost about \$8 million each as compared with a \$3.5 million pricetag for the B-36s. About 400 B-36s were built, beginning in 1947, and 270 are still in operation in SAC. . . . An AF B-47, with an assist from the jet stream, flew coast to coast late in January in three hours, forty-seven minutes. The plane flew the estimated 2,650 miles between March AFB, Calif., and Hanscom AFB, Mass., at an average speed of about 700 mph, with 750 mph as the maximum speed attained. The B-47 used the AN/APN-66 navigation system, developed by the General Precision Laboratory, which enables aircraft to stay in the jet stream as if on auto-pilot. . . . On the same day the B-47 was riding the jet stream, one of the MATS turboprop test planes (see page 82), a YC-121F Lockheed Super Constellation modified for propjet operations, flew from Long Beach, Calif., to Andrews AFB, Washington, D. C., in four hours and forty-three minutes. The test plane averaged close to 500 mph on the 2,400-mile flight. . . . The famed North American F-51 Mustang, last propeller-driven fighter in the USAF, made its final flight on January 27. The destination of the last F-51: the AF Central Museum, Wright-Patterson AFB, Ohio. The 470-mph Mustang was designed as an escort fighter for our heavy bombers in World War II and saw extensive action in both the ETO and the Pacific. It was called on again in Korea. Some of the 15,367 Mustangs produced during World War II are still in service with Air Guard and Air Force Reserve units.

■ **STAFF CHANGES . . .** Maj. Gen. Frederic E. Glantzberg, presently assigned to Hq., USAF, is now chairman of the Ad Hoc Committee for Single Manager, Airlift Service. . . . Brig. Gen. Dolf E. Muehleisen, J-3 Alaskan Command, has been assigned to ADC as Assistant Chief of Staff. . . . Brig. Gen. John D. Howe, Deputy Commander, Sacramento Air Materiel Area, became Deputy Director of Maintenance Engineering, Hq., AMC, on March 1. . . . Brig. Gen. Lewis L. Mundell, Special Assistant to the Commander, Air Materiel Force, European Area, will become Commander of the Southern Air Materiel Area in April. . . . Brig. Gen. Edward B. Gallant, Deputy Chief, Army-AF Exchange Service, has been reassigned as Special Assistant to the Chief of the Exchange Service. . . . Brig. Gen. Charles A. Heim, Commander of the Southern Air Materiel Area, AMC, Europe, will return to the US for assignment as Commander of the Dayton AF Depot (Continued on page 19)



PRACTICE MAKES PERFECT—In 1957, as in 1776, one measure of effective defense is the true aim and steady skill of a nation's fighting men. To make American warriors proficient against complex modern weapons, Northrop Aircraft's subsidiary, Radioplane Company, produces targets like the rocket-powered RP-70 type, a light, low-cost drone, which simulates a high speed modern jet plane or missile at stratospheric altitudes. Like Northrop's new supersonic Air Force trainer airplane and Snark SM-62 intercontinental guided missile, the RP-70 is another example of the Northrop-Radioplane policy of "*security with solvency*" which applies advanced science and technology to deliver the maximum in national defense for the minimum in tax dollars.



NORTHROP

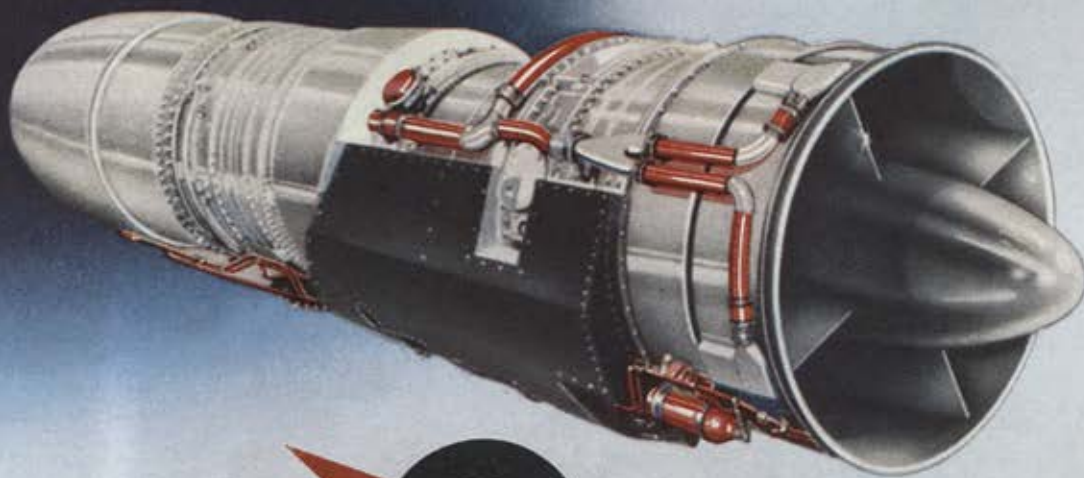
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Builders of the First Intercontinental Guided Missile



ORENDAS...

**IN OPERATIONAL SERVICE
ON FOUR CONTINENTS**



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design.*

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in May. . . Maj. Gen. Richard C. Lindsay, Director of Plans, DCS/Operations, Hq., USAF, has moved to the position of Assistant DCS/Operations. . . Maj. Gen. John B. Cary, Deputy Director of Plans, Hq., USAF, replaced General Lindsay as Director of Plans. . . The following generals retired effective January 31: Maj. Gen. John F. McBlain, Brig. Gen. Darr H. Alkire, Brig. Gen. James W. Andrew, Brig. Gen. John C. Crosthwaite, Brig. Gen. Oscar F. Carlson, Maj. Gen. John H. McCormick, Lt. Gen. Roger M. Ramey, Maj. Gen. James W. Spry, and Maj. Gen. Wycliffe E. Steele. Brig. Gen. Tom W. Scott retired on February 2.

■ **HONORS AND AWARDS.** . . . Cartoonist Milton Caniff, close friend of both the Air Force and the Air Force Association, has been awarded a **USAF Exceptional Service Award**, for his "meritorious service to the AF" for more than twenty years through the adventures of his creations—"Terry and the Pirates," "Miss Lace" of "Male Call," and "Steve Canyon." After the award was made to Mr. Caniff by AF Secretary Donald Quarles, the cartoonist was honored by an AFA-sponsored reception. Mr. Caniff was the recipient of AFA's Arts and Letters Trophy in 1953. . . Next month Grandview AFB, Mo., will be redesignated Richards-Gebaur AFB, in tribute to two Kansas City, Mo., flyers. They are Lt. John F. Richards II, first pilot from the area to die in combat in World War I, and Lt. Col. Arthur W. Gebaur, Jr., who was killed in action over North Korea in 1952. . . Two representatives of the Air Research and Development Command have been named Fellows of the Institute of the Aeronautical Sciences, the highest ranking membership given by the IAS. They are Maj. Gen. Albert Boyd, Deputy Commander for Weapons Systems, and Jean A. Roche, an ARDC Development Field Representative, currently serving at NACA's Langley, Va., facility.

■ In the charts below are the figures recommended in the report of the **Cordiner Committee** (see also "Shooting the Breeze," page 34), which represent a complete overhaul of the present military pay structure. The Cordiner Committee, named for the man who heads it—Ralph J. Cordiner, president of the General Electric Company—has



AFA founders get together at a birthday party given for them in January at New York's "21" Club. They are, from left, Brig. Gen. John Allard, Lt. Gen. James Doolittle's wartime chief of staff; Maj. Gen. Edward P. Curtis; General Doolittle; and their host, Lt. Col. Maxwell Kriendler.

been examining the military-pay system since last May. If the committee's proposals are adopted, the services will pay for skills and career incentive rather than time in service. This would end the time-honored longevity system and at the same time eliminate "inversions" (whereby some lower ranking officers, because of long service, receive more money than their superiors). In the case of airmen, the highest pay would go to those in the **highly trained—hence, most needed—skills**. Airmen in the "soft-core" jobs, however, would not be penalized because of a "savings clause" in the Cordiner proposals, which would protect present pay. If it were adopted, the Cordiner plan would make it impossible for airmen in the lowest two grades to earn more money without being promoted. For others there would be bigger jumps with most promotions, and "super pay" in the new E-8 and E-9 grades for the most highly trained top-graders.—END

Proposed Monthly Officer Pay

GRADE	GRADE ENTRY RATE			IN-GRADE PAY STEPS (including Active Duty Supplement)					
	BASIC PAY RATE	ACTIVE DUTY PAY SUPP. ML	TOTAL ENTRY RATE	STEP I OVER 1 YEAR	STEP II OVER 2 YEARS	STEP III OVER 3 YEARS	STEP IV OVER 4 YEARS	STEP V OVER 5 YEARS	STEP VI OVER 6 YEARS
O-10	\$1,700	\$300	\$2,000						
O-9	1,500	250	1,750						
O-8	1,300	200	1,500						
O-7	1,100	150	1,250						
O-6	850	100	950		\$1,005		\$1,065		
O-5	660	50	710		750		795		\$840
O-4	530		530		560		595		630
O-3	410		410	\$422	435	\$448	461	\$475	490
O-2	335		335	345	355	365	375		
O-1	222		222	244	268				
W-4	530		530		560		595		
W-3	462		462		484		506		
W-2	396		396		418		440		
W-1	350		350		373				

Features of new pay scales proposed under Cordiner plan would add two new enlisted grades, E-8 and E-9 (see below), and create new pay grades of 0-9 and 0-10 for three- and four-star generals, now paid as 0-8s.

Proposed Monthly Enlisted Pay

GRADE	BASIC ENTRY PAY	IN-GRADE PAY STEPS			
		OVER 2 YRS.	OVER 4 YRS.	OVER 6 YRS.	OVER 8 YRS.
E-9	\$400.00	\$410	\$420	\$430	\$440
E-8	350.00	360	370	380	
E-7	300.00	310	320	330	
E-6	250.00	260	270	280	
E-5	210.00	220	230		
E-4	140.00	180			
E-3	99.37	117			
E-2	85.80				
E-1	78.00				

What's New With RED AIRPOWER

Here's a summary of the latest available information on Soviet air intelligence. Because of the nature of this material, we are not able to disclose our sources, nor to document the information beyond the fact that the sources are trustworthy.

High-level NATO officers are saying (at least to some correspondents) that the reduction of Soviet armed forces has reached the Russian Long Range Flying Command, which operates the Bison and Badger bombers. This is said to be because the Soviets are placing more emphasis on guided missiles, including an intercontinental ballistic missile now under development.

Back in 1955, some weeks before the US announced its Project Vanguard, the Soviets announced plans to establish an earth satellite of their own. They set up a committee to handle the project. Since then they have written in their English-language press more and more about earth satellites, and this year they are saying flatly that Russia, too, will launch an earth satellite during the International Geophysical Year.

Such a launching would serve notice on the world that the Russians have much of the technology perfected for an ICBM. At the same time, it would bring immense credit to the USSR, especially if the Russian satellite got up into the skies before we were able to get Project Vanguard off the ground.

Russia's Chief Marshal of Aviation, Pavel Zhigarev, authored a brochure in May 1955, titled "Thoughts on Air Strategy," in which he placed much emphasis on the development of long-range guided missiles. He is known to be an advocate of guided missiles, even though the development of such weapons is largely in the hands of the Army in Russia.

China and Russia have gotten together on defense of the East China coast. A Russian general is in charge of air defenses from Magadan, in Eastern Siberia, to the south along the China coast to Indo-China. Radar stations are being increased; more and more fighter bases are being built.

The Ministry of Defense, USSR, may be deluged with subscription requests for a new newspaper it began publishing on December 1, 1956. Called *Sovetskaya Aviatsiya*, it has to do with the Soviet Air Forces. While not the first time this branch of the unified Soviet military services has had its own newspaper, it nonetheless is a departure from the practice of recent years. It perhaps marks the growing importance of airpower in the Soviet Union.

The Czechoslovak state aircraft works (CRS) near Prague has for some time been producing the Soviet-designed MIG-15 (NATO code-named Fagot), under the Czech designations: CS-102 and S-103.

Some of these aircraft have been exported to Egypt. Insofar as is known, no MIG-17s are produced under license outside of the USSR. Even so, the MIG-17 was seen in Egypt during the French-British-Israeli invasion.

More recently, about twenty MIG-17s were unloaded from a Soviet freighter at Latakia, Syria.

Several hundred million East German deutsche marks will be spent in 1957-58 to enlarge, improve, and otherwise raise the level of performance of the state aircraft center at Dresden, East Germany. For this year, production has been planned for 142 twin-engine IL-14Ps, Russian-designed transports. According to Swedish sources, who are close to the East Germans, about a third of East Germany's IL-14P production is scheduled for export this year.

At the same time, the East Germans have been talking about a new turbojet engine they will have in production this year—7,700 pounds of static thrust. It was designed by East Germans at the engine development center, Pirna. Production of the new engine will get under way at the Daimler-Benz engine works at Genshagen near Berlin and now known as the "VEB Industriewerk Ludwigsfelde." The firm suffers from mismanagement, and since 1952 has failed to produce diesel engines for ships as per schedule, and has failed even more in its efforts to turn out a new motor scooter for the East Germans.

Red China has begun to produce MIG-15s under license. The first of these flew late in 1956. At the same time the Chinese have been trying to boost aluminum production. Their goal—20,000 tons per year—much of it consigned to the Red Chinese aircraft center at Mukden. Fuel also is a problem for the Red Chinese Air Force. Almost every drop of fuel for the 2,500 planes of the air force must be imported. Plans call for bolstering Red China's current petroleum production from 966,000 metric tons (1955) to more than two million tons by 1960.

The USSR secretly included in the present Five-Year Plan money for forty new airfields for use by jet airliners. That gives some idea of Russian large-jet activities for the future. It was not clear how many of the airfields might in fact be limited to Bison-Badger operations.

Because of the part played by the Hungarian Air Force in the recent uprisings in that country, there will be no more Hungarian-piloted military planes (see "Airpower in the News," *Air Force*, December '56). In fact, all Hungarian military forces are said to have been reduced to 25,000 by the Russians—and the Hungarian Air Force has been grounded.

The Soviet-designed MI-1 (NATO code-named Hare) helicopter (similar to the Sikorsky S-51) is now being built in Poland under license. Its Polish designation is SM-1. The aeronautical institute at Swidnik has a new twinjet helicopter on its design boards, or perhaps even further along. Its capacity has been estimated at twenty men.—END

You can't shrink the pilot
...so **Admiral** shrinks the controls



New transceiver control box reduced to one-fifth former size

The cockpit of a modern fighter plane is packed as tight as a filling in a hollow tooth. As more and more electronic equipment is added to the plane's complement, each new device must fight for space on and behind the instrument panel or console. Now Admiral, maker of the famed AN/ARC27 transceiver, has designed a control box that "moves over" to make room for other needed equipment.

Heart of the new control is an ingenious "mechanical memory" drum that selects any one of 20 preset frequencies with a single knob. Another knob controls three coaxial

switches designed by Admiral so the pilot can manually select any of the transceiver's 1750 frequencies. This single compact unit will be universally employed to replace any one of 15 currently used control box combinations. It occupies as little as one-fifth the space and also reduces weight up to 80%.

Here is another instance where Admiral initiated and perfected an important advance in the science of military electronics. Inquiries are invited regarding Admiral's capabilities and production capacity for electronic or electro-mechanical equipment.

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CORPORATION

Government Laboratories Division, Chicago 47

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ENGINEERS: The wide scope of work in progress at Admiral creates challenging opportunities in the field of your choice. Write Director of Engineering and Research, Admiral Corporation, Chicago 47, Illinois.



WASHINGTON, D. C.

Airpower Capital of the World

July 30—August 4, 1957

For one week—July 30 to August 4—Washington, our nation's capital, will be the airpower capital of the world. That is the week of the Air Force Association's 1957 National Convention and Airpower Panorama, climaxing the celebration of the Golden Anniversary of the United States Air Force. That is the week when more than 3,000 Air Force veterans, Reservists and active-duty personnel, mem-

bers of the aviation industry, government, and defense leaders and friends of airpower will attend the country's largest aviation meeting of the year. It will be an event of color and impact second only to the Presidential Inauguration. It is a must on your list of things to do in 1957.

AIR FORCE ASSOCIATION'S

National



Convention

CELEBRATING THE



Golden Anniversary of the USAF

Program Highlights . . .

RESERVE FORCES DAY—July 30

A seminar, reception, and awards dinner.

INDUSTRY DAY—July 31

Briefings, forums, and pioneers' luncheon.

GOLDEN ANNIVERSARY DAY—August 1

Memorial service, anniversary luncheon, and birthday party.

ANNIVERSARY BALLS—August 2

Four balls in four hotels, a reunion theme throughout.

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SEE PAGE 15 FOR HOTEL RESERVATIONS

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How **FLEXIBLE** can you get?

AIR Force Manual 1-2, entitled "Basic Air Force Doctrine," cites "flexibility as one of the unique traits possessed by air forces."

The Air Force is indeed fortunate to possess flexibility, not only for combat but for the annual battles of the budget. In fact, the question has become, "How flexible can you get?"

Here are some of the goals the Air Force has been asked to shoot at but never allowed to hit:

- Seventy groups (later "wings") by July 1, 1949.
- Ninety-five wings by July 1, 1952.
- One hundred and forty-three wings by July 1, 1954.

In the past, the Air Force knew how many wings it was building toward, but outside forces kept shifting the dates. Now the Air Force faces a new technique in the budget battle—that of combining no fixed force goal with no specific date of attainment. Now its very goal is unsteady—no fixed number of wings by no special date. This calls for super-flexibility, indeed.

At this point it might be well to go back to the previous Administration and see how it handled the situation.

Based on a cold and factual estimate of the military requirement by the Joint Chiefs of Staff, it was decided that the minimum Air Force goal should be 143 modern, combat-ready wings to be achieved by July 1, 1954.

This one was clobbered in the budget for Fiscal Year 1953. The Truman Administration was wedded to a "planes-and-butter" philosophy, and stretched out the target date by almost two years to hang onto the butter.

Came the budget for Fiscal Year 1954, with a new Administration and the "New Look." The 143-wing program was sluiced down the drain by a \$5 billion cut. The new Joint Chiefs were asked to take their new look at an old situation, and in the meantime the Air Force program temporarily called for 120 wings.

The Chiefs labored and came up with a new require-

ment. This was it—137 modern, combat-ready wings to be achieved by July 1, 1957. Air Force leaders hailed the steadiness of the new program. They had been assured that, for the first time in its young and independent life, the Air Force had a force goal it could live with and work toward over "the long haul."

But in reality it was "planes-and-butter" all over again. Succeeding budgets slashed away at airpower's vitals, and the butter-fingered approach to national security made it obvious that the 137-wing program had become still another dodo, plummeting its way into oblivion. As long ago as mid-1955 this magazine predicted that 137 wings could never be attained by July 1, 1957—at least not without resorting to the "paper-wing" façade for which General Vandenberg had been so scathingly excoriated back in 1953.

We have never been so right, nor so willing to be proven wrong.

Here is how General Twining cautiously phrased it before the House Armed Services Committee last month:

"In numbers of wings, the Air Force is reducing from 137 wings to 128 by the end of FY 1958. This is actually an over-all elimination of fourteen wings from the FY 1957 137-wing force you were briefed on last year. Four troop-carrier assault groups previously listed as support forces are becoming operational in 1957. These are included as part of the 128-wing force. One Matador missile wing is also counted in the 128-wing program."

Implicit in this statement is the fact that the FY 1958 program, advertised as a 128-wing program, is actually a 123-wing program.

Based on performance of the past dozen years, is there any real reason to maintain the fiction that this or any announced goal is being seriously sought? We think not. We'll stick to our original prediction of 110 wings, some-

(Continued on page 29)

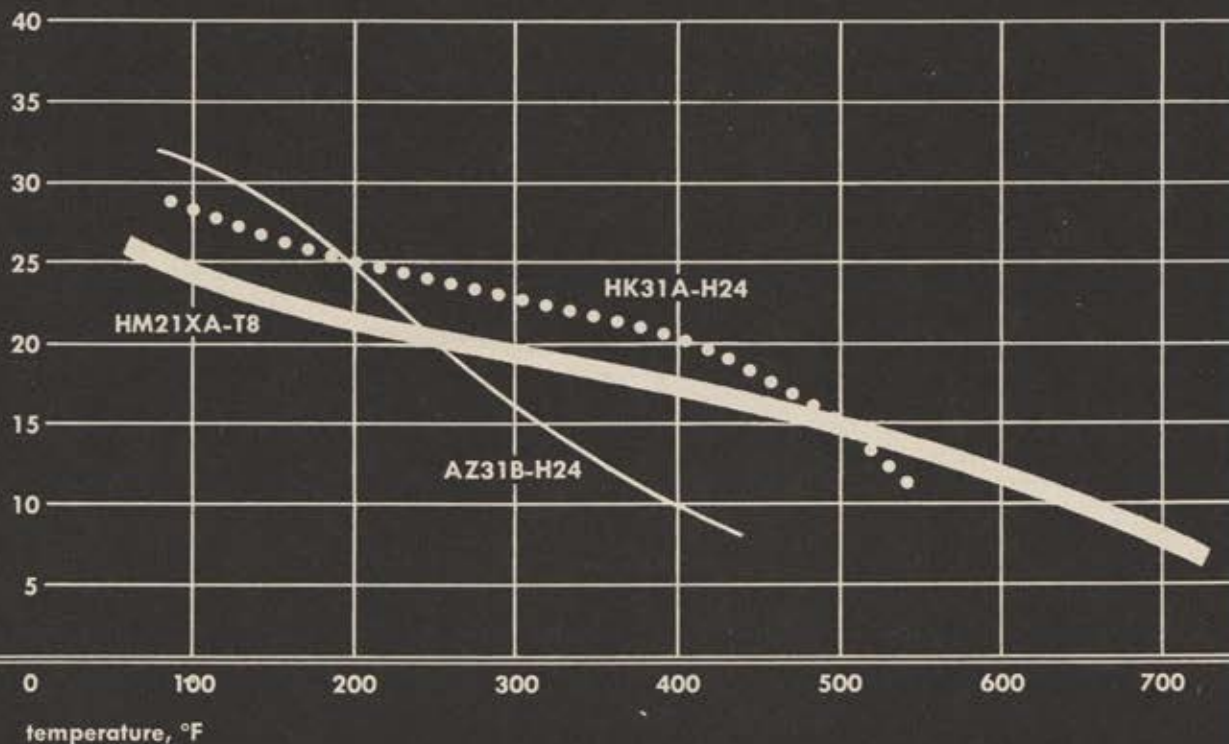
HOW THE **cuts** WERE MADE

MAY 1956	\$23.6 BILLION	Initial Air Force estimate based on military requirement.
NOVEMBER 1956	\$21.0 BILLION	Revised Air Force minimum estimate based on Department of Defense instructions.
DECEMBER 1956	\$19.0 BILLION	Department of Defense estimate.
JANUARY 1957	\$17.65 BILLION	Final budget figure as determined by Bureau of the Budget and the White House.

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time in 1960, as the best we can foresee at this juncture.

Thus the floating force goal has been coupled with a floating date of attainment, a situation made to order for the budgeteer since it makes it impossible for any yardstick to be laid against the rate of accomplishment.

This is flexibility with a vengeance—a rubber-band sort of flexibility which, we are sure, was quite far from the minds of the writers of AFM-1-2 when they listed "flexibility" as an attribute of air forces. As one waggish gentleman of our acquaintance put it, "The Air Force is so flexible, it can hardly stand up."

Now, if there is any part of one's anatomy in which hyper-flexibility can be a liability, it is the backbone. And the base system can be logically termed the backbone of the Air Force. Here we find an anomalous situation.

At the very time that over-crowded bases are inviting Soviet attack, and when money for new construction is lagging dangerously behind the operational requirement, we have learned that the Air Force is seriously considering closing between five and ten of its existing bases because it does not have the money to run them! Precisely which bases will be closed, we understand, the Air Force itself has been unable to decide. But we have heard disquieting rumors that they include installations in the South, the Southwest, and the Northern periphery of the country, and that both the Strategic Air Command and the Air Defense Command may be involved.

Far be it from us to argue that bases be kept open if they do not fit the operational requirement. We do not believe in paper bases any more than we believe in paper wings. The Air Force has an obligation, when it lacks all the money it needs, to spend what it has where it will do the most good.

We do believe, however, that even thinking about closing existing bases at a time when vulnerability is a vexing problem is an unhealthy indication of the fiscal vise which is strangling our airpower—and therefore our national security. Millions of dollars will inevitably go down the drain, with the many added side effects upon local economies, often in communities which went out of their way to make the Air Force welcome. At the very least the situation deserves the most careful scrutiny of the nation's lawmakers on Capitol Hill.

For the base situation is symptomatic of the Air Force's plight. A base may be closed for many reasons. Perhaps the maintenance and operations budget provides no funds to run it. Or the planes scheduled for it have been cut out of the program through lack of procurement money. Or the needed funds for operational facilities and runway modernization are lacking.

There are many ways to skin a cat—or to gut an Air Force. And years of experience are providing the airpower budget-cutters with many and varied devices.

One tried-and-true technique is the "vicious circle" approach. You cut back the base program. Then you cut back the aircraft procurement program because obviously it is foolhardy to provide planes for non-existent bases. Then, due to the reductions in programmed aircraft, you can lower the personnel ceiling. And, it would be ridiculous to expand the base program if you're not going to have the people to man them.

So it goes, like the legendary bird which flies in ever-decreasing circles until the inevitable anatomical catastrophe takes place.

The Air Force is fond of saying it "has never been turned back in battle." But it has been turned back in every fiscal fight since it became a separate service. And it stands to lose another one within the next four months.

The fiscal sharpshooters have produced an attrition rate which Air Defense Command can look on with envy. Over the past two years, their adding machines have shot 2,362 planes and 34,946 men right out of the Air Force—a casualty list longer than that produced by the entire Korean war. The planes were not destroyed in combat, nor can these men be truly called casualties. Yet they are lost to the Air Force forever, with the finality of battle losses.

We are on record as agreeing that there is no magic number of wings. But we believe there is some point at which the size of the force becomes a determining factor. Quality of forces is said to be the key, but this can be true only up to a point. Would a force of twenty wings, even of the highest possible quality, conceivably be enough to maintain the deterrent?

And, of course, the quality of the force is not keeping pace, either with our own technological capacity or the progress rate of the Soviets. The research and development program for Fiscal Year 1958 was described by Secretary Quarles during his first appearance before Congress this year. He said:

"In Fiscal Year 1957 we requested \$610 million for research and development, and the Congress appropriated \$710 million for that fiscal year. The additional \$100 million has been programmed for implementation of various priority technical projects to be accomplished during Fiscal Years 1957 and 1958. The \$661 million for Fiscal Year 1958 basically provides the same level of technical programming which has been established in prior fiscal years, with additional amounts required for the ballistic missile program and for normal increases in the operations and management program of this appropriation."

This talk of a "level effort" is an interesting contrast to the warnings voiced in sworn testimony before the Symington Subcommittee last year.

Generals Twining, Putt, and Irvine, all with a first-hand knowledge of where we stand, were unanimous in the view that Soviet development and production of new weapons are progressing at a faster rate than those of the United States, and if present plans and programs are not changed, the USSR will inevitably become top dog in this field. How a "level effort" can mend this fence remains a mystery.

There has been a lot of talk about keeping the force modern, more talk than action. Again a recent quote from General Twining is pertinent. He said that he would "feel more confident if this year's budget permitted more rapid modernization of the force." The Chief of Staff knows that his replacement and modernization rate is slowing down each year. Last year he hoped that the aircraft he couldn't buy would be made up in this year's budget. Instead, he will get 300 fewer. In fact, of the total aircraft to be procured from FY 1958 funds, the Army and Navy are to get fifty-three percent and the Air Force only forty-seven percent.

If we could really begin to dispense with manned aircraft, if missiles soon could effectively take over significant parts of the manned aircraft tasks, then such cuts might make some sense. But the missiles becoming operational during the next three years or so are not even thought of—except by the budgeteers, perhaps—as substitutes for manned aircraft. They are, for the most part, auxiliary weapons, designed to make manned aircraft more effective, not to take their place. Falcons, Sidewinders, and Rascals are all weapons that add to, rather than replace, the punch of piloted planes. Even Nike, with its fixed, short-range, point-defense capability, is a supplement to our air defense

(Continued on following page)

fighters, not a substitute for them. The long-range missiles are still years away. This is why the current cut in aircraft is significant. It means a decrease in the over-all strength of our force in being from 1958 through 1960-61, or until such time as new unmanned weapons have been thoroughly tested and can really be counted upon.

So we will not only have paper aircraft wings, which an Assistant Secretary of Defense has admitted we have today. We are adding to our show-window defenses a raft of paper missile wings as well.

Up to now, all the cutting has been done by the Executive Department. Now the bucks have been passed to Congress—all \$78 billion of them in the total national budget. And Congress not only has been challenged to cut still deeper, but it is being goaded by a well-planned campaign on the dangers of inflation.

At budget time, it is a too-popular pastime in the military to throw rocks at Congress. Congress ordinarily gets the blame for any deficiencies that show up in the final appropriations and precious little credit for the holes it plugs. The fact is that, while Congress has the constitutional power to provide for the common defense, it has no legal means to insure that its desires are carried out.

Take last year's budget. Congress voted \$900 million more for the Air Force than the Executive Department requested. Part of it (\$800 million) was to procure more aircraft. Another part (\$100 million) was to give the Air Force research and development program a badly needed shot in the arm.

How was it spent? Some \$200 million was not spent at all, and was used to justify a reduced request this year. The bulk of the balance was used to shore up the high-priority ballistic missile program, with approximately the specified amount going into added research and development. Net result—less money requested this year for both missiles and research and development. The "vicious circle" technique again.

Thus, once more executive control of expenditures has been used to subvert the traditional and constitutional Congressional power of the purse. A constitutional safeguard, inserted by the founding fathers to insure that no President could build a larger military establishment than Congress desired, has left a loophole which permits a President to build a smaller military establishment than Congress desires.

It will be interesting to see how Congress meets this challenge to its purse-power. To take one example, last month we devoted several pages to the findings and conclusions of the Symington Airpower Subcommittee. The report contains warning after warning as to the inadequacy of our airpower effort—now and in the future. It performed the legitimate legislative function of obtaining information on which to base new legislation. Under the present defense set-up, corrective legislation can only involve greater Air Force appropriations than the President has requested—if the findings of the subcommittee have any validity at all.

But, if Congress votes the extra money and the Executive Department refuses to spend it, then the 1,863 pages of sworn testimony taken by the subcommittee might well turn out to be an interesting semantical exercise, without so much as an added tip tank as a tangible result of its efforts.

Congress has already begun its review of the new budget. It has heard from Secretary Wilson, who did little except to bless his program, and review the economies achieved over the past four years. As to the adequacy of the new program he said:

"The revised budget requests of the three Military Departments which were presented for final review in early November represented the best estimates of the requirements of the individual Military Departments as they appraised their problems. Their presentations and budget analyses were the best that have been presented to me since I have been Secretary of Defense. Nevertheless, when we added up all the requests and the cost of the individual projects in all programs, it became clear that they could not all be financed under a reasonable total budget and some further reductions were necessary. We found we cannot afford to, nor do we need to push every program as rapidly as the individual advocates of each program would like to see done. Even our great and prosperous country cannot finance all the hopes and fears, dreams and ambitions of all the people engaged in our defense effort."

This is a politically appealing statement. But there is little consolation in the idea that our programs are getting better each year because our military people are learning to duck their heads under each new budget ceiling with greater agility.

General Twining has had little to say thus far. His prepared statement before the House Armed Services Committee set a record for brevity. But he raised some of the main issues. Without referring in detail to the Soviet threat, which he tallied up item-by-item last year, he said:

"A precise answer to the question of how we measure up is impossible to determine short of actual war. However, the evaluations we have made prove to me that we must continue to improve our defenses and to protect and disperse our retaliatory force to give us the capability to survive an attack with enough left to retaliate effectively. This is the indispensable quality of deterrence we must retain."

He summed up the problems posed in the new budget in this one sentence:

"I would naturally feel more confident if the resources available to the Air Force permitted more rapid modernization of aircraft and supporting equipment and a faster rate of improvement of our base and support system."

This was a polite way of saying:

Aircraft procurement has been whacked down by hundreds of planes.

Ground facilities and maintenance equipment is in short supply, is getting old, and is not being replaced.

The base system is not growing in comparison to the needs of the force.

The research and development program cannot promise the weapons needed to keep the force modern in the years to come.

Amidst all this gloom, there remains one shining ray of hope, that Congress will measure the airpower budget in terms of the knowledge the Symington Subcommittee so painstakingly compiled. In the course of so measuring, the inadequacy of the nation's effort must inevitably, if painfully, emerge into the light of day. Then, perhaps, the most important single conclusion of the Symington investigation may be fulfilled.

"If any conclusion should be singled out for special attention," said that report, "it might well be the importance of taking prompt steps to see that the American people are given more of the truth about the relative strength of the United States as against that of the Communists."

We don't think the budget now being considered can stand this kind of inspection.

Certainly, if the American people are asked to underwrite the ante in this big poker game, the least they can expect is to be allowed a peek at their own hand.—END



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Ready for Air Force cadet-pilots... Cessna T-37's.



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SHOOTING THE BREEZE

WITH THE EDITORS OF AIR FORCE MAGAZINE



Don't Start Spending That Cordiner Money Yet . . .

The long-awaited report of the Cordiner Committee (Defense Advisory Committee on Professional and Technical Compensation) was probably the worst-kept secret in Washington at presstime. There had been no official release of the bulky mimeographed booklet which represented the committee's findings and recommendations. Nor could you say it had merely been leaked. Rather it had flooded the Pentagon pressroom.

Space and time do not permit a more detailed assessment of the report than appears on page 19, but we'll have more to say about it in coming issues. In general it marks a more sane approach to what General Twining called, in Congressional testimony, "the greatest problem we face in our effort to build a more effective force—retention of skilled and experienced personnel."

To build this retention, the Cordiner Committee recommends scrapping what it terms the "Methuselah" method

of steadily increasing pay on the basis of longevity, in favor of pay increases based on how much an individual actually contributes to his service, with special emphasis on extra pay for proficiency in the so-called "hard-core" of technical skills. The general idea is to reward a man to the degree that he becomes more useful and thus increase the retention rate in those fields where private industry beckons most invitingly.

As far as both officers and enlisted men are concerned, the big hikes are recommended for the higher ranks, as further incentive to make the service a career.

No one knows, at this writing, what kind of legislation the Department of Defense intends to propose as a result of the Cordiner findings. But a straw in the winds on Capitol Hill indicates that it would be unwise for airmen and officers to begin spending the extra pay they would stand to get should the reported recommendations become law. For the Cordiner Committee's proposals will cost money, initially, even though they might well result in long-range savings. And the Administration's attitude toward its present budget frowns on anything that costs more money, even though Defense Secretary Wilson has asked Congress to give "priority consideration" to "any legislation developed in the Cordiner study."

In an interesting exchange with Rep. Paul J. Kilday (D.-Tex.) before the House Committee on Armed Services, Secretary Quarles outlined the Administration's dilemma as follows:

Secretary Quarles: I can assure you that the [Cordiner] Committee's findings were very constructive and are being taken very seriously by the Department of Defense.

Mr. Kilday: Those proposals would cost about \$700 million, wouldn't they?

Secretary Quarles: The committee's findings, if fully implemented, would cost something of that kind, around \$700 million. Actually, at one time it was even a larger figure than that.

Mr. Kilday: And none of that is contained in the President's budget?

Secretary Quarles: That is correct, sir.

Mr. Kilday: There is not one dime in the President's budget to take care of whatever portion of the Cordiner Committee report is adopted?

Secretary Quarles: That is correct, sir. But I am afraid I might leave a wrong impression there. I don't mean to imply that legislation involving that level of expenditure is apt to be recommended. I think that the initial recommendations will probably run to a small fraction of that, maybe a third, or something of that kind.

Mr. Kilday: Now, the \$4 billion that was cut from the Air Force's budget request did not include any portion of the Cordiner Committee's recommendations?

Secretary Quarles: It did not, sir. We did not have any
(Continued on page 37)



Beauty combined with high style for travel comfort. That's how Piper Aircraft Corp. describes this view of their 1957 Piper Apache. The company tells us that Apache buyers have a choice of three standard three-tone color schemes—Pasadena rose, Cadillac red, or Key West blue, all combined with Daytona white and Dakota black—and that the plane's wings and fuselage top are painted white. But they never do mention the name of our March "Miss Breezecake." We wish they had, because we wanted to caution her about smoking while the airplane is on the ground.



To NATO from Canada

Camouflaged in official NATO colors and proudly flying the Canadian Ensign on their tails, the first Royal Canadian Air Force squadron of AVRO CF-100's to join NATO air defence in Western Europe, departs for its base in France.

This flight, the first of several scheduled to hop the North Atlantic this year, is Canada's response to a specific requirement of NATO for all-weather, night fighters.

It is one more of Canada's contributions to the defence of Western Europe, while continuing round-the-clock interception alert in the defence of North America.



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provision for Cordiner [recommendations] in our request.

Mr. Kilday: Of course, the thing I am wondering about [is] whether we are going to be holding out a forlorn hope to the personnel that we could increase the President's budget anywhere approaching three-quarters of a billion dollars in order to take care of the recommendations of the Cordiner Committee.

Secretary Quarles: I can only give you my personal view of that, since it is a matter that isn't finally determined. It runs along this line, that the Cordiner Committee contemplates a more efficient operation of the military establishment by the retention of skilled personnel, and therefore it looks forward to the time when it will be economical or will have been economical to spend this kind of money.

I don't see any latitude in the Air Force budget as it stands to cover such expenditures, but I can well imagine that in the years immediately ahead, say two or three years from now, we could operate more economically with the Cordiner Committee provisions than we can today, and therefore in that period of time it would be an over-all economy.

Mr. Kilday: The point I am getting at is this, with so many complaints about the size of the present budget, we have to bear in mind that whatever portion of the Cordiner Committee report is accepted and placed into effect means a net increase over the present budget.

Secretary Quarles: As far as I can see, that is true, sir.

Mr. Kilday: I don't know how much of that we can do, and I hope that personnel aren't already spending what they hope to get under the Cordiner Committee report, because it is going to be an awful job to get any of it.

Need we say more?



On February 1, John O. Gray, an Air Force Reserve colonel, became a member of the National Headquarters staff of the Air Force Association. Gray's immediate duties will be Director of Projects, Golden Anniversary Celebration of the Air Force. He has just finished a four-year tour of active duty as Reserve Forces Liaison officer with the AF Office of Information Services. He served with the Eighth Air Force during World War II and with the Directorate of Industrial Resources, Hq., USAF, during Korea. He is a graduate of the University of Idaho and, between his periods of active duty, was in the field of merchandising and an active Reservist in his hometown of Spokane, Wash.



Some background material on the author of "The Deterrent," starting on page 65, reached us from London too late to be included with the article, which as we noted appeared originally in *The Hawk*, the Journal of the RAF Staff Colleges. It was written during Squadron Leader Crosbie's tour at the college at Bracknell last year. Born in 1923, Crosbie earned an M.A. degree from Oxford University. He joined the RAF in 1942 and served in Bomber Command in 1944-45. From 1946-49 he was with a Rhodesian Air Training Group, and in 1950 flew Avro Lincolns in operations in Malaya. He became a flight commander in 1951 in squadrons flying B-29s and Canberras, and in 1955 was given air staff duty at Bomber Command headquarters. After his year at Bracknell, he was assigned to his present post in Operational Requirements at the Air Ministry, in London.



George Bunker, left, the Martin Company's president, with Joanne Alford, AFA's "Miss Airpower," reads letter from AFA President John P. Henebry, delivered by AFA Program Director Ralph Whitener, right. The letter, written on behalf of AFA's Board, cited Miss Alford and the Martin Company for her efforts in telling high school students across the country about the national shortage of scientists and engineers. Since November Miss Alford, now touring Southern states, has spoken to 36,000 students.

We are happy to note that one of our authors, Lt. Col. Kenneth E. Kay (see *Air Force*, March '56, "Never Underestimate Your Crew Chief," and August '56, "How the AF Learns from Business"), has won the fifth annual Air Force short story contest and its top cash award of \$300. Colonel Kay is now batting .400 in the fiction league, since he also took first honors two years ago. His duty station is the 1141st Special Activities Squadron, which is located in Paris, France.

Second prize of \$200 went to Lt. Boris A. Fine, of Air Defense Command, stationed at Hamilton AFB, Calif., and third prize of \$100 was won by Capt. Clifton L. Dance, a medical officer who is now on duty at Wiesbaden, Germany.



Among the better jobs of telling the airpower story, we'd like to single out the series of interviews with top airpower figures conceived and produced by Clive Davis, McClatchey Broadcasting Co., Sacramento, Calif., (see "AFA News," page 102), and the half-hour show "The Iron Umbrella," an air defense program put together by Bruce Cox of Cincinnati's WLW.—END





How to cool a pilot in the Thermal



*The Douglas X-3,
used in heat
dispersion studies.*

With aircraft that top 1000 mph now in military service, the problem of *heat dispersion* gets growing attention from Douglas engineers.

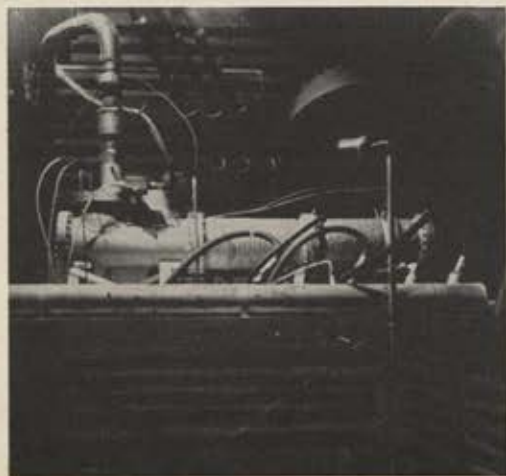
Once called the heat barrier, science now uses a more accurate term, *thermal thicket*. The faster you fly through the earth's atmospheric blanket, the further into the thicket you get . . .

At Mach 2, twice the speed of sound, a plane's skin temperature can reach 275°F. At Mach 3 it leaps to 650°F, and at Mach 5 hardened steel wilts like lettuce . . .

Douglas is attacking this heat problem on many fronts. Air conditioners powerful enough to cool a theater were tested in the famous X-3 research plane seen at left. In current Douglas missiles, amazing advancements are being made in the design of heat-resisting materials and structures. This knowledge will speed the solution of the thermal thicket problem for piloted aircraft.



Thicket



The Douglas Aero-rotor, an instrument that blasts out high velocity gas at temperatures upward of 3000 degrees Fahrenheit, helps in research for materials to withstand high temperatures and jet velocity erosion. Other work now on the boards at Douglas ranges from designs for the practical application of atomic power to the complete design and building of inter-continental missiles — and even includes the engineering for a space platform first considered as early as 1946.

Depend on
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The Heli-Rotor Compressor

Surge-free • Efficient • No Containment Problems

Now available for aircraft applications is a new type of rotary-positive displacement compressor offering these advantages:

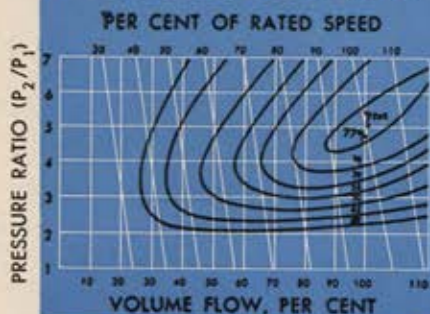
- High specific delivery at high speed—up to 42000 rpm. Capacities 25 scfm to 25,000 scfm.
- High pressure ratios in single stage (up to 10:1) from small compact units.
- Surge-free operation with compression ratios independent of speed.
- High efficiencies resulting from built in pressure ratios.
- Suitable for high temperature operation—suitable for air, freon and other gases.
- Simple construction—simple control systems.

Heli-Rotor compressors are adaptable to a variety of drives: hermetically sealed electric, turbine, hydraulic or direct from an engine. The design of the Heli-Rotor compressor assures unusually long and trouble-free service life. Individual compressors have operated without stopping for as long as 3 years.

In these units, two helical lobe rotors trap the entering gas, compress it and deliver it to an exit port at design pressure. Two-stage machines with a 24 to 1 compression ratio have been designed. The patented design of the rotors is already proved in a variety of aircraft installations.

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... WHERE THE FUTURE IS MEASURED IN LIGHT-YEARS!



The Last Flight of the X-2

By Clay Blair, Jr.

In the last few years a new breed of airplane has been built. It is called the X series—X for Experimental. These are powerful rocket planes, each icebox white, small, and more powerful than any engine man has ever built. They are rapier-nosed guided missiles, guided by men who are a new breed of pilots. These pilots have flown the X planes through the sound barrier, and to the very threshold of space. Probing the unknown, their missions are dangerous. Occasionally, when they break records, they make headlines. This is the story behind a headline one test pilot made in an X plane last autumn. It was the last flight for both.

AT five-thirty on the morning of September 27, 1956, the alarm clock jangled harshly on the bedside table of Capt. Milburn Grant Apt, thirty-two, a senior test pilot at Edwards Air Force Base, Calif. Apt shook himself awake and dressed hurriedly. He had good reason: this day was the high point of his flying career. After many long months of anxious waiting,

pleading, and prayerful hope, he had at last been detailed to fly the most advanced airplane in the Free World: the Bell X-2 rocket ship. This remarkable craft had already brought great fame to two other Edwards test pilots: Lt. Col. Frank "Pete" Everest, who established a world's speed record of 1,900 mph, and Capt. Iven Kinche-
(Continued on following page)



loe, who had stood the X-2 practically on end, and blazed his way to 126,000 feet altitude—to the edge of space.

In less than four hours, balding Mel Apt would exceed Everest's speed record by more than 200 miles an hour, and a few seconds later he would be dead.

Apt hastily downed a breakfast which had been prepared by his wife, Faye. The two children, Christine Lorrie, five, and Sharman Jean, two, were still asleep when Apt, buttoning his jacket against the cold desert wind, climbed into his splotchy-painted model-A Ford, and jounced down the blacktop road toward the flight line. The dim headlights of the Ford flicked across the sagebrush and joshua trees. There is no record of what he thought about during this period. However, Kincheloe and Everest, the only other men who have flown the X-2, say the worst part of the flight is not actually in the air, but on the ground just before, and during the ride up in the mother ship. "Your stomach grows hard. You are not at ease," says Kincheloe, in the masterful understatement of the test pilot.

Stocky, dark-eyed Mel Apt was a man who spoke quietly, but positively, and liked to spend much of his off-hours time with his family. A do-it-yourselfer, he had paneled the den, put in a patio, and nursed along a striking flower garden. "He made the best martinis around here," says a test pilot. "Used to make a gallon at a time and put them in the freezer." But Apt's primary interest in life was flying, and according to the other flyers at Edwards, he was a superb pilot. In seven years of testing new jet airplanes (his pay was \$800 a month), he had built up 3,505 hours in the air and had flown all the new, tricky Century Series fighters—the F-100, the F-101, the F-102, and the Mach Two F-104. He was project officer for the F-105, Republic's still-classified supersonic fighter-bomber. Apt, they say, was also a very courageous man. On one flight he brought the F-105, worth millions, back to base with an engine fire, the most hazardous situation possible in a jet. "He hated to lose the airplane. And, as a result of getting it back, the plane was extensively redesigned," an Edwards test pilot says. "All of the manufacturers used to ask for 'the guy with the bald

Shortly before his death, Capt. Milburn G. Apt kneels beside the Bell X-2, the plane which took his life the first time he flew it last fall.



Capt. Iven C. Kincheloe, who became a jet ace in Korea, went on to pilot the X-2 to a record of 126,000 feet.



Maj. Charles E. Yeager, who was the first man to fly faster than sound (in the X-1), pioneered with the X-1A.

head." The story of how Apt pulled a fellow pilot, Capt. Richard J. Harer, from a burning Lockheed F-94C after Harer had crash-landed in the desert is recalled with awe, even in a place like Edwards where heroism and bravery are everyday things. Apt had smashed the cockpit canopy of the burning plane with a five-gallon POL can. He was awarded the Soldier's Medal for saving Harer's life.

In February 1956 when the decision was made to transfer Pete Everest, the original X-2 pilot, to school, and to give other test pilots X-2 experience, Apt, along with Iven Kincheloe, was picked from the small band of test pilots in the fighter section at Ed-

wards. Apt was singled out not only because of his flying ability, his diminutive size, his demonstrated coolness, but also because he had an engineering degree from Kansas University. Such a degree is almost necessary in operating a ship like the X-2. The way the program was mapped out, Kincheloe was assigned to make the altitude attempts with the X-2. Apt would concentrate on speed, picking up where Pete Everest had left off. The purpose of these flights was not, as has been widely reported, so much to probe the "thermal thicket"—to study the effects of aerodynamic heating—but rather to establish the operating limits of the aircraft, so that scientists at NACA, to

whom the plane would soon be assigned, could carry out this mission with a wider margin of safety.

Arriving at flight operations, Apt parked his model-A and went directly to the locker room. There he met Kincheloe, who was scheduled to fly "low chase" on the X-2 in a North American F-86 Sabrejet, a job that Apt himself had done for Kincheloe and Everest on many occasions. Also on hand was Capt. James Carson, a test pilot who would fly "high chase," at 50,000 feet in a North American F-100. There were not many words exchanged. Kincheloe helped Apt into his skin-tight pressure suit, a device that would protect him in the event the cockpit pressurization in the X-2 failed. There was a joke about locking Apt away so that Kincheloe could make the flight instead. Then Kincheloe asked: "How do you feel, Mel?"

"Fine," Apt replied. "Ready to go."

In the wake of his first—and last—flight, the question of how ready to go Apt actually was has become a matter of considerable speculation. Of all the rocket planes built, the sweptwing X-2 was far and away the most difficult to fly, largely because of its higher performance. After it was hauled aloft by the mother plane and dropped from its belly like a bomb, it was a glider. ("The world's heaviest," says Everest). Then, once clear of its carrier, the power was kicked in. For approximately 140 seconds, while the rockets pushed it forward in a kind of controlled explosion which could be heard for twenty miles, it was a tiny thing of immense power and speed. On cloudy days, men on the ground have observed the X-2's supersonic shock wave with their naked eye. If the plane was climbed at too steep an angle, the rocket engine would die. If it nosed down too sharply after a drop, so much time and fuel would be lost in the recovery that the flights were often canceled.

There was an ever-present danger of the plane tumbling nose over tail out of control in the thin air, as Chuck Yeager and Arthur Murray had done in the rocket-powered X-1A—at 1,400 to 1,600 mph. This X-2 was subjected to a weird variety of aerodynamic phenomena such as control reversal in high-speed rolls, or loss of elevator control. Her instruments usually lagged far behind actual performance. Her rockets often stopped with a bone-jarring semi-explosion, or with a tail-fire.

Then, at the end of its powered run, the X-2 reverted to being a glider. (Continued on following page)



Lt. Col. Frank K. "Pete" Everest, chief of flight test operations at Edwards, stands with the stainless steel research plane he flew to a record 1,900 mph.



An earlier Bell test plane, the X-1A, piloted by Chuck Yeager, begins its record flight. He hit nearly 1,650 mph.

THE LAST FLIGHT OF THE X-2

Landing it dead-stick on the packed-sand desert was no cinch either; on his first three tries Everest plumped the plane down on its steel skids (conventional landing gear was left off to make more room for fuel), and due to a faulty nose-wheel, found himself spinning across the desert, on a hundred-mile-per-hour wild merry-go-round ride.

With planes of this type and size, there is no way to carry along another pilot to teach him the ropes. It is possible to drop a beginner from the mother plane and, without making the powered run, let him glide down to earth, as Everest did on his first few flights. However, long ago authorities at Edwards concluded this had no practical value, since it was manifestly the easiest part of the flight. The system employed today, which may be changed in light of Apt's experience, is to put the pilot in the plane and let him sink or fly. Apt's background instruction for flying the X-2 consisted of (1) flying "chase" behind the X-2, (2) riding in the mother plane, (3) sitting in the cockpit on the ground during static engine run-ups, handling the throttleable engines, (4) studying the plane and movies of previous flights, (5) talking with Everest and Kincheloe, and (6) operating the ground "simulator." The latter consists of a kind

of electronic brain, with a stick and oscilloscope. Through a complex electronic process, flight data can be pumped into the computer, and the pilot can "fly" the machine, watching a picture on the oscilloscope to see how well he does. But this machine does not—nor does anything else—give him the "feel" of the airplane. Even so, in the opinion of his superiors at Edwards, "few people had as much preparation and background for the flight." An Air Force officer adds: "The truth is that Mel Apt was probably over-trained."

At approximately 8:15, Apt walked out to the flight line, where the Boeing B-50 mother plane was waiting, the gleaming white X-2 snuggled up in her bomb-bay belly. He climbed up into the bubble-nose of the B-50 and the pilot, Capt. Fitzhugh Fulton, started his engines, the first step of 200 that would be carried out, and checked on a list, before the final drop of the X-2. At 8:30 the B-50 was airborne. Apt climbed back through the plane toward the bomb bay. There one of his assistants helped cinch up the pressure suit, and strapped on his parachute.

Meanwhile, technicians at control panels in the B-50 were keeping a close watch on the pulse of the X-2, while others finished filling her fuel tanks with highly volatile liquid oxy-

gen and alcohol. When the B-50 had reached an altitude of 7,000 feet, Apt was fitted with a glass-plated space helmet, then, following an item on the check list, grabbed two yellow bars and lowered himself into the cockpit of the X-2. A shoulder harness, a crotch strap, and a regular safety belt were tightened, then a heavy canopy, with special tinted glass to screen infra-red rays of the sun, which are intense at very high altitudes, was lowered and locked into place.

The cockpit of the X-2 was so small that both Apt's shoulders pressed against the sides of the fuselage. There was only an inch or two clearance above his helmet. Through the small canopy panels he could see the gleaming desert lake below. The instrument panel was a maze of gauges and switches, most of them designed to control the powerful rocket engines. Every minute from this point on Apt would be in relative danger. At least two X-model rocket planes had exploded while still in the bomb bay. The first was the original X-2. Bell test pilot Jean L. "Skip" Ziegler and a mother-ship crewman had been killed. Seemingly oblivious to this danger, Apt flicked his gloved hand across a row of switches, running through fifty-one items on the check list: Engine master switch OFF; Forward LOX tank pres-

surization switch PRESS; Fuel jet-tison switch OFF, etc., etc.

At 9:00 o'clock, when the B-50 had reached an altitude of 15,000 feet, Fulton radioed the "low chase" plane piloted by Kincheloe, and told him to take off. At 20,000 he called "high chase," piloted by Carson. The two jets zoomed skyward; Kincheloe taking position just to the right and behind the B-50; Carson went up to 50,000 feet. Tension was beginning to build up inside the B-50, as the men methodically ticked off the check list: open line drain switch; retract X-2 air scoops; check pump #1 switch to RUN position. By now, Apt had gone through an additional twenty items, including a test of the control surfaces, which Kincheloe, in the chase plane, observed and confirmed. They were reaching a critical point: if any of the sensitive machinery of the X-2 malfunctioned, the flight, in spite of days of preparation, would be canceled.

At approximately one hour after take-off, the B-50 reached drop altitude—30,000 feet. While the men in the B-50 continued down the check list, Fulton pushed over the nose of the bomber, to build up to 220 miles per hour airspeed so that the X-2 would

not stall on drop. On the ground, radar operators, radio operators, recorders, men manning special photo theodolite cameras, got ready. Apt may have felt alone—and apprehensive—in the X-2's cockpit, but he was not actually alone. All told there were no fewer than one thousand men at Edwards directly participating in the X-2 flight.

When all was set, Fulton reached down beside his seat and removed the safety pin on the "DROP" handle. Then he spoke into the open radio circuit, which was being monitored by Apt in the X-2, the chase planes, and the ground installations: "Ready to drop." It was now 9:30.

In the X-2, Apt intoned: "Five . . . four . . . three . . . two . . . one . . . DROP." Fulton pulled a handle beside his seat and Apt and the X-2 dropped from the dark shadow of the B-50 into the brilliant sunlight. Apt's stomach tingled as though in a rapidly descending elevator. The X-2 was now ready to begin its thirteenth powered flight.

The flight profile of the X-2 was so complex that it had to be worked out on an electronic computer. On most speed flights, after drop and engine light-off, the plane was directed on a course which resembled, roughly, the

trajectory of a howitzer shell—that is, a large arc. The flight plan was dictated by factors such as a constantly and rapidly diminishing weight during powered flight (the X-2 gulped more than a ton of fuel a minute), altitude, speed, and G forces which could be expected on the airplane. It was almost impossible to keep the X-2 on its planned flight pattern. In his eight powered flights in the X-2, Everest managed to come close only once—the last time when he achieved a speed of 1,900 miles per hour. It took Kincheloe four tries to reach his peak altitude of 126,000 feet.

In laying out Apt's first flight plan, his superiors, drawing on the experience of Everest and Kincheloe, concluded that he had "one chance in a thousand to fly a perfect flight pattern," and thus come anywhere near the dangerous speed levels which Everest had established. Before the flight, Apt's boss, Brig. Gen. J. S. Holtoner, had considered giving Apt a specific speed limit. But, General Holtoner says today, it was believed that it would be better if, on his first flight, Apt would not have to concentrate on the mach-meter. It was enough to watch the accelerometer (which measures G forces on the plane) and the controls. This is a decision General Holtoner now regrets. He says: "It was one of those chances we didn't allow for. I think that every supervisory guy from me on down has criticized himself because if we had told this boy to stop at a specific speed this wouldn't have happened." When Apt went aloft, his only orders consisted of vague instructions to "stay within the envelope of knowledge" of the X-2; that is, not to exceed any forces—particularly G forces—that the plane had not been subjected to previously.

Moreover, if unexpected trouble did develop in flight, theoretically, the X-2 had a means of escape with which no other rocket plane had been equipped. The X-2 was the first US plane to incorporate an "escape capsule." The whole forward portion of the fuselage, including the cockpit, was fixed so that it could be exploded away by the pilot in case he got into trouble. Once the capsule was free of the main body of the airplane, an arresting parachute would open automatically, slowing the capsule to 120-150 miles an hour. To get out safely, the pilot needed only eject the canopy, unbuckle his safety belt and harness, then climb over the side and bail out, using his regular parachute for the remaining descent to the ground. The escape capsule in the X-2 was designed, like the rest of the plane, ten years ago. (Pete Everest has been highly critical of it.) The

(Continued on following page)

CONTINUED



A top view shows off the clean lines and the swept wings of the Bell X-2.

THE LAST FLIGHT OF THE X-2



The X-2 began its test flights in August 1955. Here, in an early test, the X-2 is dropped from its B-50 "mother."

main disadvantage—presumably to be corrected in capsules on our forthcoming fighters—was that it was not completely automatic. Unlike newer capsules, which should be fully automatic, the X-2's depended in large part on the pilot's maintaining consciousness.

After Apt and the X-2 fell away from the B-50, a series of "miracles" began to occur.

First, Apt's drop attitude from the B-50 was "perfect." As he began to fall away, Kincheloe, following close behind in the chase plane, yelled over the radio: "Suck your nose up now, Mel. That's a boy. Keep coming back."

Second, his reaction time on the light-off was amazingly good. As Apt fired the lower, larger rocket, Kincheloe, referring to it by code, snapped: "Ten's going good." The impact had punched Apt in the back. Then Apt fired the second, smaller rocket chamber, and Kincheloe reported: "Five's going." Flames 100 feet long trailed the X-2.

Kincheloe rattled on: "Keep her coming back, Mel. Keep her coming back. You got her . . . come on back some more . . . you got her . . . you're in good shape . . . looking good."

Then as the X-2 zoomed skyward like a giant roman candle, leaving Kincheloe hopelessly behind, he radioed from the F-86 to Carson in the F-100: "He's starting to come now, high chase."

The third "miracle" was now taking place. Apt, on his first flight was actually staying precisely on the profile—the first time any X-2—or any other rocketed plane—pilot had done so. As he rocketed upwards, the radar called off points on the flight path: "One . . . Four . . . Five . . . Up . . . Up . . . Up . . ." The fact that Apt was sticking exactly on the profile meant that he was building up maximum speed faster than any of his predecessors. The machmeter spun dizzily: "2.2 . . . 2.5 . . . 2.8 . . . 3.0 . . ."

Apt, himself, had no sensation of speed. He was flying so fast that the noise of his rockets was left far behind him, and except for an occasional crackle in his radio earphones, an unearthly quiet pervaded the cockpit. The temperature outside the plane was minus sixty-seven degrees. The thin air pressure would make his blood boil were it not for cabin pressurization. When flying the X-2 the pilot must concentrate intensely on the in-

struments, particularly the accelerometer. There was no time to speak over the radio, or to look outside at the deep intense blue of the high sky.

Had Apt been a conservative pilot, he would have thought at this point that he was coming close to exceeding the "envelope of knowledge." He might have shut down the rockets. An Air Force colonel quotes Chuck Yeager as saying: "The temptation to keep her wide open is almost overwhelming." The temptation to beat Everest's record must also have been overwhelming for Apt kept the rockets wide open.

Then the fourth "miracle" occurred. The usually cranky and temperamental rocket engines had performed perfectly, burning six seconds longer than they ever had previously.

The machmeter in the X-2 moved ahead: 3.1 . . . 3.2 . . . 3.3 . . . 2,178 miles per hour—thirty-six miles per minute—at Apt's peak altitude of about 70,000 feet. He had broken Everest's old record by 278 miles per hour!

Apt came on the radio: "They're cutting in and out," meaning that the rocket engines were running out of fuel. Meantime, he was now arching downward, and the radar noted his

progress: "Ten . . . Eleven . . . Down . . . Down . . . Down . . ."

Now Apt was on the air again: "She's cut out . . . I'm turning." With his rocket engines now completely dead, he had started the long, gliding turn, which would head him back toward the great dry lake landing strip. The chase planes, which, as usual, had lost sight of the X-2, were searching wide-eyed. Jim Carson in the F-100 temporarily caught sight of the X-2, but then it flew into the sun and never came out.

Kincheloe, on low chase, was looking hard, too. It would be his job to steer Apt back to the lake. He came on the radio: "Mel, do you read me?"

A few seconds later, a voice that was obviously Apt's broke the radio silence with an unintelligible phrase, something like "Aaaawaaak," the sound a man might make who had been slugged unexpectedly in the belly.

Alarmed, Kincheloe came back on the radio instantly: "Mel. Mel, do you read? Radar, do you have him?" Then, in the confusion that followed, radar switched to the wrong airplane, and kept reporting Kincheloe's position. Men on the ground stared hard at the snake-like vapor trail which the X-2's rockets had spewed across the sky. But there was no trace of Apt or the X-2.

Twenty-eight minutes later, search aircraft found the X-2, smashed into the ground fifteen miles east of the main base. Both of its stainless steel wings had sheared off on impact. The tail surfaces were intact. The rudder was locked—as it should have been for normal speed runs. Five miles away lay the escape capsule, shrouded by the arresting parachute. When the ground parties reached the capsule they found Apt's body inside.

Movies, taken both inside the X-2 cockpit and from the ground, helped piece together the probable cause of the crash.

After his record-breaking rocket run, Apt, as he reported on the radio, had started his turn—six seconds after burnout. At that point he was still traveling at a high rate of speed. Because he had made a perfect profile run, and because the rockets had burned longer than previous X-2 runs, he now found himself farther away from the dry lake than any pilot before him, a fact which may have caused him to turn too soon. In any case, after he went into the turn, Apt lost control of the X-2. It pitched and rolled violently, and began falling across the sky, subjecting Apt to unimaginable G forces.



With a rocket engine that was able to develop almost as much power as a Navy cruiser, the Bell X-2 flies over the AF's test center at Edwards AFB, Calif.

In a matter of seconds, the X-2 fell from 70,000 to 45,000 feet. During this fall, the plane's speed was reduced considerably, and in spite of the tremendous forces working against him, Apt was able to unlock a safety switch, then reach down between his legs and pull a handle. This set off a charge which blew the capsule away from the main body of the X-2. As the old-fashioned capsule tumbled through the sky, Apt once more was subjected to a severe beating. The camera inside the cockpit, which up to this minute had recorded his every move, was separated from its power source, and stopped running.

Cameras on the ground saw the automatic arresting parachute on the capsule unfurled. The jolting, opening shock once more bashed Apt around in the cockpit. He may have blacked out, momentarily losing consciousness. But somehow he regained enough

strength and presence of mind to begin the bail-out procedures. He pulled the handle which ejected the canopy. He unbuckled his seat belt. But before he could get out, the capsule slammed into the ground at a speed estimated at between 120 and 150 miles an hour. Apt was killed instantly.

The X-2 was not the first X-model lost. Mel Apt was the thirteenth test pilot to die at Edwards since 1950. But his death was not without meaning. Elaborate instrumentation which was recovered undamaged from the X-2 recorded every split second of the flight and every detail of the aerodynamic phenomena which caused his death. It will be used in widening the envelope of knowledge. Because of Apt and the X-2, future Air Force pilots flying hypersonic fighter planes in the defense of the nation will have a greater measure of confidence and safety.—END

ABOUT THE AUTHOR



Clay Blair, Jr., the Pentagon correspondent for Time and Life, wrote the article "The Man Who Put the Squeeze on Aircraft Design" for our January '56 issue. Earlier we ran part of his book *Beyond Courage* (June '55 AIR FORCE). Mr. Blair's other books include *The Atomic Submarine* and *Admiral Rickover* and *The Hydrogen Bomb*, written with James R. Shepley. A native of Lexington, Va., Mr. Blair served in the Navy in WW II. He spent almost two years in submarines, including war patrols against the Japanese.

By John W. Crowley, Jr.
ASSOCIATE DIRECTOR FOR RESEARCH, NACA



An NACA scientist checks the stability of a research model in 300-mph wind tunnel at Langley Lab.

Why Research Costs So Much

EVERYONE is quite aware of the three-fold increase in the cost of just about everything. The nickel magazine, the nickel cigar, and the nickel subway ride today all cost fifteen cents, or more. While perhaps we don't understand why it must be that prices seemingly are on a perpetual escalator, and while we may grumble about the phenomenon, we accept it with varying degrees of grace as a way of life.

Because it is quite a specialized subject—and also because in this particular field the costs have risen at a much faster pace—many people have difficulty in understanding why aeronautical research and development have become “so expensive.” Actually, once you stop to realize all the factors involved, the basic reasons are quite simple. We are caught not only in the bind of rising costs; in aeronautics we have progressed into regions where everything is fantastically complex. Let's face it, we are just beginning to learn the facts of hyper-sonic life!

On top of all this, we are being forced to operate under conditions—as regards timing—where we are being threatened by world conquest by another nation. Sometimes the factors that make costs go up are beyond our control. Nonetheless, these same fac-

tors can affect survival by a profit-making manufacturer, or even survival by a freedom-loving nation.

When I first went to work for the National Advisory Committee for Aeronautics in 1921 (fresh out of the Massachusetts Institute of Technology) as a junior engineer at the Langley Memorial Aeronautical Laboratory, I was very proud to be joining the largest aeronautical research establishment in the United States (and, I believe, in all the world).

Employment at the NACA's Langley Laboratory in 1921 was near the hundred mark, give or take a half-dozen men. The annual operating budget was \$192,000, which included the expenses of the NACA headquarters staff in Washington.

About the time I arrived at Langley, a momentous decision was being made. The NACA was going to double the number of its wind tunnels—to two! What made this action even more important than the expansion itself was the fact that the new apparatus was to be a pressure tunnel, enabling the engineers to obtain aerodynamic data that approached full-scale values, even though only small models were used.

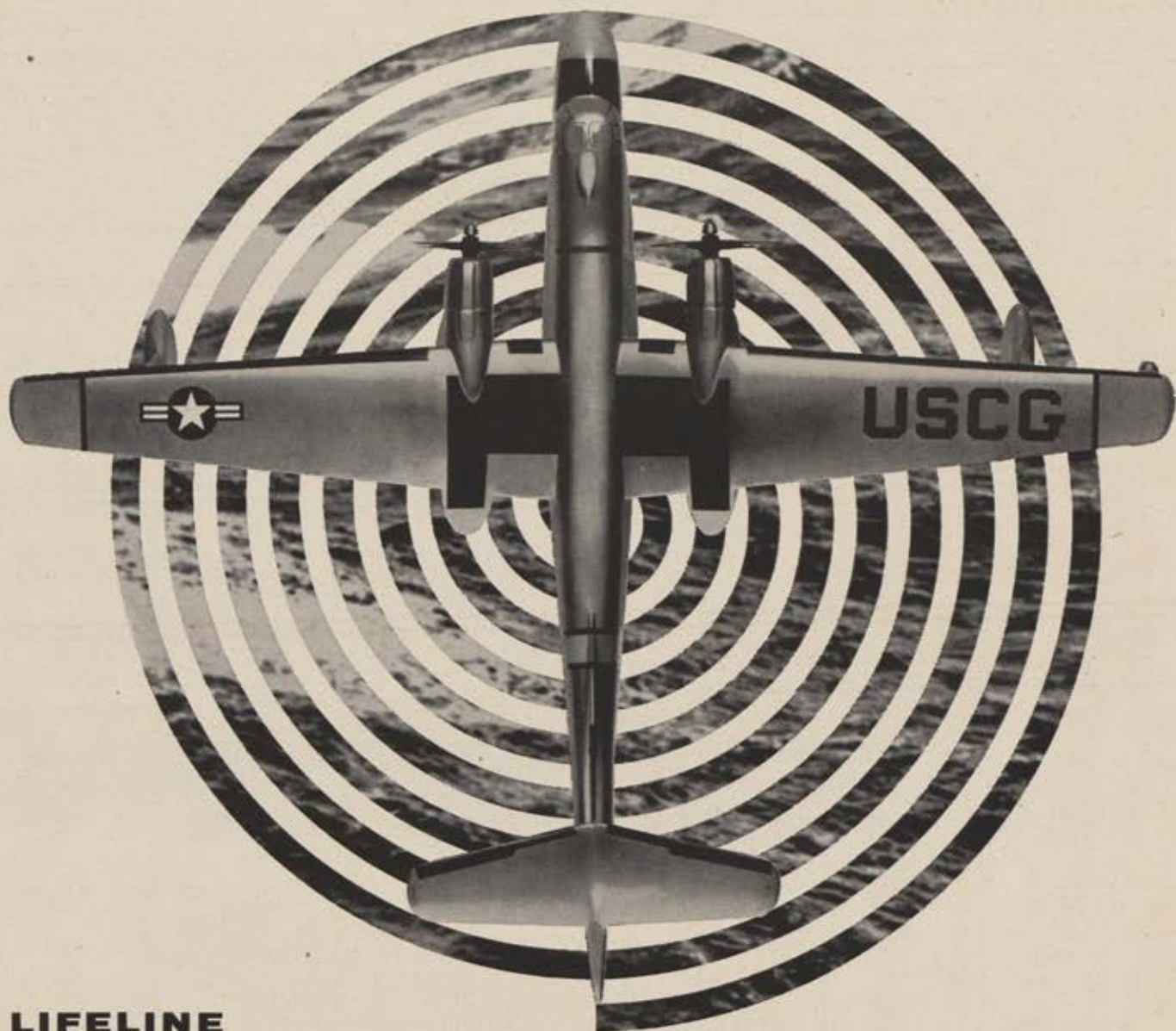
The cost of that new pressure wind tunnel—the first of its kind in the world—was about \$70,000. And its

cost of operation—electric power, salaries, models, data reduction, and all the rest, was \$31,300 a year.

Through the years, the NACA pioneered in the design and construction of radical new research tools that its engineers and scientists could use to increase the store of knowledge so necessary for further performance improvement in aeronautics. In 1927, for example, another new wind tunnel—the world's largest—was put into operation. It was so large (it had a circular test section twenty feet in diameter) that full-size propellers and wing sections could be tested. Within a year, research in the tunnel had shown how the speed of an airplane powered by an air-cooled engine could be increased by fifteen percent or more without use of additional power.

By the mid-thirties, the contributions of the NACA had been recognized internationally, to the point where in Great Britain it was conceded that “many of our most capable design staffs prefer to base their technical work upon the results of the American NACA.” And yet the NACA had not been greatly expanded, either in personnel or in operating cost. As of July 1, 1936, total employment was 385, and all operating expenses for

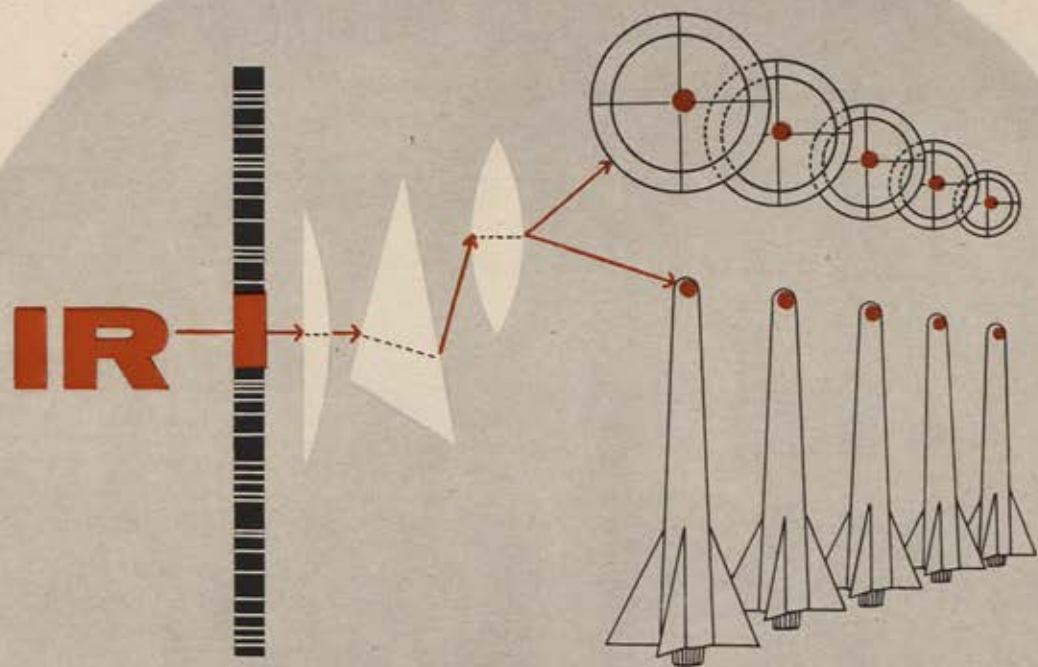
(Continued on page 51)



LIFELINE

... --- ... These are the "call letters" of the U. S. Coast Guard. Watching over more than half a million square miles of our coastal waters, the rescue record of this famous organization is one of the great air-sea sagas of war and peacetime service. Helping to extend the Coast Guard's far-flung lifeline is the Martin P5M and the new P5M-2G, providing long-range sea reconnaissance for any emergency. Also, in active service with both the Atlantic and Pacific fleets of the U. S. Navy, ten squadrons of this famous seaplane—specially armored for anti-submarine warfare—are in operation today, from Norfolk to the Mediterranean and from Washington to the Orient.

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AZUSA, CALIFORNIA
SACRAMENTO, CALIFORNIA



Here's what some of the research money buys—the supersonic wind tunnel at NACA's California facility, Ames Lab.

the preceding twelve months totaled \$766,530.

About that time, it became apparent that in Europe, to quote from a statement by Dr. Joseph S. Ames, then NACA chairman, "The greatly increased interest of the major powers in fostering aeronautical research and their determined efforts to excel in this rapidly expanding engineering science constitute a scientific challenge to America's present leadership." In this country, we increased our research activity, but the increases were modest in comparison with the enormous acceleration of effort overseas. Even as late as the summer of 1939, the NACA's total complement was only 523, including only 278 technical people. Operating expenses of the NACA for the fiscal year ending June 30, 1941, were \$2,800,000.

With our involvement in World War II, NACA costs skyrocketed. For the fiscal year ending June 30, 1945, operating costs were \$26,557,330—nine times the rate before Pearl Harbor—and employment jumped to 6,449. In these years, the emphasis of NACA research had been greatly changed, from investigations that were largely basic in nature, to *ad hoc*, or "quick fix" projects, designed to improve performance of existing aircraft or power plants.

Once the war was over we might have expected—indeed welcomed—an easing of the pace of aeronautical research. After all, the Germans and the Japanese had just been thoroughly vanquished. And surely our Allies would be as much delighted as we

with a return to a life in which the rich fruits of a peaceful existence could be enjoyed. Under such conditions the researcher could happily apply himself to the business of an orderly projection of further knowledge about the new and fascinating happenings in aviation—the development of jet and rocket power, the advent of supersonic flight.

Unfortunately, it didn't work out as we all had hoped.

We learned, the hard way, that the terrible costs of World War II did not assure a lasting peace, not even one as long as had resulted from the fighting of World War I. We learned that our one-time comrades, the Russians, had launched upon a determined drive for world conquest. More to the point of this discussion, we learned—in the skies over Korea and elsewhere—that the Russians were challenging our position of aerial supremacy, and that they were being very logical in their approach. If they were behind—and they were—well, then they would do whatever was necessary to catch up. Especially, they would work harder at the job than we.

Dr. Clifford C. Furnas, just now returned to the University of Buffalo after service as Assistant Secretary of Defense (Research and Development), has also served as a member of the NACA. Recently, he pointed out that today it requires \$1.43 to buy what \$1 would have bought in the way of research and development in the period from 1947 to 1949. His figures don't take into account any change in complexity of the problems faced—

what he is saying is that the R&D dollar of 1957—applied to the same job—is worth only fifty-seven cents, compared to that of 1947-49. When the Red Queen in *Alice in Wonderland* said, "It takes all the running you can do, to keep in the same place," perhaps she had such a situation in mind.

Of course, of all the activities you could name, the one least deserving of being considered as "keeping in the same place," would be aeronautics. Not quite ten years ago, Capt. Charles E. Yeager, USAF, made history by flying supersonically for the first time. The best performance of the Bell X-1 was in the neighborhood of 1,000 mph. In 1953, it was officially announced that Chuck Yeager had flown the X-1A at 1,650 mph. Last fall, the Bell X-2 went even faster (see "The Last Flight of the X-2," beginning on page 41). In passing, I cannot resist mentioning that in this research airplane program of pioneering, the NACA has been proudly teamed as a partner with the military services and the aircraft industry.

In 1946, the NACA completed a new wind tunnel at its Ames Aeronautical Laboratory in California. It had a test section measuring seven by ten feet, and its top speed was a little below that of sound at altitude (660 mph). It cost \$961,000 to build. A staff of forty—engineers and operating people, with salaries totaling \$126,000—ran the tunnel. The year's power cost was \$3,400.

Compare those figures with the
(Continued on following page)



NACA uses Lockheed U-2 in research program into gust-meteorological conditions at altitudes of up to 55,000 feet.

ones for the supersonic Unitary Wind Tunnel completed last year at the Ames Laboratory: construction, \$27,000,000; staff, 147; salaries, \$845,000; power cost, \$1,650,000. Excepting only the difference in speed and improved instrumentation, the research conducted in the new wind tunnel is the same sort as in the one built in 1946!

At our Lewis Flight Propulsion Laboratory in Cleveland, where we concentrate on power plant research, a facility built in 1946 to permit study of engines under operating conditions

cost \$276,000. It required eight men to do the work, with a yearly payroll of \$26,000. Power cost was \$10 an hour. Ten years later, a similar facility—differing only in the extent necessary to accommodate the more powerful turbojet engines under test—cost \$18,500,000 to build. Seventy-four men were needed to do the work, with a yearly payroll of \$426,000. Power cost was \$800 an hour.

As may be seen, the cost of performing necessary research in connection with man-carrying supersonic airplanes is becoming increasingly ex-

pensive when measured in dollars. But that is only part of the story. The possibility of delivering a ballistic missile halfway around the world in thirty minutes or less has implications that become the more frightening when it is realized that other nations are strenuously working on the enormous problems which such a project involves.

Here we face the exceedingly difficult task of devising ways to design and build the equipment by which we can duplicate in the laboratory the
(Continued on page 55)

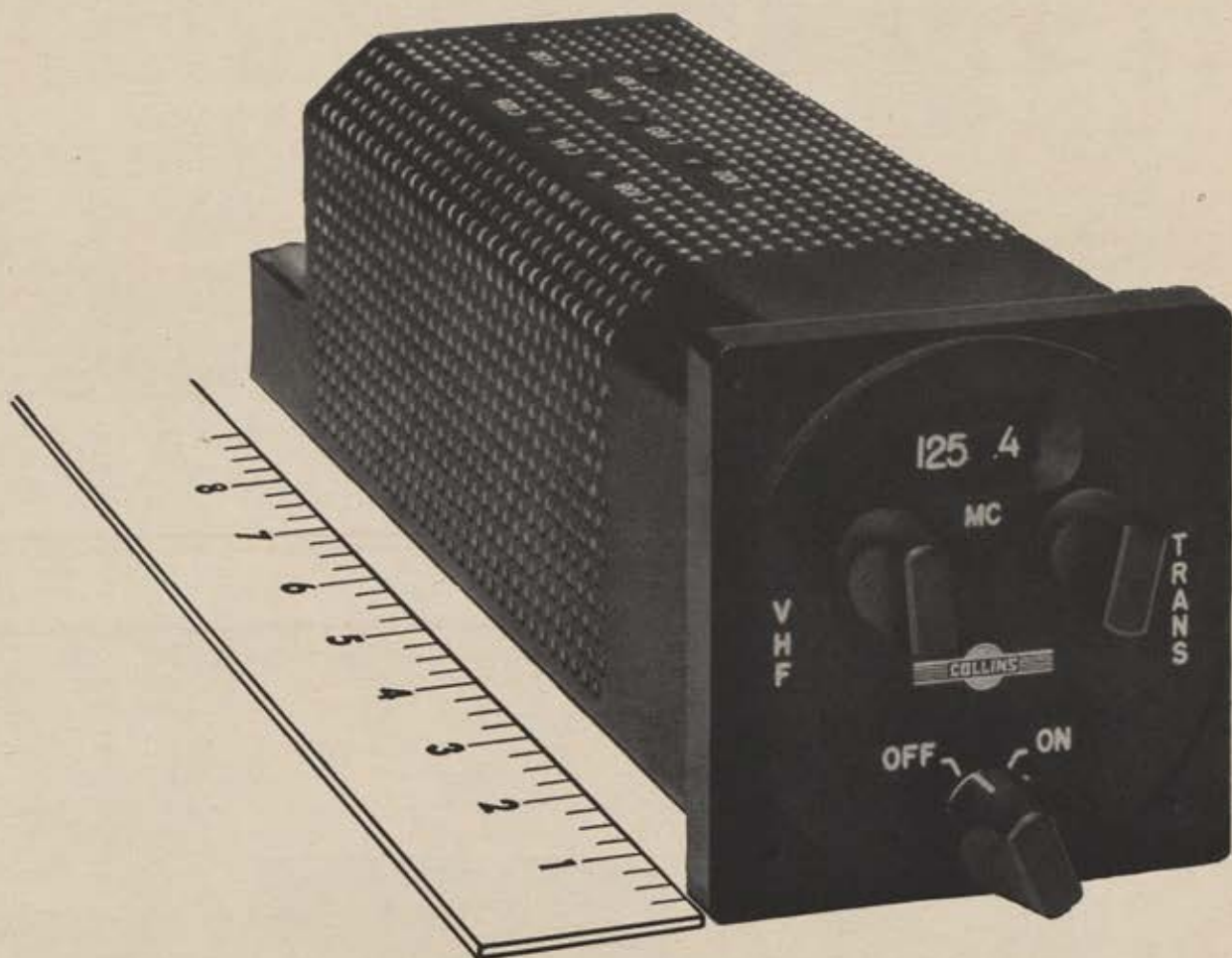


NACA technicians at Lewis Flight Propulsion Lab, Cleveland, check screened inlet of one of the wind tunnel compressors used when tunnel is operated at Mach 2.5 to 3.5.

One of the installations at the Langley Lab is a helicopter test tower. At right, small ram jets at blade tips of a rotor form a halo effect during a night operation.



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Collins new 17L-8 pint-sized transmitter will be wanted by anyone with an aircraft — airlines, business aircraft, or private plane. Provides excellent regular or standby transmitter services and Collins high reliability and extra service performance. 90 crystal controlled channels — 118 to 126.9 mc and 3 watts into a 52 ohm antenna. In a 3" instrument case slightly over 8" long. All controls front panel. Separate 427A-1 transistorized modulator-power supply is only 7"x4½"x3½" and mounts anywhere without shockmounts. Total weight 5 pounds. For DC only.

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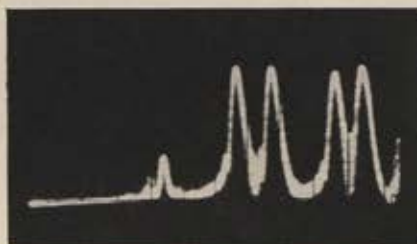
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Scope pattern taken from Hoffman CV-157 showing two dualtone teletype channels on upper sideband, carrier partially suppressed. Each sideband can carry 32 teletype channels at one time.



One AM voice channel (made by continuous vowel sound) on each sideband, carrier completely suppressed. CV-157 carries two 3KC voice channels on each sideband.



AM voice on lower sideband, dualtone teletype channel on upper. With suitable multiplexing equipment, the CV-157 handles 64 simultaneous dualtone teletype channels.

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Television monitor sets (near the ceiling) are used in closed-circuit hook-up in the control room of the Lewis Unitary Plan Wind Tunnel, Cleveland. The sets can be connected to any of the three TV cameras that survey the tunnel.



Guide vanes in transonic pressure tunnel at Langley Lab turn rushing air around a right angle smoothly.

extremely high temperatures and the other conditions of future flight. Even though great attention has been given this matter, only recently have ways been learned to design and build the small, pilot models with which to demonstrate the practicability of constructing the radical new tools so necessary for the rapid expansion of our knowledge.

A single example of the kind of equipment we must build will suffice. This year we are asking for funds to construct a hypersonic facility at the Langley Laboratory where we can study problems at all points along the speed and temperature scales up to Mach numbers of twenty (13,200 mph) and 11,000 degrees Fahrenheit. Such a complex of equipment, need I say, will not be inexpensive, nor will it be easy to construct.

So far, all the emphasis on the cost of research has been in terms of dollars. Respecting dollars, certainly any thinking person will concede there must be some limit to the expenditure of funds our nation can make. That, of course, is a statement equally applicable to any federal expenditure. I would quickly add that the cost of aeronautical research to date in the United States has been relatively modest, at least in comparison with our total income.

There are other aspects—other costs in terms of scientific manpower and in terms of time. In these areas, there may be grave doubt whether we are so favorably positioned as in the matter of dollar wealth.

Solving the problems of aeronautics today demands the effort of talented young men trained in many scientific

disciplines. There is a shortage of such talent. Our technical schools are graduating fewer young men each year than are needed, not only by aeronautics but by all the other facets of our economy, civilian and military. I am not proposing that we draft this manpower. However, I will observe that unless sufficient brainpower can be marshaled for attack upon the problems of aeronautics, they won't be solved as quickly as may be necessary, no matter how many additional billions of dollars we appropriate. I will observe, too, that in Russia, the number of technically trained young people being graduated from their schools is accelerating very rapidly.

In the justifications which the NACA prepares for its construction projects—these are presented for consideration by the Congress—total time for completion is carefully estimated in the case of each project. Here they are for Fiscal Year 1958, expressed in months: thirty-six, twenty-four, twenty-four, twenty-eight, thirty, forty-two, etc. Assume the money is appropriated and the manpower is available. Even so, anywhere from two to three and a half years will pass before

the new pieces of research equipment can be completed and put into operation.

Once in operation, more time will pass while the solutions are sought for the problems demanding urgent attention.

Yes, the business of aeronautical research must be considered expensive when measured in terms of dollars, manpower, and time.

If I thought it necessary, I could ask whether such expense of aeronautical research would loom so high if compared with the costs that would accrue if we tried to build our airplanes and missiles without first learning the answers that research provides. Too, I could ask how the expense of research would compare with the costs of every kind that would accrue if we didn't build our airpower—if we waited for a conquest-minded nation to accomplish the job.

Instead, I shall conclude by finishing the quotation from the Red Queen: "It takes all the running you can do, to keep in the same place. If you want to get somewhere else, you must run at least twice as fast as that."—END



ABOUT THE AUTHOR

Mr. Crowley has been Associate Director for Research at NACA headquarters since 1947. He graduated from M.I.T. in 1920 and became a junior engineer at NACA's Langley Aeronautical Lab the next year. In 1923 he became head of the Flight Research Section. In 1940 he was named chief of the Aerodynamics Division. In 1943 he became head of the Research Department, and from 1945-47 was Acting Director of Aeronautical Research at NACA's Washington office. He's a Fellow of the Institute of Aeronautical Sciences.

AIR-SUPPORTED FABRIC ANTENNA



In less than one hour, this small crew can assemble the revolutionary Paraballoon antenna from these few parts. They will place the tripod directly on the ground.

PROVIDES FRONT-LINE SUPPORT IN MINUTES

One hundred and twenty minutes after the site is selected, high-power radar using a new, extremely portable antenna can be scanning the skies. This revolutionary, lightweight antenna has been developed by Westinghouse Electronics Division for the Rome Air Development Center.

The Paraballoon® antenna is blown up like a balloon! It maintains its shape with only slightly more than atmospheric pressure. Two fiberglass paraboloids—one of which is coated with vaporized aluminum—are zipped together to form the 30-foot antenna. In comparison with equivalent conventional antennas, the Paraballoon has shown weight advantages as much as 10 to 1.

The antenna retains its accurate contour no matter how many times it is erected and dismantled, so no contour checking is required in the field.

Major General Stuart P. Wright, Commander of Rome Air Development Center states: "This outstanding development is a major break-through in the design of ground electronics equipment. The air-inflated Paraballoon antenna is the key to a large and truly mobile radar set. It is now possible to employ high-power radars in tactical situations and locations where time and transportability are of utmost importance."

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J-02300

YOU CAN BE SURE...IF IT'S

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Here, the crew has assembled the antenna tripod. With a block and tackle attached to the radome crown piece, they are positioning the antenna base.

The paraboloids are zipped to a two-ply neoprene-nylon tube. This tube forms a stiff arch—the main structural member of the balloon—which holds the inflated antenna in position.

The 30-foot antenna shown here, ready for operation, weighs only 1690 pounds complete with its base and tripod. It will rotate at 6 rpm driven by a ¼-hp motor.

HELPFUL HINTS for AIR FORCE LIVING

By Maj. Gen. H. K. Mooney

DEPUTY COMMANDER, FIFTEENTH AIR FORCE



ABOUT
THE
AUTHOR

Not long ago General Mooney published these "helpful hints" in memo form at his March AFB headquarters. The reaction was so favorable that he decided to put the material into article form for us. Here's the result. General Mooney has been in SAC since 1950, in his present assignment since July '55. Born in New Orleans in 1910, he's a 1931 graduate of West Point. He served in a number of tactical assignments and in 1944 took command of the 459th Bomb Group in Italy. He was graduated from the National War College in 1950.

THE staff officer had worn out his welcome by at least five minutes before he saluted and sailed out of my office. I couldn't help but recall the other incident that morning.

While driving to my office, I had noticed one of my staff officers walking sprucely down the sidewalk. I told my driver to stop, rolled down the sedan's window, and asked the officer if he would like a ride to headquarters.

He did. He opened the door, climbed in, and then profusely apologized for roughing me up in the process. After we were settled I got the impression that he felt I was rather rude because I didn't move over to the left side.

At the headquarters building he solved the problem by opening the left door and easing out while my driver was holding the door open for me on the right side. In a way I was grateful that I didn't have to wrestle him for the right to leave first.

Although it is the responsibility of all of us to make constructive corrections on the spot, occasionally the spots before our eyes start consuming too much of our time. I have therefore

found it beneficial to review periodically with all my officers a few of the "do's and don't's" of service life. Many of us unconsciously slip into bad habits or become lax in observing customs or regulations.

The officer who had just left my office was a good example. After introducing his subject verbally, he handed me a report to read. Then he continued with a running commentary, and I found my attention torn between trying to read and listen to his chatter at the same time. I had invited him to sit down, but apparently he was afraid I would miss a salient point. I had a hovering prompter.

At one point he was so diligent in being sure I understood that he leaned across my desk and pointed at an important paragraph in his report. The pencil he used as a rapier finally came to rest behind his ear. As I passed the report back to him with a comment, my eyes rested for a moment on a copy of the *Air Officer's Guide*.

Many things which an Air Force officer should or should not do are (Continued on page 61)



Turns "JET BLAST" INTO A WHISPER

You stand within a few feet of a blasting jet engine, but your hearing is protected from an ear-splitting roar that under ordinary circumstances would be intolerable and perhaps cause permanent hearing loss.

The reason is RCA's *Ear Protector*, a new and scientific approach to the problem of excessively loud noise. This device dampens out intense and penetrating sounds, permitting you to work comfortably in areas where-

in the noise levels might otherwise be prohibitive.

Made of plastic, the Ear Protector surrounds the ear without actually touching it. Contact with the head is by means of a soft, replaceable, liquid-filled cushion that provides a comfortable, self-adjusting seal. It may also be adapted for intercom use, and for any other application where noise can interfere with efficiency.



Light in weight, highly efficient, sanitary, simple and inexpensive, RCA's Ear Protector belongs wherever noise becomes a menace or a nuisance.



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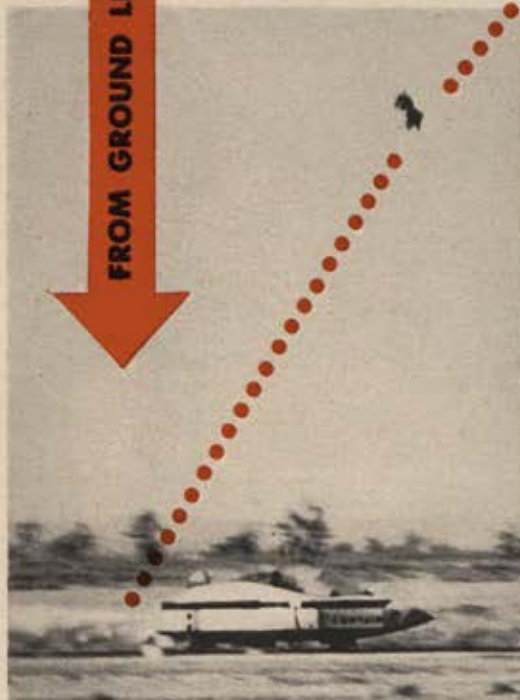
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EMERGENCY ESCAPES FOR HIGH PERFORMANCE A/C CREWS!

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In sled tests at .73 Mach, conducted at Edwards Air Force Base, the Talco Rocket Catapult* carried a man-seat mass to approximately 60 feet in a stabilized trajectory for a normal parachute deployment and landing. In other ground level tests at zero velocity the man-seat mass was ejected to a height of approximately 220 feet, again, with full parachute deployment and a normal landing.

The men who challenge nature's greatest forces in today's high performance aircraft will soon have emergency escape protection from ground level to aircraft performance ceiling. Ejection seats will be equipped with a Rocket-Catapult* recently developed and produced by Talco.

Sled tests have proven that this unique design of a canted rocket thrust in conjunction with catapult ejection can reduce deceleration to tolerable limits, increase clearance of tail assemblies, stabilize seat attitude and give complete "on the deck" escape capability. With only minor modifications, the new Rocket-Catapult* is effective for the full performance range of any high performance aircraft.

The Talco Rocket-Catapult*, having the same mounting provisions, can be readily installed in all aircraft equipped with conventional catapults. Variations of this basic, proprietary design are being completed for many advanced aircraft.

Talco experience in ballistic and cartridge actuated devices can provide new approaches to the solution of many problems, on the ground and in the air, with fast, sure action in milli-seconds from "Packaged Power" units.

After the catapult tubes separate, the rocket contained in the inner tube provides a continuing thrust through the center of gravity of the man-seat mass, providing forward thrust to counter air drag and upward thrust to insure aircraft clearance at high speeds and sufficient ejection height for a complete "on the deck" escape capability.



Engineers interested in this exciting new field are invited to contact us.



The **TALCO** Engineering Company

2685 State Street, Hamden, Conn.

Research, Development, Application Engineering and Manufacture for ballistic and cartridge-actuated devices.

*Patent Applied for

not specifically covered by regulations or the *Officer's Guide*. Many of the "do's and don't's" are picked up during cadet days or are passed on by word of mouth from older members of the service.

Others are based on common sense and good breeding. Although unwritten, they have become law by tradition. Their proper observance distinguishes a well disciplined leader from the undisciplined marginal officer.

To assist us in maintaining our high standards, I made a list of the most commonly overlooked "hints" and passed them on to the officers of the Fifteenth Air Force. Primarily for officers, most of them are equally applicable to non-commissioned officers and airmen. They have also proven interesting to new members of the Air Force, both military and dependents, who were unaware of their existence.

General Application

Leadership, discipline, human relations. There is nothing "human" about treatment received in the early stages of cadet or basic training days. Discipline must be taught first. Good human relationships can come later.



Do not substitute "buddy-buddy" human relations for discipline. Concentrate on human relations after you are sure that you have discipline.

NCO prestige. Do not call a non-commissioned officer by his last name. He is proud of the fact that he is a non-commissioned officer and wants to be called "Sergeant" Smith.

Deference. In automobiles, the senior sits on the right of the back seat. He is the last to enter and first to leave. If asked to join your senior who is already seated, enter the left door—do not crawl over his feet.

Walking in step. Men in uniform should walk in step, the junior on the left. Adjust your stride to your senior and he will meet you halfway.



Lead the way. When showing a senior or an inspector your activity, lead the way. He doesn't know which way to go and might turn into a dirty closet, which you didn't want him to see.

Punctuality. You know what will happen to you if you are late for an appointment. Be sure that when you call a meeting you do not waste the valuable time of your subordinates by making them wait for you.

Nicknames. When referring to a subordinate in front of a senior, call him by his rank and last name. Your senior may not know who "good old Joe" is.

Guessing games. The best answer to "I bet you don't remember me," is to say "NO" and turn your back. When meeting someone you have not seen for a while, always give your name and rank and where you knew him before. Guessing games accomplish nothing except to deflate the ego of a thoughtless big shot, or embarrass and lose a friend.

Gum chewing. This shouldn't even require comment but unfortunately it does. It is more fitting for a goat than a commissioned officer in the Air Force to chew while in formation, in uniform in public places, or in your boss's presence.

Lounging in uniform on the street. Either walk, stand, or sit. Don't drape around a handy post, pole, waste can, or hydrant.

Phone dangling. If your senior calls
(Continued on following page)



and asks for information which you don't have readily available, do not leave the phone to get it without first asking if you should. You might leave an infuriated senior dangling on the phone when he couldn't afford to wait for you to return.

Maintain that barrier. It is a compliment to you that your senior can relax in your presence during off-duty hours. The extent of the informality and relaxation should be governed by your senior—not you. Do not extend off-duty informality into the next official day, if you desire to continue enjoyable informal relations when you're off duty.

R. H. I. P. Do not resent privileges extended to your senior. Some day you will want the same. Remember, he has worked up from the bottom through your grade and has done without, just as you are doing now.

Wearing the Uniform

Sun glasses case strung on belt. It is all right for a Boy Scout to hang



accessories on his belt, but an Air Force officer should not.

Hats tilted. If your hat is uncomfortable, take it off and hold it in your hand. Do not tilt it on the back of your head like a taxi driver.

Loosened neckwear. Do not unbutton the top button of a shirt or loosen your tie while on duty. When you get hot under the collar, retire to a men's room to cool off.

Cuffs turned up. If it is hot enough to roll up your sleeves, a short-sleeved shirt is probably authorized. Wear it instead.

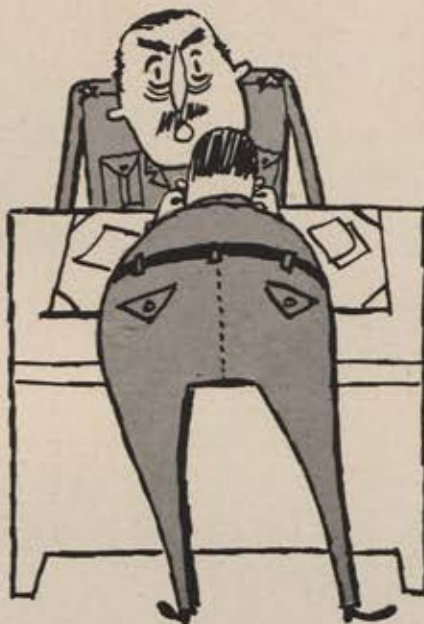
Blouse unbuttoned. It is acceptable to take off your blouse in the privacy of your office. If your senior enters, or when you leave your office, you should put on your blouse and button it up. The need to wear your blouse

unbuttoned normally indicates over-eating or over-heating.

Serving on a Staff

Pencils on ears. If you want to look like a clerk, rather than a commissioned officer in the Air Force, walk around with a pencil on your ear.

Leaning on desks. Do not lean on



your senior's desk. If you are tired, request permission to sit down.

Running commentary. After you have presented a paper to your senior to read, sit down and shut up. As good as he may be, he cannot read your paper intelligently if you continue to talk.

Briefing distractions. When using a pointer, point to that which you want your audience to see. Do not cover up the material with the pointer. Return the pointer to your side when not in use, and keep it still. Do not distract your audience by using it as a baton, golf club, or baseball bat.

Speaking distractions. While speaking formally or informally, do not distract your audience by jingling change in your pocket, twirling key chain or eyeglasses, maneuvering pipes, table finger-tapping, etc.

Odiferous odors. Do not enter your senior's office while smoking your favorite pipe, cigar, or cigarette. If your relationship is close and you know your senior does not object, it is permissible to smoke after you have been seated—otherwise refrain or ask permission.



Visits by your boss. You should be complimented when your boss takes time to visit your office. Assume that he has come for a specific purpose and that his time is limited. Ask if you can help him—do not immediately pour out your problems to him. If his time permits, when he is finished with his business he may ask if you have anything to bring up.

Wild bores. An excellent way to become unpopular is to hog the conversation and tell long pointless stories. A surer way is to take the time of other officers at an official gathering, such as a staff meeting, to try to solve your particular problem which is of no interest or concern to the rest of the group.

The three B's. Your senior's time is valuable and must be apportioned out to others whose problems are probably more important than yours. In presenting the problem, *BE Clear, BE Brief, BE Gone!*

There is no known substitute for consideration and courtesy, and this Biblical quotation is as valid today as it was when first written:

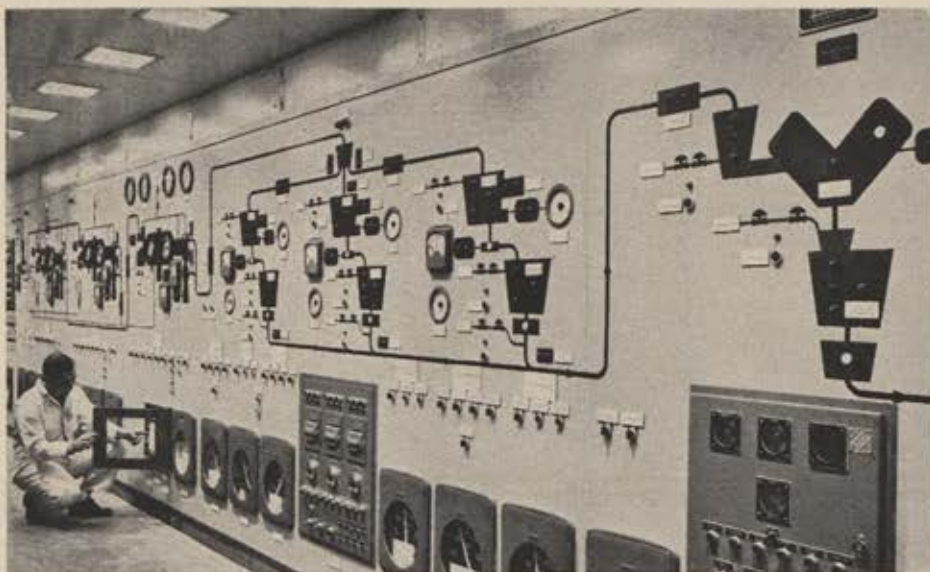
"Do unto others as you would have them do unto you."—END



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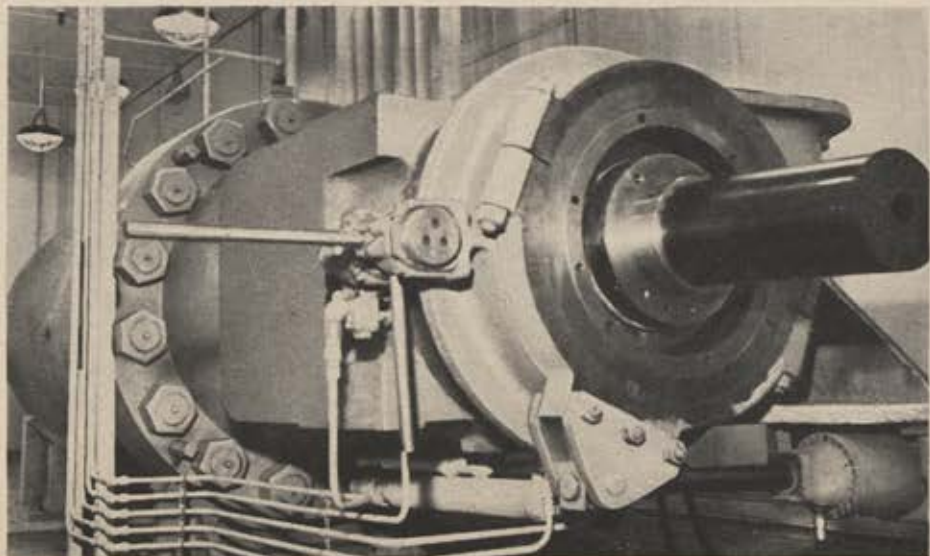


ABOVE ♦ Process and inspection controls, from mixing to final extrusion of Phillips solid propellants, maintain high standards of quality.



LEFT ♦ Readily available petrochemicals are combined to make new low cost propellants.

BELOW ♦ Giant extruders form solid propellants that are easily handled and can be stored for long periods.



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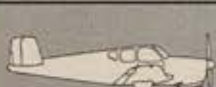
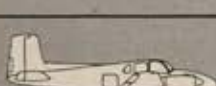
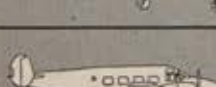
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The DETERRENT

Defense or Delusion?

By Squadron Leader Michael Crosbie, Royal Air Force

INDIVIDUALS and nations throughout history have sought for ways of obtaining "defense on the cheap." By the time of the Crusades it was appreciated that one armored horseman was the equal of many foot soldiers, and that the initial capital outlay was soon made good by reduced running costs. So also in the turbulent days of Stephen and Matilda peaceably minded barons found that the thick walls of a Norman keep were a more economical deterrent to aggression than a large standing army. In the nineteenth century Great Britain was able to maintain a widespread empire very cheaply; elements of her small regular army could be moved quickly to any outpost of empire which needed help, because the nations of Europe were too preoccupied with military rivalries to dispute Britain's mastery of the seas.

Today defense is no longer such a simple matter; thick walls and a moat are no longer protection against attack, while Britain's security would not be materially increased if Britannia did still rule the waves. Man's mastery of the air, and his mastery of the fission and fusion processes, have increased both the costs of defense and the consequences of failure. The running costs of a modern military machine are vast, as are the capital outlay and manpower requirements involved. Technological progress must be ensured; this necessitates unremitting research and development by the best brains in industry. In fact, defense of the Western nations would be a matter of fine judgment purely from the military side; the problem is made more acute by the ideological nature of the conflict. However prosperous a nation may be, national prosperity must be reduced by a heavy defense budget, because defense production and expenditure, being essentially non-productive, must be inflationary. Thus the Communist nations tend to gain from either over- or under-provision for defense by the Western nations.

The current Western solution to this problem is reflected in the United Kingdom's 1956 Statement of Defense, and particularly in paragraph eight. This paragraph lists the roles which British forces are to carry out as, firstly, con-

tributing to the Allied deterrent, then giving substance to national cold war policies and being available to deal with outbreaks of limited war, and finally taking an effective part in global war should it break out.

Of these defense priorities the last three are the traditional roles of British forces, under different names; these roles therefore need no discussion. The purpose of this paper is to discuss the first, newest, and most vital role listed, that of the Allied deterrent. It is intended to investigate the history of the deterrent, to consider its political and military implications, and to examine its advantages and limitations as an instrument of Western policy. In fact, the vital question is whether the deterrent will deter aggression; such side issues as whether there should be a graduated deterrent or whether the provision of deterrent forces should be left to the United States clearly stand or fall on the larger argument.

The Theory of the Deterrent

The Concise Oxford Dictionary defines "deterrent" as that which discourages or hinders by fear, dislike, or trouble. The formalized theory of the deterrent has been evolved since 1945. It was clear in the immediate post-war years that a victorious Soviet Russia was determined to fill the gap in Europe left by the defeat of Nazi Germany; Russian armed might was so preponderant that the Western nations would have been powerless to intervene on land. However, the USA possessed both a monopoly of the atom bomb and the ability to deliver it against targets in Russia. Because the USA was manifestly prepared to react with nuclear retaliation against any Soviet aggression, the aggressive intentions of the Soviet Union remained intentions.

The theory of the deterrent has been associated with nuclear weapons. Nevertheless, the lesson of history is that the principles of war remain immutable even though weapons change. It is therefore profitable, when deciding whether the present deterrent is a short-lived phenomenon created by a fortuitous combination of circumstances or a reliable prop against aggression, to consider whether, in the past, aggressive people or nations have ever been
(Continued on following page)

This article appeared originally in the December 1956 issue of The Hawk, the Journal of the Royal Air Force Staff Colleges. It is reprinted here with special permission.

deterred from aggression through fear of the consequences.

The history of mankind to date can be told entirely in terms of wars. Originally these wars were fought by primitive man against the predatory forces of nature; later man fought man for control of the earth's resources. The consequences of defeat were severe; until the emergence of the coherent nations of the last millennium, defeat in war was the prelude to wholesale massacre or enslavement. Thus the Trojan nation ceased to exist after the fall of Troy, while only a nation with such intense racial force as the Jews could have survived the Captivity. A later proof that fear of the consequences of war is not in itself a force for peace can be found in Great Britain's and France's decision to go to war in 1939 under the imagined threat of 3,000 German bombers.

Nevertheless, there were two periods of history when all civilized nations found the prospect of aggression uninviting. In each case overwhelming power was concentrated in the hands of a nation which, whether through sated appetite or intrinsic virtue, had no call to threaten peace. For nearly 400 years the Pax Romana was maintained by the deterrent threat of the Roman legions; the fate of Carthage was an adequate warning to potential aggressors. For most of the nineteenth century the overwhelming power of the British navy ensured peace wherever sea power could be decisive. Determined Russian moves toward the Dardanelles were frustrated in 1827, 1857, and 1875 at the cost of one limited war in the Crimea. Nevertheless, both deterrents were brought to an end, the first by internal disruption and the second by the emergence of the German navy.

The modern deterrent of the nuclear weapon delivered drastically and suddenly from the air undoubtedly represents both a more overwhelming and a more easily recognizable threat than either of the historical examples. Furthermore, now, provided the deterrent force retains its power to deliver, the presence of hostile deterrent forces need not, as hitherto, reduce its effectiveness. No rational government authority would voluntarily embark on aggression while there was even a possibility of a few retaliatory hydrogen bombs striking vital targets in the heartland.

Nevertheless, it is necessary to take this discussion on the philosophy of the deterrent one stage further. Theoretically, the deterrent may have rendered global war obsolete, as far as global wars for imperialistic or ideological reasons are concerned. Prehistoric wars, however, were fought for the limited available resources. In 1956, the reserves of some of the minerals at present considered vital to modern civilization are dwindling in terms of present consumption. Pressure on these reserves will increase as the advancement of underdeveloped areas gains momentum. The land masses of India and China contain the largest concentrations of underdeveloped people and the smallest promise of untapped mineral resources. Thus progressive industrialization of India and China will reduce rapidly the world's resources of such commodities as oil, copper, rubber, and iron. The threat of possible retaliatory action might no longer deter a nation whose alternative to war should be economic strangulation.

In fact, one lesson of history is that the two mutually hostile power blocks will inevitably clash as the resources of capital, food, fuel, and living space dwindle. Nevertheless, the world is only slowly approaching this stage at present. History has also shown that overwhelming force in the right hands has twice been effective in keeping the peace. Moreover, modern technical developments have resulted in the nuclear deterrent becoming a force which

can retain its effectiveness as a threat to aggressors after its numerical superiority has been surpassed. It is therefore considered that the Allied deterrent is theoretically capable, for the measurable future, of preventing aggression.

Political Aspects of the Deterrent

M. Clemenceau said, "War is far too serious a business to be left to the soldiers." Thus undoubtedly the decision that the deterrent force should become a retaliatory force would be taken by politicians. The autocratic rulers of Soviet Russia would be likely to make an intelligent appraisal of the Allied deterrent; equally they would be unfettered by public opinion when making the decision to launch the ultimate weapon. In the case of democracies, craven politicians have on occasions been swept to greatness by a courageous people; this seems unlikely to happen in the nuclear age. There is, in fact, a danger that the Allied deterrent might be made ineffective at a critical moment by a failure of Western will power, except in the face of critical or global aggression.

The very effectiveness of the weapons at the disposal of a deterrent force is a liability. The opinions of the neutral, uncommitted nations are important today, because these nations lie across the world's major centers of oil production. Suspicion by these nations that the Western nations intend to use their deterrent forces otherwise than as pure deterrents to Soviet and Chinese aggression might weaken still further the Western position in the Middle East; equally, the use of part of the nuclear deterrent force in a limited war, and especially one with the stigma of colonialism, might well evoke political and economic sanctions by the neutral nations. Finally, if the Allied deterrent failed in its primary object, so that the major powers of the world were crippled by an exchange of nuclear weapons, the so-called victor nations would have to reckon with the neutral nations.

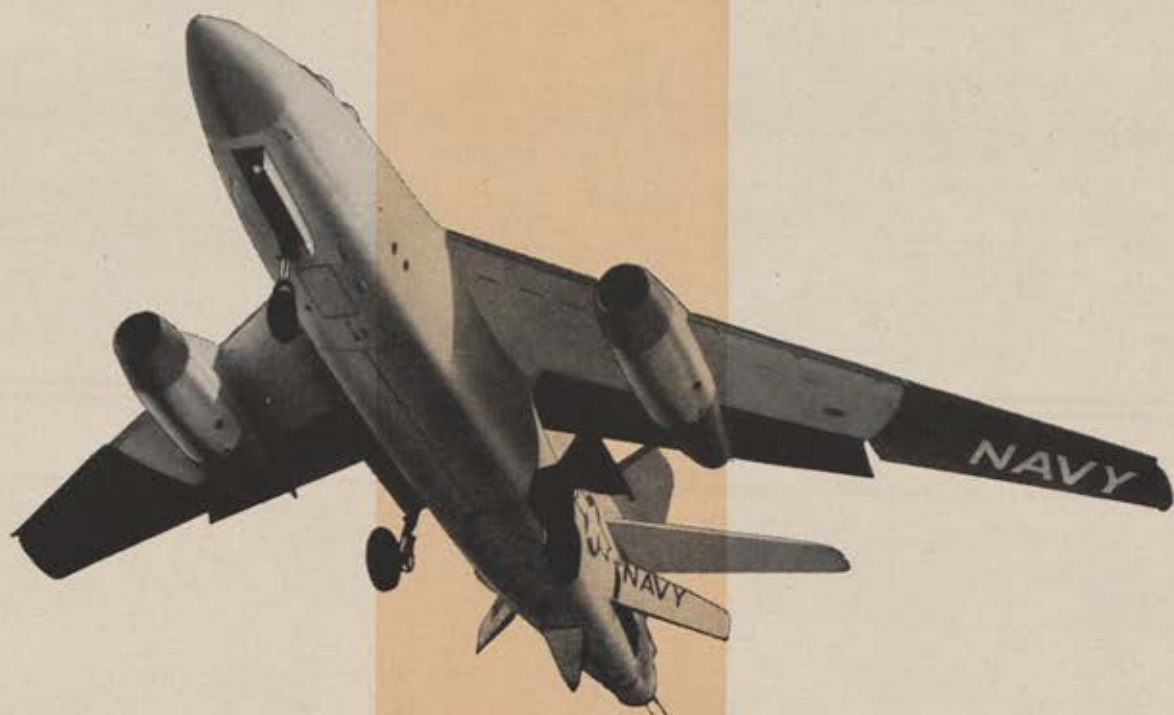
Military Aspects of the Deterrent

Ultimately, the value of the deterrent rests on its capability as a military force. So far the Allied deterrent has been maintained by a force of strategic bomber aircraft capable of delivering nuclear and other weapons to the majority of targets in Russia and China. Until recently the existence of this force was sufficient to deter; the subsequent emergence of Soviet Russia as a significant airpower has altered the picture. The existence of hostile deterrent forces need not detract from the effectiveness of the deterrent; nevertheless, the nuclear bomber force must retain its ability to deliver. This ability must depend on the deterrent force's state of readiness and the security of its base in the face of possible enemy attack, and on its ability to penetrate to enemy targets.

One of the undisputed advantages of a nuclear air striking force is that even partially successful retaliation might make aggression unprofitable. Thus a logical prelude to aggression would be an assault on the bases of the deterrent force. It would therefore be the duty of the bomber force commander to maintain his force at such a state of readiness that successful surprise attack on his aircraft on the ground would be unlikely. While the deterrent relies on manned bombers, the question of readiness can be reduced to that of aircraft and crews. The requirement for readiness will inevitably render cer-

(Continued on page 69)

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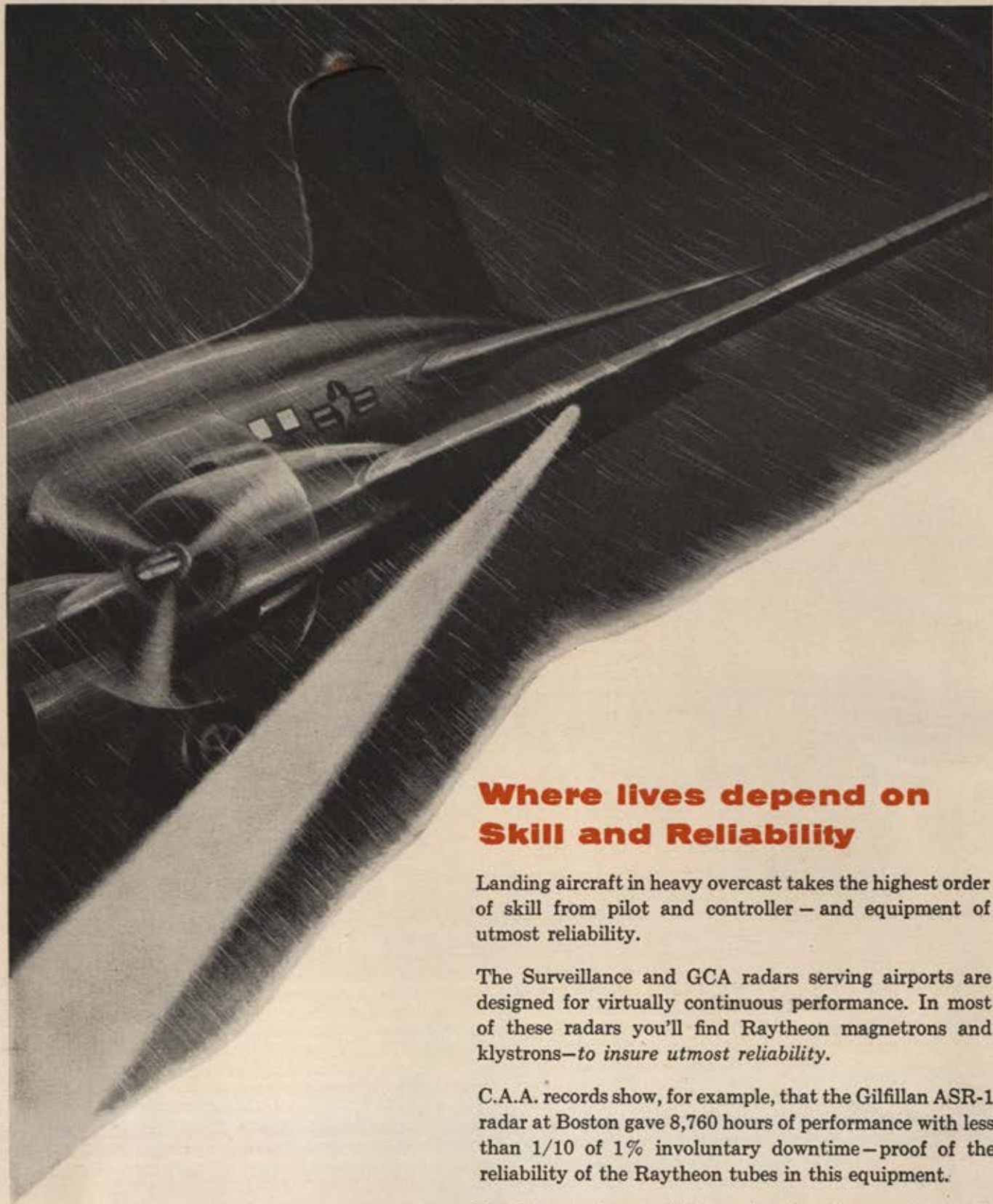
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tain technical conventions obsolete. Lengthy pre-flight inspection and arming procedures will be impossible, as it will be advisable to match the degree of readiness required to the expected time of radar early warning.

Also, traditional briefing procedures for air crews are incompatible with readiness. Ideally, each crew could be pre-briefed on one main target and, by flying regular practice simulated profile flights, would be constantly ready to go to war against that target. In times of tension pre-planned operations could be flown at short notice by crews held at "Tarmac readiness," "Cockpit readiness," and even "Airborne readiness." Ideally a crew-to-aircraft ratio of two-to-one would cater for sick and absent crews, although in practice such a high ratio would tie up a large proportion of the force in training, and reduce the amount of flying available for operational crews.

The complicated ground organization of an air striking force requires, above all, a secure base. The Air Defense Force must play its part in the maintenance of the deterrent by ensuring this. Although defenses are not considered likely to guarantee a 100 percent kill rate, saturation raids are impractical with high-yield weapons; thus a twenty-five percent destruction rate against the first wave of an enemy air attack against the bases of the deterrent force might ensure sufficient breathing space for twenty-five percent of the deterrent force to retaliate. While this possibility remained, aggression would continue to be risky. Naval forces could extend the degree of early warning. The army would undoubtedly be fully engaged, in times of tension, in maintaining the security of Western home and overseas bases. In fact, it might be argued that the real function of the North Atlantic and Southeast Asia Treaty Organizations is to maintain secure bases for the Allied deterrent.

The positive benefit of an adequate state of readiness and a secure base is that air crews of the deterrent force would, if ordered to retaliate, be able to take off and locate their targets. Nevertheless, the theoretical ability to locate a target would be of no avail if aircraft did not have the power to penetrate to, and bomb, the target. A bomber force with only a night capability would gain nothing from immediate readiness if the order to attack came at first light. Nevertheless, the scales are tilted in favor of the Allied deterrent in certain ways. New developments in jamming techniques promise to extend the scope of radio countermeasures. In addition, bases of the Allied bomber forces are ranged round the periphery of a large land mass. If, at a later date, medium bombers can no longer penetrate by day, long-range fighter bombers may be available to mount the deterrent by day against fringe targets while the medium- and long-range bombers hide out on dispersed airfields. Later, when the Allied air striking force is no longer capable of winning a nuclear exchange in the face of Russian guided missile defenses, there would still be the danger of a few hydrogen bombs hitting enemy vital targets, and thus still a deterrent.

It was suggested during the discussion on the theory of the deterrent that the principles of war remained immutable while weapons changed. A glance into the future confirms this view. The deterrent will continue to deter aggression so long as the air striking force is seen to be an effective and ready force. Danger periods must be those when potential aggressors feel that retaliatory aircraft can be caught on the ground before take-off or destroyed in their entirety before reaching vital targets. The next stage in development should produce intercontinental ballistic missiles. These missiles will not have the possible weaknesses of the present deterrent of an

insecure base or inadequate readiness. Their weak link may easily be a jammable guidance system. Provided Western scientists can solve the technical problems in time, this type of missile would seem to provide the cast-iron deterrent to aggression.

The Deterrent as an Instrument of Western Policy

Principal criticism of the decision to concentrate on making a contribution to the Allied deterrent as a higher priority than providing forces to deal with limited and cold wars seems to stem from the fact that the threat of global war is like an iceberg—seven-eighths are out of sight. Meanwhile, Western cold war reverses are as clearly seen as the Western inability to deal with them. The fact that possession of nuclear preponderance did not enable the West to hold Indo-China or to stay in Suez is not condemnation of the deterrent but of the Western political position. Recently liberated nations of the Middle East and Far East are hostile to the so-called colonial powers; Western nations cannot impose their will on them with nuclear weapons, but equally they cannot match them man to man in a series of conventional limited wars. Meanwhile the deterrent seems to make the best use of Western technological knowledge. If the deterrent remains effective it will at least avoid the greater evil of Russian and Chinese overt aggression. If the Western nations can maintain their economic and political position, the newly independent nations may decide, when they come of age politically, that the West as well as the East has something to offer. They will not make this decision if the Western nations have fought their growth all the way and beggared themselves in the process.

Conclusion

Despite the apparent lessons of history, the concept of the deterrent is theoretically sound. Thus, to quote from the White Paper on Defense, the increased power of the deterrent has made global warfare more frightening and less likely. Against this the Allied deterrent will not live up to its name unless potential Communist aggressors are convinced that the Western nations have sufficiently courageous leadership and national will power to oppose aggression with the ultimate weapon. In addition, service and national organizations in the United States and Great Britain must be sufficiently developed for the launching of retaliatory forces to be possible, if necessary in the face of enemy nuclear attack. Finally, the power of the deterrent will be increased still further, and its weaknesses reduced, if the Western nations can master the problems on the intercontinental ballistic missile in time.

Nevertheless, the deterrent's days may well be numbered. If competition for the world's resources continues to increase, nations may one day be faced with the alternatives of certain economic extinction or possible nuclear devastation. The freedom-loving nations of the West might find the gamble worthwhile. Against this the deterrent has attained its present status through the development of nuclear weapons. Possible future developments of nuclear power may extend the life of the deterrent to war by making available to the world inexhaustible sources of power, thereby limiting the possible causes of war to the traditional ones of ambition, ideology, and greed. In either case the Western nations, and especially the United States and Great Britain, will have to maintain their technical prowess, their vigilance, and their courage.—END



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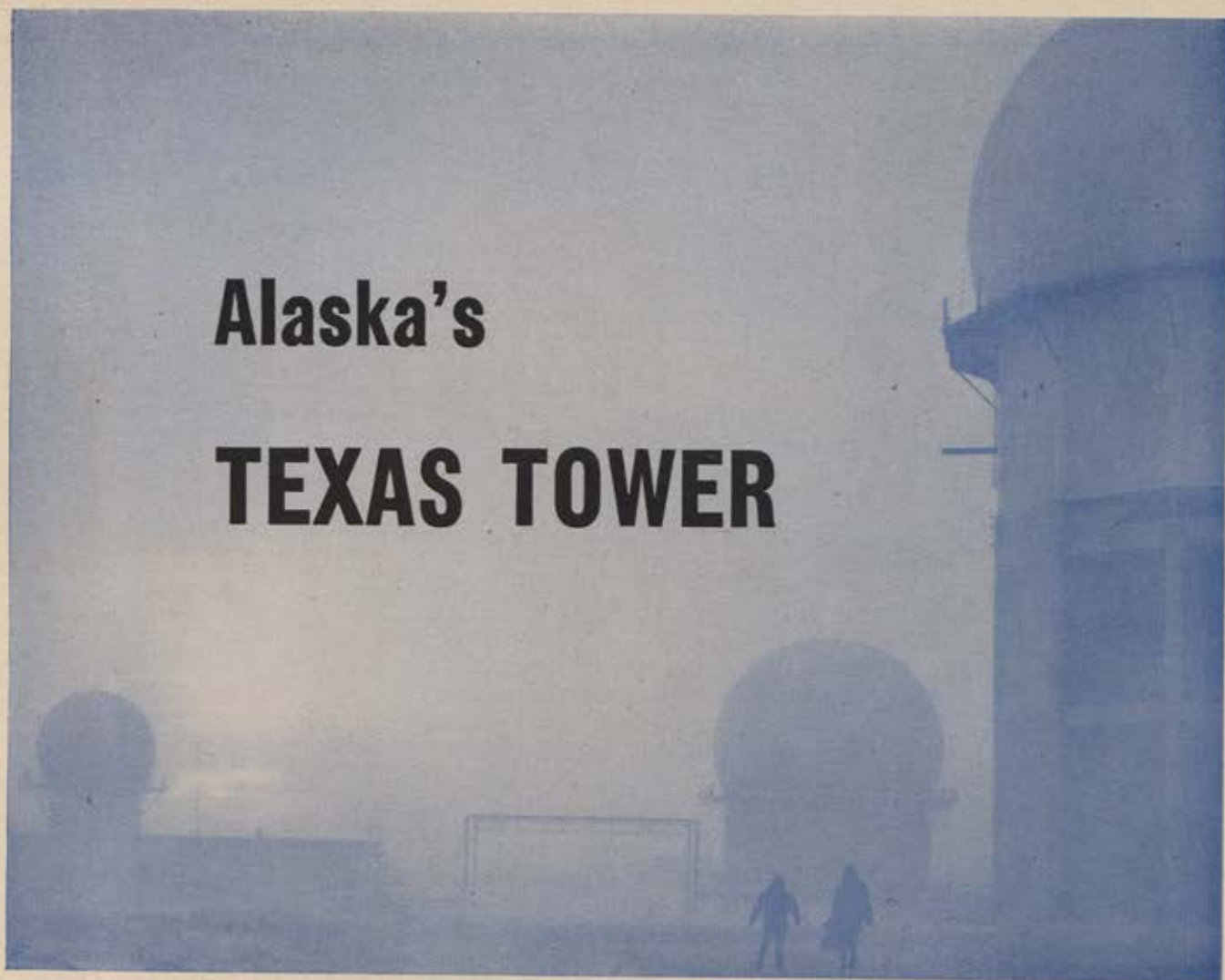


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Alaska's TEXAS TOWER



Two AF radar men brave snow and fierce cold as they plod toward their operations building at Alaska's Texas Tower.

By T/Sgt. Benjamin F. Blackman

ON A lone, barren rock, which nudges its way up through the North Pacific runs of the Japanese current some two hundred miles off the coast of Alaska, a new watchdog for the defense of America has lifted its eyes into the uneasy Arctic skies, closing a dangerous gap in the increasingly powerful radar wall of the polar region. The men who operate this unique warning bastion call it "Alaska's Texas Tower."

But unlike the radar stations off the east coast of the US (which stand sixty feet above the Atlantic on great steel legs), Alaska's dome-topped towers have been erected on a small snow-shrouded plateau and reach more than 200 feet above the restless icy waters of the Gulf of Alaska.

Lashing waves, encouraged by 100-mph winds, break against the sheer rock cliffs and fling their spray upward

at the enclosed antennas far above them in a vain attempt to disrupt their vigil.

But the powerful radar screens, firmly held by reinforced concrete bases and covered with balloon-like rubberized domes, ignore the futile gestures of the turbulent sea and keep their silent watch of the northern skies for unknown planes.

In a small operations building at the base of the towers, a group of Air Force men go about the serious business of watching for small greenish spots on radium-dialed instruments—spots signaling that the "big eyes" spinning above have picked up a moving object in the sky.

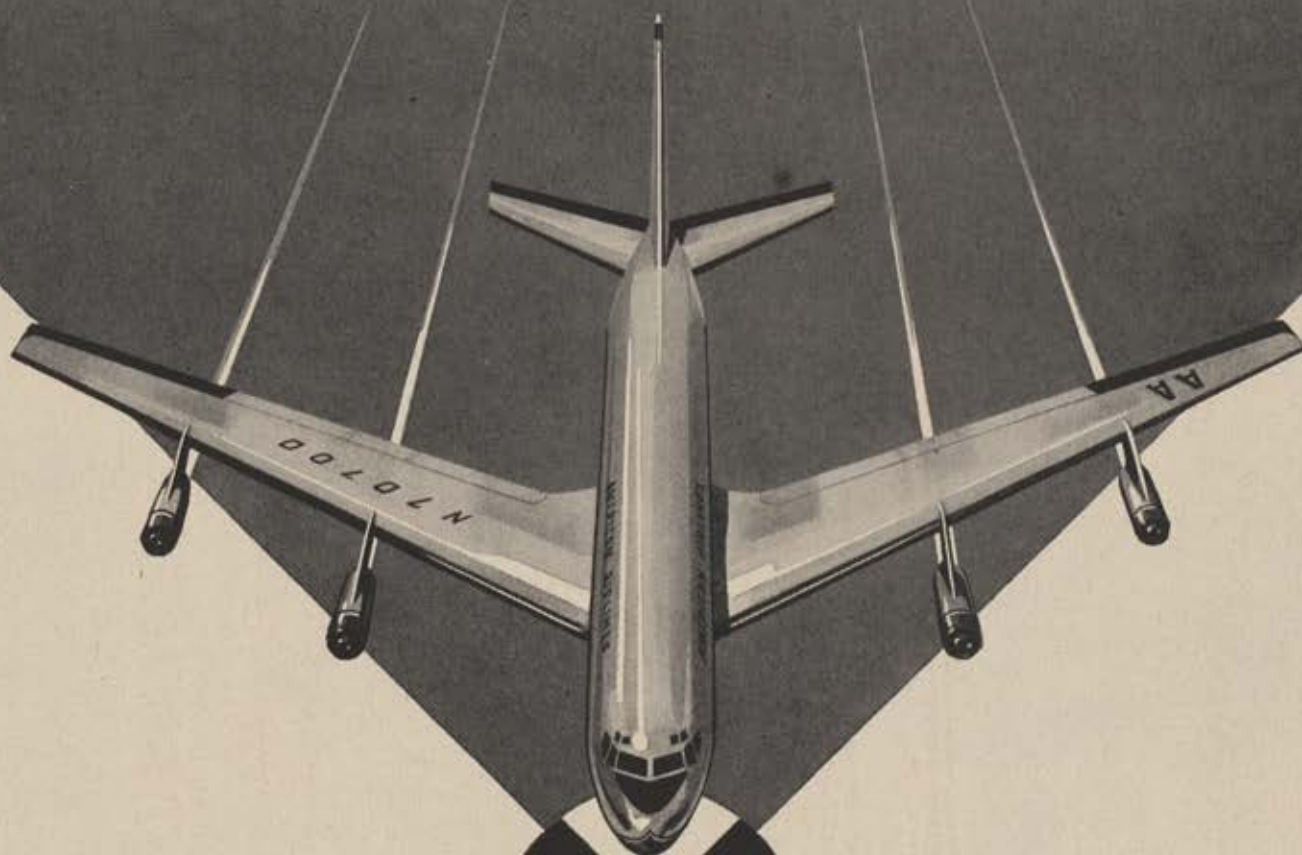
The realization that the nation's existence could well depend on their alertness is evident on the stern faces of these trained youngsters during their twelve-hour watches. The dull

outlines of the strange-looking black domes silhouetted against overcast Arctic skies outside hold no glamour for these and other Air Force personnel at the northern outpost. Yet they take satisfaction from the fact that they are forward sentinels.

One of these young men is twenty-one-year old A/IC Paul Buzhardt of Greenwood, S.C. He entered the Air Force two years ago and attended radar school before going to the remote station in Alaska six months ago. His feeling about the assignment out on the island is typical of others whose daily task is now considered routine duty.

"We stay here watching for something we hope we'll never see," he volunteered, staring intently at the bright revolving arm on the radar scope. "But if enemy planes come,

(Continued on page 74)



American Airlines selects

Long before American Airlines takes delivery of its first Boeing 707 Flagship, its flight crews will have the equivalent of hundreds of hours of all-weather flight operations in this new jet transport. For, American has awarded to the ERCO Division of ACF Industries the contract to design and build a flight simulator for the 707.

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crew members will already be familiar with the 707's every characteristic, and many hours of costly in-flight training will be eliminated.

Introduction of the 707 brings to American's passengers a new era in transcontinental flight — Los Angeles to New York non-stop in an estimated 4 hours and 15 minutes! ERCO is proud of its selection to produce the simulator for this magnificent new aircraft.

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A/IC Paul Buzhardt enters the operations building, the heart of the Tower.

we'll put the finger on them—but quick."

The intricate radar system is so rigged at the island installation that the second a moving blip appears on the illuminated scope, a warning is flashed by the operator to the Alaskan Air Command's Combat Operations Center on the mainland. Within seconds standby pilots are racing toward their planes. But the job of the radarscope operator just begins when the jet interceptors race into the air. He must direct the attacking pilots to their target. From the time the sleek fighters take off, they are entirely under control of the young airman in the darkened operations room at the isolated site.

In the strange language of this breed, the scope operator talks into the mouthpiece of his radio headset.

Fragments of the two-way conversation drift out.

"Saucy One, this is Suntan, Roger, Port Five Zero for Bandit, Over. . . ."

"Saucy One, Angels Twenty, Speed, Three Fifty, Out. . . . Pillow Fifteen. . . . Bandit Crossing to Starboard, Level, Punch, Over."

"Saucy One, Judy. . . . Saucy One, Roger, Standing By, Out. . . . Saucy One, Splash, Over."

The pilot follows his directions: "Angels Twenty" orders a climb to 20,000 feet. The pilot helps by disclosing visibility (Pillow) of fifteen miles. Not until the word "Punch" does the radar observer aboard the jet interceptor take over the search. "Splash" indicates a successful attack. It's all over that quick, and the operator at the remote site directs his birdmen back to home base.

It was little more than a year ago that the Alaskan Air Command sent the first group of twenty-one specialists to the "rock." Their first duties showed no resemblance to the task for which they were trained. The station had to be readied before it could operate. The saga of these early days on

the small island is a lesson in how the men of today's Air Force face the job of being prepared.

An old timer at the site, who never tires of reminiscing about "how things were then" and "how we were almost blown off the island," is T/Sgt. Arville F. Sullivan of Wichita, Kan. Now chief operator of the eight giant power generators that provide electricity for the site, he has already served his one-year tour at the installation and has extended for an additional period.

"There was plenty of power on the island when we first landed," he mused, "but it was in the form of sleet, rain, and forty- to fifty-mph winds. We thought that was enough, but Mother Nature must have found an additional charge somewhere and flung it all right at us.

"It was just after we finished setting up our tents that the big blow started," he remembered. "A new storm packing 100-mph winds hit us. The snow was blinding. It almost wiped us out completely."

This veteran of fourteen years explained how the men had erected the tents on wooden floorings in an effort to make things more comfortable. Strong ropes lashed tent platforms to anchor pins driven in the frozen ground between the rocks.

"At one time," he continued, "I felt my tent being lifted clear of the rocks and actually shuddering in the storm. The ropes must have stretched a foot, but they held. To top it all, big waves foamed over the high cliffs, drenching everything we had, and the strong wind was pounding a few loose oil drums about the area like tennis balls. Things got worse by the minute.

"It seemed," Sullivan grinned, "as though the Pacific itself resented our being on the island and that it was doing everything it could to drive us away."

A few days after the storm, several barges, loaded with equipment and supplies for the site, approached the island's north end and ground onto the rocky beaches at high tide.

Simultaneously, an Alaskan Air Command transport, carrying additional men, landed at the small airstrip that had been leveled out on the beach.

According to Sergeant Sullivan, the men worked in twelve-hour shifts to offload the delicate equipment. It was carried across rocks and fine gravel beds to a safe distance from the rolling waves.

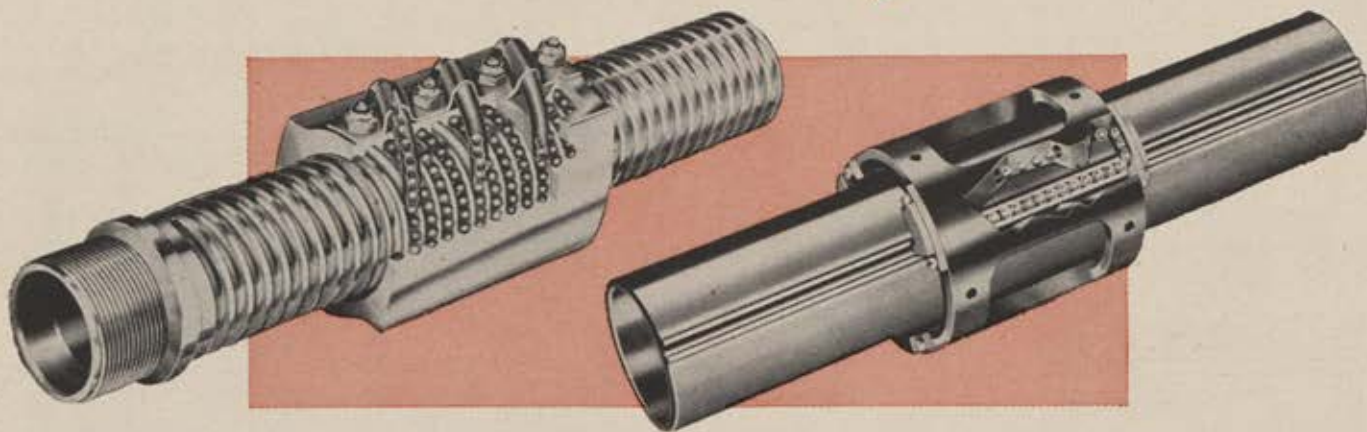
"In eight days and nights," he remarked, "we unloaded and placed (Continued on page 77)



The Tower stands on a snowy plateau above the waters of the Gulf of Alaska.

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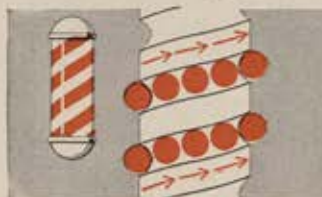


Saginaw b/b Screws guaranteed 90% efficient —offer 6 major advantages for designers

Saginaw b/b Splines average 40 times lower friction coefficient than sliding splines

Available in custom machined and commercial rolled thread types—have been built from 1½ inches to 39½ feet long—¾ to 10 inches diameter.

Transmit or restrain high torque loads far more efficiently—have been built from 3 inches to 10 feet long—¾ inch to 6 inches in diameter.



Nut glides on steel balls. Like stripes on a barber pole, the balls travel forward end of nut through spiral "tunnel" formed by concave threads in both screw and mating nut.



At end of trip, one or more tubular guides lead balls diagonally back across outside of nut to starting point, forming closed circuit through which balls recirculate.



The Saginaw b/b Spline radically increases the efficiency of transmitting or restraining high torque loads. Instead of sliding against each other, surfaces glide on rolling balls.



The steel balls recirculate in closed circuits formed by mating longitudinal raceways spaced around the circumference of inner and outer splines. Guides return balls.

1 VITAL POWER SAVINGS. With guaranteed efficiency of 90%, Saginaw b/b Screws are up to 5 times as efficient as Acme screws, require only ½ as much torque. This permits much smaller motors with far less drain on the electrical system. Circuitry is greatly simplified.

2 SPACE/WEIGHT REDUCTION. Saginaw b/b Screws permit use of smaller motors and gear boxes; eliminate pumps, accumulators and piping required by hydraulics. In addition, Saginaw b/b Screws themselves are smaller and lighter. Units have been engineered from 1½ in. to 39½ ft. in length.

3 PRECISE POSITIONING. Machine-ground Saginaw b/b Screws offer a great advantage over hydraulics or pneumatics because a component can be positioned at a predetermined point with precision. Tolerances on position are held within .0006 in./ft. of travel.

4 TEMPERATURE TOLERANCE. Normal operating range is from -75° to +275° F., but assemblies have been designed in selected materials which function efficiently as high as +900° F. These units are practical where hydraulic fluids have lost efficiency or reached their flash point.

5 LUBRICATION LATITUDE. Even if lubrication fails or cannot originally be provided because of extreme temperatures or other problems, Saginaw b/b Screws will still operate with remarkable efficiency. Saginaw units have been designed, built and qualified for operation without any lubrication.

6 FAIL-SAFE PERFORMANCE. Far less vulnerable than hydraulics. In addition, Saginaw offers three significant advantages over other makes: (1) Gothic arch grooves eliminate dirt sensitivity, increase ball life; (2) yoke deflectors and (3) multiple circuits provide added assurance against operating failure.

This revolutionary new kind of spline utilizes the same basic principle pioneered by Saginaw in the ball/bearing screw.

It permits new engineering designs never before practical—literally lets you achieve the "impossible"! In any application where column length must change under torque load, the Saginaw b/b Spline offers greatly decreased friction, less wear, longer life, more dependable operation. It can be fitted with integral gears, clutch dogs, bearing and sprocket seats or a wide choice of other attachments for use with electric, hydraulic or pneumatic units. To convert push-pull to rotary motion, helical types are available with very high leads, ranging from 20:1 to 100:1.

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into position more than 1,000,000 pounds from the rocking barges."

Since that time the labors of these men have been enjoyed not only by them but also by other men who have been assigned to the island. It is now one of the most modern remote stations in the Air Force and is known in the Alaskan Air Command as the Waldorf-Astoria of radar sites in the Territory.

The largest building on the tiny isolated pinnacle is a two-story structure, which houses the 100 or more personnel. Spacious rooms, equipped with Hollywood-style beds, inner-spring mattresses, clothes closets, and writing desks with chairs, provide contrasting comfort to the bitter weather outside.

The long hallway, extending the length of the building, measures more than the length of a football field. Doors lead off from this passageway to the small theater, barber shop, dispensary, radio station, recreation hall, and a cozy library with more than 1,000 books on its shelves.

The dining hall, centrally located on the first floor, is operated by a full staff of cooks and helpers, who prepare their menus on the same schedule as that of any main Air Force base.

The extreme weather conditions that exist most of the time keep the men indoors when they are off duty, but the occasional drone of an aircraft engine heard above the whistling winds brings everyone outside. It means mail from home.

Is there a morale problem at the Pacific station in the Far North? Commander of the site, Capt. Lorenzo D. Baird, Jr., of Houston, Tex., thinks not.

"Most of the men stay too busy to have morale problems," he says. "They know their tour is for one year and try to make the most of it. Once during their stay, they can fly back to the main base at Elmendorf, near Anchorage, for a few days' leave if they can be spared. But not all of them take advantage of that."

"There are no special personnel assigned to take care of the added facilities such as the library, radio station, and rec hall. We don't even have a regular barber. Our radar, communications, and administrative men double up on these jobs."

The captain's duty roster reflected what he said. A radar operator was listed as librarian. From 6 a.m. to 6 p.m. the specialist peers into the scopes in the operations building. At night he keeps the library open until 10 p.m. A crane operator and the fire



One of the busiest men at the Tower is CWO Norman Schauer, not only ground radar supervisor, but also in charge of the communication centers, radio and ECM operations, and maintenance for communications and photographic equipment.

chief were doing off-time duty as store clerks.

"Nearly all the work is voluntary," the CO boasted. "Our biggest problem is with barbers, but then, we do have some men who 'cut a pretty good head of hair.'"

Many of the airmen have their own short-wave radio sets. A popular hobby is trying to outdo each other in the number of stateside stations they can pick up at night.

The beguiling voice of Moscow Molly, who has aimed her propaganda at American servicemen in the Alaskan area for several years, has been heard on everyone's radio.

Echoing the sentiments of all regarding "Molly" was A/1C Joseph D. Butler of Quincy, Fla., a shift leader in the dining hall. "It's a lot of bal-lyhoo and I'm not impressed," he said.

Even the sports-minded airmen have improvised to keep themselves in shape. A small building, housing the site's two vehicles, has been converted into half a basketball court—goal and all. They hope to organize a team and enter the command tournament this season.

Ingenuity has been the keynote of success at the site. Even interim vacancies in "hard core" jobs pose no great problem.

Recently, the only coffee urn on the island failed to percolate. No electrician was available at the time, and the mess sergeant was frantic. To his rescue came A/1C Rudi Kasel of Kenmore, N.Y. A telephone maintenance repairman, Rudi's knowledge of electricity soon had the coffee boiling

again, to the mess sergeant's relief.

Everyone at the radar site is geared for most anything. Their work is serious and they play in the same manner.

When the clutching cold of winter gives way to spring, there are many ways of eliminating monotony. Temperatures climb to a comfortable sixty degrees in June, July, and August each year, and the once-frozen terrain sends up more than 100 species of flowering plants that dress up the little island for a short while. Thousands of migratory birds flutter over the rocky cliffs during their annual rendezvous. Hair seals flounder over the glistening rocks and frolic along the smooth gravel beds of the narrow beaches in the momentary wonderland.

This is "Alaska's Texas Tower," standing in the cold North. Men find discomfort in the bleak winter season. They marvel at the splendor of the short summer. But above this, they remain steadfastly alert in the vital job of being the forward eyes in our nation's defense against an enemy attack across the Arctic.—END

ABOUT THE AUTHOR

This is Sergeant Blackman's first appearance as one of our authors since the January '51 issue. At that time, as a FEAF combat correspondent in Korea, he wrote "One Way Out" for us—the story of how Combat Cargo planes helped supply and evacuate UN forces trapped by invading Chinese in Northern Korea. From late 1951 until 1953 Sergeant Blackman was the editor of Stars and Stripes in Japan. He's now stationed in Alaska.

JET BLASTS

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Is a United Nations Police Force Really Practical?

What kind of a United Nations police force? Despite the moral support of approximately sixty-five nations and Secretary Dag Hammarskjöld's herculean efforts, even a large United Nations police force composed of national units, will not bring lasting peace between warring factions in Egypt, or in any other part of the globe. Until the United Nations Charter is revised, this situation will continue. For years a number of the best recognized international historians, writers, and statesmen have contended that a genuine United Nations Army, operating under enforceable United Nations law, was a prerequisite for permanent peace. This is what President Eisenhower intimated when in his memorable broadcast to the nation on October 31 he declared "there can be no peace without law"—(enforceable, of course). But uppermost in the minds of the American citizen are the questions—What kind of police force? How composed? Where located?

Article 45 of the existing United Nations 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. No such contingents have ever been made available. Why? Because the United Nations has no legal enforcement powers. Each nation can, as crises arise, arbitrarily decide

whether or not to make any military units available. Not until each and every member nation of the United Nations can, under United Nations law, be counted upon to supply the permanent armed forces and facilities demanded of them, will a real international army come into being.

This permanent international army, estimated at not less than 300,000 or more than 700,000—a considerable portion of which would consist of air units—would be the only military force in the world equipped with weapons of mass destruction. Some of the checks and balances to keep this force "tyranny-proof" are the general control of the Chief of Staff and Army by a *vetoless* Executive Council, a carefully regulated proportionate distribution of nationalities, and provision that not more than ten percent of the entire force would be located in any one region. Such forces would be situated on United Nations neutralized and strategic spots throughout the globe in order that they would be close enough to any area to prevent a minor conflict developing into a serious war. Because the cost of the United Nations forces would be so trifling as compared to the accumulated cost of the many armies now in the world, the remuneration to each soldier could be considerably larger than that ordinarily paid. He would be especially educated. Excellent living conditions would be provided for him and his

family and better schools for his children. Under such conditions it is believed that the cream of the youth of each country would vie with each other to enter the United Nations service, somewhat as American youths in each state now compete to get into Annapolis, West Point, and the Air Force Academy. No difficulty, therefore, is expected in obtaining an élite, loyal, and effective *voluntary* force having high morale and conscious of its high mission.

As the most important and final phase in establishing the effectiveness of the United Nations police force, there shall be applied, during its gradual building-up period, a step-by-step plan for the disarmament of each nation right down to a point where its national military force is reduced to that of a "Nation State Militia," equipped only with small arms—capable of keeping peace and order—but not large enough or strong enough to make war on any other nation.

All this may seem to be a "far cry" from the token force emerging in the Near East, but as crisis after crisis arises in world affairs, the American people will find that the development of a genuine United Nations Peace Force is an indispensable requisite of permanent peace and that unwittingly Premiers Eden, Mollet, and Nasser have forced the world one step closer to this objective.

J. A. MIGEL

Let's Try an Exchange of Surplus Personnel

To you Air Force personnel who will moan and groan upon reading the contents of this, let me say: I haven't been kicked in the head by a horse, nor have I been in the sun too long. I have simply been evaluating a problem that should have the attention and support of every American, especially members of the military, Regulars and Reserves, and look upon the suggestion that follows as a form of medicine, an ill-tasting dose but very

necessary if the patient is to survive.

The patient in this case is "Unification of our Armed Forces."

We must face the obvious fact that for unification to work in its broadest sense some method of service-wide transfers must be worked out for both officer and enlisted personnel of the Army, Navy, Air Force, and, of course, the Marines.

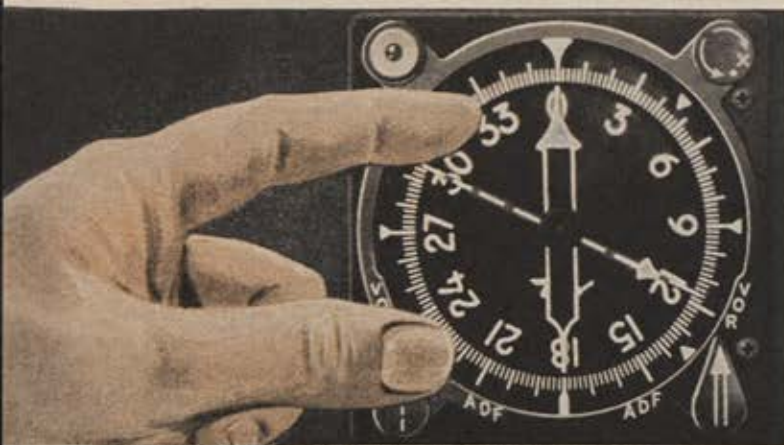
Top Department of Defense officials have worked out supply and procure-

ment policies which have reduced past competitive methods practiced by the services and installations. Why couldn't some of the same principles of consolidation be put in force as concerns the Department of Defense's most important factor of all: manpower?

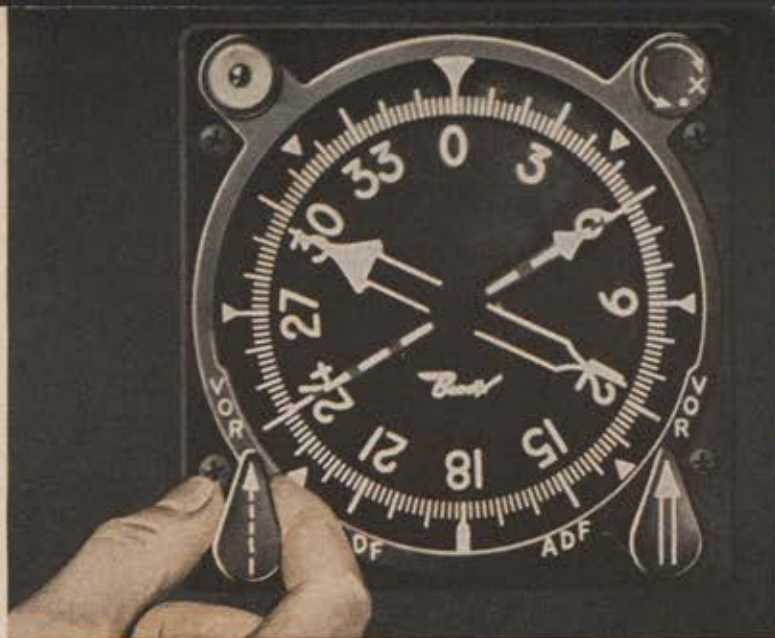
Current legislation and regulations allow for interchange of officers for training purposes among the various
(Continued on page 81)



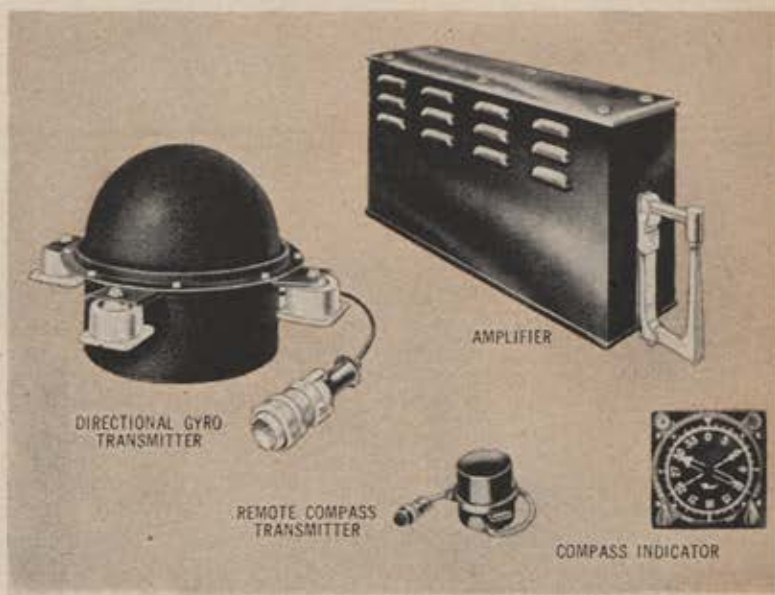
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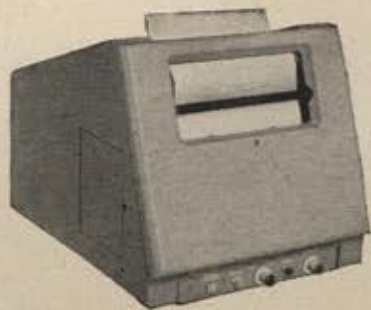
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branches of the Department of Defense, but as far as enlisted personnel are concerned (and there are several million) transfers are out of the question. Training tours for officers, of course, are for prescribed periods, after which they return to their original branch of service.

Lack of authority to transfer personnel between the Army, Navy, Air Force, and Marines must cost taxpayers thousands of their defense dollars and untold units of manpower each year.

With proper legislation and revision of regulations, it is quite possible that personnel declared surplus because of overages in certain career fields could be utilized in the specialty they were surplus in by transferring to another branch of service.

For example, the Air Force recently authorized and directed retraining of hundreds of NCOs found surplus to the USAF's present and projected needs. These men, most with eight to twelve years' service, were trained and highly skilled technicians or supervisors in such fields as automotive maintenance, administration, photography, and food service.

In a like case, the Army not too long ago retrained many of their NCOs who were declared overage as far as Army requirements were concerned.

It's understandable that the vast progress made in aeronautics in recent years—a period in which we have moved from reciprocating engines to jets and now into the field of rockets and missiles—would bring about many changes in USAF requirements. In the same vein, changes in weapons and streamlining of divisions have brought about changes in the Army, Navy, and Marines personnel-wise. Technological changes have been many, but why haven't we taken time to evaluate one service's requirements against another's in the field of personnel?

Could the Army use some of the AF's administrative supervisors? Perhaps the Navy could put to good use some of the excess food service airmen. Or maybe the Marines might have some use for our surplus automotive maintenance and photographic technicians. Whatever the results might be, a survey of "have and have nots" could bring about some interesting findings that in the long run might add up to considerable savings in dollars and personnel for the Department of Defense.

At the outset of any program to bring about service-wide transfers,

the major problem would be to convince personnel concerned of the advantages of moving from one branch of service to another. Many would not care to do so, but then again many others would probably welcome an opportunity to continue to work in the field they had been in for years rather than retrain in another field.

A certain period of adjustment would be required of those transferred, but good planning would iron out many of the kinks of the service-wide transfer of personnel, with the exception of the uniform change-over, and Uncle Sam would have to outfit the "boys" on the house, so to speak, and consider it a good investment.

Those in the service now would have the option of accepting or declining transfers, in keeping with their enlistment contract, but legislation would authorize future transfers at the discretion of the Secretary of Defense. It simply means that when enlistments ran out, service personnel would have to re-up for the Department of Defense with a first choice and initial assigned arm being that of their choosing. A proviso, which each enlistee or reenlistee would sign, would clearly signify the individual's understanding that if his services were required in one of the other services he would be reassigned where needed.

Since the bulk of the forces is composed of enlisted men, the problem mainly concerns EM, but legislation could apply to both officers and enlisted men for the same personnel problems arise in both cases.

I realize that this idea is not new, but with this business of surplus personnel gaining more prominence and the matter of manpower and defense dollars vying for headlines in public print, it seems about time that this most obvious step towards true unification and economy be made.

The step is somewhat revolutionary, but in this day and age where getting the most for the least is uppermost in so many minds, the move should have sufficient merit to gain much consideration from our law-makers in Washington.

M/SGT. BILL O'KEEFFE

An airman with fourteen years' service to his credit, Sergeant O'Keeffe has spent most of them in public relations work. He's edited service papers at many bases, both in the ZI and overseas. At present he's stationed at Long Beach, Calif., with the 2645th Air Reserve Center.

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WHAT WE'VE LEARNED ABOUT Turboprops

A rather wry sidelight on the accompanying article is the fact that the Fiscal Year 1958 budget, currently under consideration on Capitol Hill, contains no funds for procurement of any long-range strategic turboprop transports, like the Douglas C-132 or the Douglas C-133A, which General Allen discusses here. So the optimistic conclusions of this article must be tempered by the fiscal facts of life.

—THE EDITORS.



Test combination on the MATS Convair YC-131C includes Allison YT-56-A3 engines and Aeroproducts turbine propellers.



Pratt & Whitney T-34-P5 engines with Curtiss-Wright turboelectric props were used in MATS tests of Boeing YC-97Js.



Lockheed Super Connie C-121C was fitted with Pratt & Whitney T-34-P6 engines, Hamilton Standard turbomatic props.

By Maj. Gen. Brooke E. Allen

COMMANDER, MATS CONTINENTAL DIVISION

THE turboprop transport has a definite place in tomorrow's air transportation picture—both commercial and military.

The six test-bed aircraft test that was flown by the Military Air Transport Service's 1700th Test Squadron at Kelly AFB, San Antonio, Tex., gives us a basis for this statement.

In 1954 when the idea of this test first came up, there was a good deal of skepticism about the future of harnessing the turbine engine to a propeller. With some jet transports and tankers already in the air and many others on the drawing boards, someone asked, "What do we gain from a propjet or turboprop?" The 1700th Test Squadron, operating under MATS's Continental Division, was told to find the answers.

The test was made with three "off the shelf" transports, which were fitted with two different types of turboprop engines with three different propeller combinations. This was not a test of the airframes as such; it was strictly for the engine-propeller combinations.

The first airframe selected was the twin-engine Convair 340, the commercial version of the Air Force C-131. This aircraft was given an Allison YT-56 engine developing a 3,250 equivalent shaft horsepower and geared to an Aeroproducts propeller. The other two were both four-engine transports—the Boeing KC-97G and the Lockheed C-121C Super Constellation. The Boeing plane was modified for the Pratt & Whitney T-34 with 6,000 ESHP engine, and the Curtiss-Wright turboelectric propeller. The Super Connie also had the Pratt & Whitney T-34 engine, geared to the Hamilton Standard turbomatic propeller.

Since this program was to fly the greatest number of hours in the shortest possible time and was expected to come up with an operational and maintenance doctrine, we brought together the finest group of flight and maintenance people we could find. The pilots averaged well over 4,000 flying hours each, and the maintenance men were all experienced in transport aircraft.

Before the aircraft arrived, all flight and key maintenance personnel received specialized factory training on the various turboprop engines and propellers.

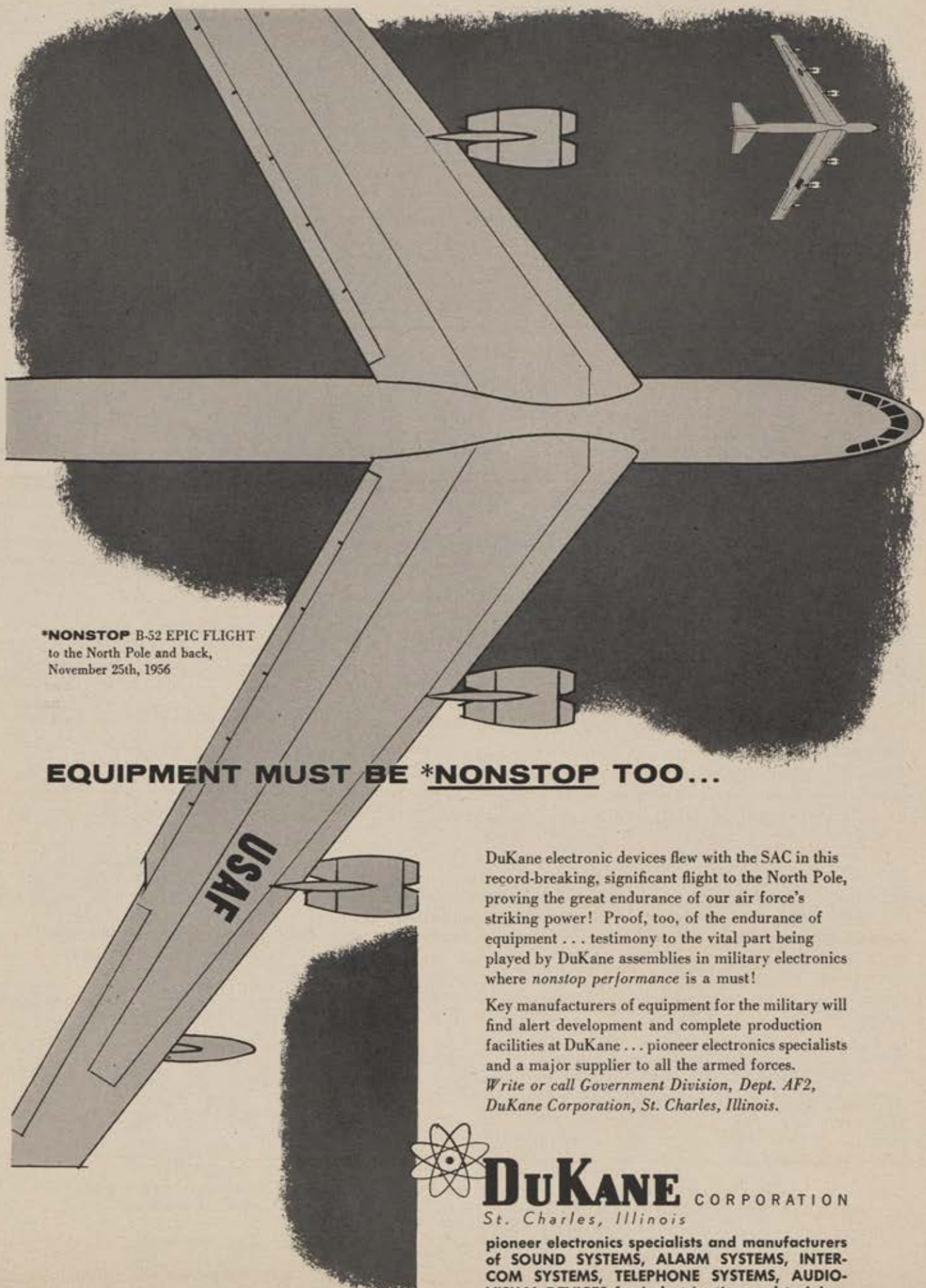
The first aircraft, the YC-131C, arrived at the Test Squadron in January 1955, and the pilot familiarization program began immediately. This meant daily local flights in the Kelly area. At the same time the ground crews were given a maintenance familiarization program.

Late in January the second YC-131C arrived, and a utilization rate of 4.4 hours per airplane per day was established. As things got under way, technical representatives of Convair, Allison, and Aeroproducts worked in close cooperation with the ground and flight crews.

Use of the YC-131C increased steadily to a point where the aircraft was being flown nine hours per day. At first, with this aircraft, we were allowed to fly only 100 hours before the engine had to be removed, regardless of performance, and sent back to the Allison factory for an analytical tear-down and evaluation. At the same time we had to make a fifty-hour inspection on the combustion section of the engine.

Our experience with the Allison engine best tells the story of its reliability. We conducted fifty-four overhaul operations on the sixteen engines in this program. Of these, fifteen overhauls were premature removals, while the other thirty-nine times the engines were operated to the authorized limit. The premature removals had no significant pattern.

(Continued on page 85)



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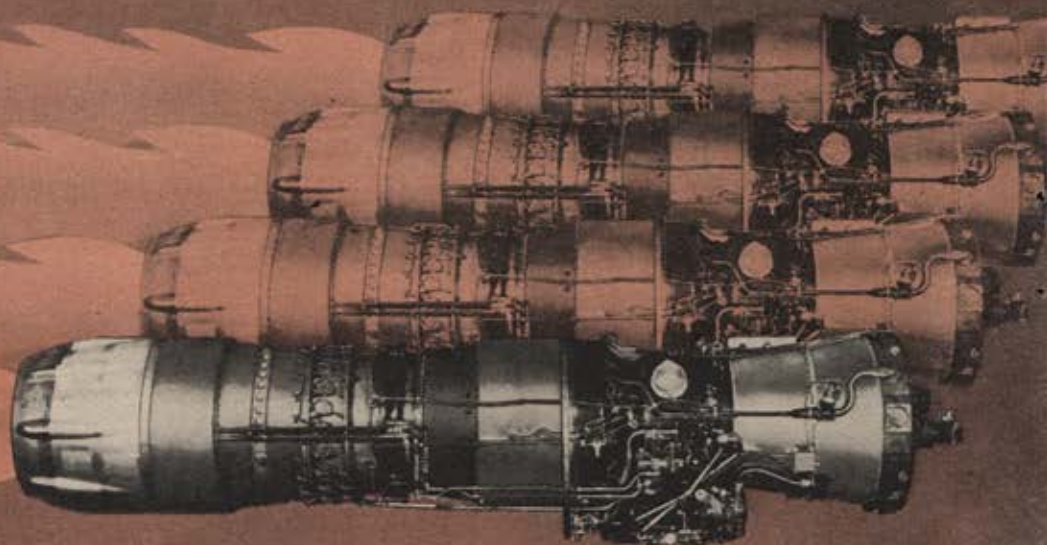


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There was one case of oil starvation which had a particularly interesting aspect. The indications were that the engine had operated without oil for about twenty minutes. Analytical tear-down showed that only the bearings in the reduction gear were damaged. There were no signs of disintegration as might be expected with the highly loaded gear trains in the reduction unit.

There were four cases of damage from foreign objects. They were similar in one respect. Each one occurred at the first run-up after a major maintenance operation. Each one was traced to human error during maintenance, and not one to loose objects picked up from the ramp by the props.

Over-all, we accumulated more than 6,600 flight hours on seven Aeroproducts turbine propellers with very satisfying results.

The YC-131Cs were flown at all altitudes up to 39,800 feet and over distances as far as from Seattle to San Antonio non-stop, an air distance of about 2,500 miles. The twin-engine turboprop test program was completed in December 1955, six weeks ahead of schedule.

The appearance of the YC-131C on the nation's airways caused quite a few humorous incidents. For example, Maj. William R. Stanton of Chamberlain, S. D., was making a routine position report one day on a flight between Kelly and Travis AFB, Calif., when a commercial airline captain radioed Major Stanton to repeat that he was in a Convair C-131 at 25,000 feet indicating speeds in excess of 300 mph. When the major replied it was a turboprop, the airline captain could only say, "Oh!"

The same power combination used in the YC-131Cs is the power package that will be used in most of the Lockheed Electras now on order by the commercial airlines.

Meanwhile, in September 1955 the two modified KC-97Gs had arrived. The power package on this aircraft was the Pratt & Whitney T-34 with a Curtiss turboelectric propeller, which gave it sixty percent more power than the standard KC-97G at a weight reduction of about 2½ tons.

The same sort of program of flight and ground crew familiarization as with the YC-131 was undertaken on the YC-97J. In December 1955 this turboprop version made its first over-water flight. The flight was for route familiarization from Kelly AFB to Bermuda and return. The 2,100-mile flight from Kelly to Bermuda took four hours and forty-two minutes at an altitude of 25,000 feet, an average ground speed of 450 mph.

When the YC-97J entered the test program, the T-34 engine had an allowable 150 hours of flying time between overhauls. This has steadily increased to 900 hours. The first engine to reach 1,000 hours since overhaul was removed recently with a total of only forty-four unscheduled maintenance man-hours recorded. At present, four more engines are authorized to go to 1,000 hours before overhaul.

In the service test program the T-34 engine has run the gamut of extremely hot and cold weather engine operation and ground handling. No engine stalls or pulsations have been encountered from sea level up to 36,000 feet. An engine has been relighted above 20,000 feet after cold soaking at 25,000 feet for a period of five hours at temperatures of minus thirty degrees Centigrade with the propeller feathered.

After an early series of difficulties that caused considerable concern, the Curtiss-Wright propeller now is authorized up to 1,100 hours between overhauls with an analytical tear-down inspection every 350 hours. This propeller is now coming up to all expectations.



ABOUT THE AUTHOR

General Allen commands the Continental Division of MATS. He'd also been in MATS before becoming AF Director of Information in 1954. Born in North Carolina in 1910, he was commissioned in 1933. In WW II he served in the 7th and 13th AFs in the Pacific. He later served in AF Hq., in the Directorate of Intelligence.

How well we got along with the large turboprop engines is evidenced by the distances flown and the cargo hauled by the YC-97J.

This aircraft has flown both the Atlantic and Pacific, and in addition to carrying payloads of more than 25,000 pounds from Charleston AFB, S. C., to Puerto Rico, one of the YC-97Js recently replaced two four-engine C-54s in scheduled transport operations. It carried a 24,000-pound payload from Dover AFB, Del., to Burtonwood, England, in the round-trip time of twenty-four hours and five minutes. The long-range cruise ability of the turboprop engine eliminated a mid-ocean stopping point, and the flight was made non-stop from Argentina, Newfoundland, directly to Burtonwood, England.

The rapid rate of climb and the speed of the turboprop YC-97Js also provided an interesting sidelight on their world flights. Once while making a radar control take-off from London International Airport, Maj. Calvin E. Jarnigan of Colorado City, Tex., was told by the ground controller to, "Please slow your rate of climb; you are fast flying out of my scope." Major Jarnigan obliged by

(Continued on following page)



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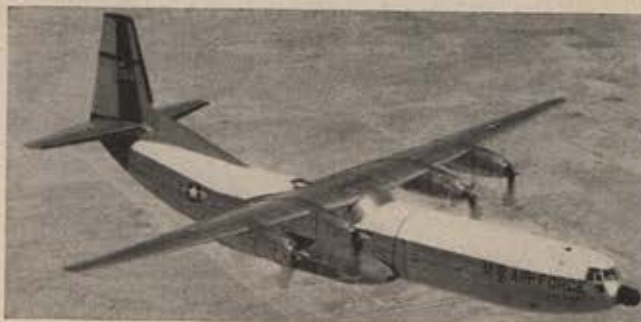
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TURBOPROPS

CONTINUED



The turboprop Douglas C-133A was the first aircraft designed and built especially for an air logistics mission.

reducing the rate of climb to a mere 2,000 feet per minute.

In February 1956, the last two test-bed airframes, the YC-121Fs, were received with the Pratt & Whitney T-34 engine and the Hamilton Standard turbomatic propeller. This is the same engine as on the YC-97Js but geared to the Hamilton Standard propeller.

Early in the test program the need for a major redesign of the propeller pump housing became evident on the Super Connies. This involved new castings of much greater strength, and the time entailed meant the YC-121Fs would have to be grounded. With the receipt of the new propeller pump housings, The Super Connies began an accelerated program of testing.

Like the YC-97J, the Constellation has also been subjected to extreme long-range flights on route survey and carrying high-priority cargo for the Defense Department.

One of the Super Connies early in 1956 crossed the North Atlantic to Germany and returned by way of the Azores, over the mid-Atlantic route. On this flight the time from Gander, Newfoundland, to Shannon, Ireland, was four hours and sixteen minutes.

In November another Connie was put into cargo operation and made the crossings non-stop from Newfoundland to Burtonwood, England.

The test program of the YC-97J, like the YC-131C, was completed six weeks ahead of schedule after having flown more than 3,240 programmed hours on the two airframes. To date, we have amassed more than 24,000 flying hours on turboprop engines.

The successful completion of the YC-131C and YC-97J programs and the experience accumulated thus far on the Super Connie turboprop transport have shown us the value of this test program. It has given an immeasurable contribution to turbo-powered transports being produced for our operational units. These tests have been and will be of great value to the commercial turboprop program.

In the military we are now in the air logistics era. Not only do we find it more efficient to supply and resupply our operational forces by air, but in the long run it is also far more economical in most cases. The turboprop Douglas C-133A represents the first plane specifically designed and built for the air logistics mission. The development of the Douglas C-132 was for the same purpose.

But we have only scratched the surface in commercial air cargo. As the cost per ton mile comes down, new and wider delivery of air cargo becomes possible. It is as the logistics carrier that the turboprop transport will have greater and greater application. And when the day comes that passenger transports fly in the stratosphere at speeds faster than sound, the turboprop cargo carrier will be plugging away at around 30,000 feet at about Mach .85, delivering vast quantities of the goods of tomorrow's commercial markets.—END



One of GPL's ground speed and drift angle measuring equipments, AN/APN-81, provides basic input information to computers which tell Air Force WB-50s exactly where they are

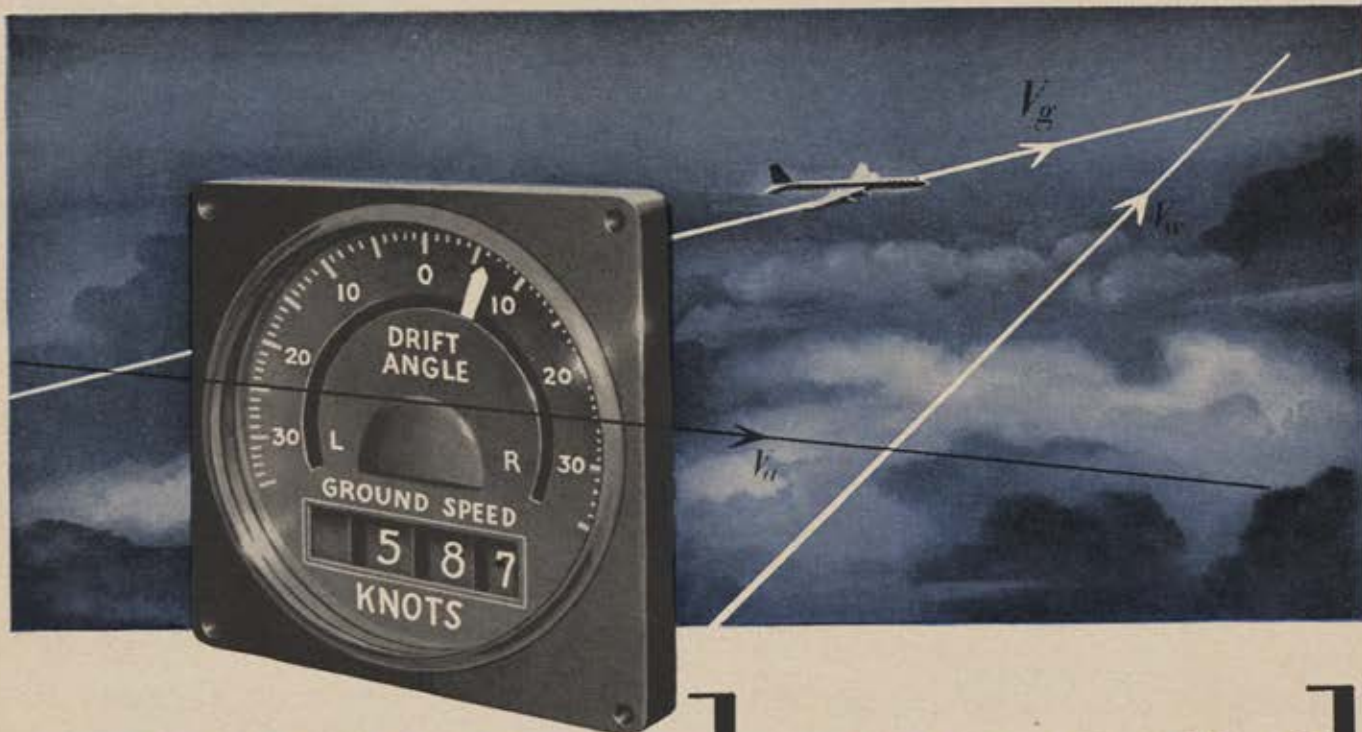
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COMPUTERS AND PROCESS CONTROL discussed by *Eric Weiss*

The application of digital computers to the direct control of processes brings up these two questions:

- (1) Can the control functions be properly formulated?
- (2) Can computers be made reliable enough?

Speed is no problem. Today's memory developments offer practically instantaneous access. A 50 kc or 100 kc serial computer is fast enough to satisfy most control operations. When this is not fast enough, the overall speed can easily be increased one or two orders of magnitude through the use of a parallel machine.

There is another way of speeding up a computer. Rather than build a general purpose machine which can compute any problem we like to code into it, special purpose computers can be designed and built for special jobs. The same proven elements would be utilized, but would be arranged in different arrays in order to come up faster and more directly with the desired solution. The resulting machine would most likely do the job faster without actually increasing the repetition rate.

The problem of reliability is not so easily disposed of. In the past, digital computers were primarily used as mathematical tools to compute lengthy mathematical problems or to process repetitive data. If a computer made an error once every billion operations (which at the rate of 100 kc would be every three hours), it was not too serious. The error was caught and the problem, at the worst, computed again.

The moment we start thinking about a computer in direct control applications, the problem becomes more critical. If the computer controls some sort of manufacturing or chemical process, a single error at the wrong time in the wrong spot can be catastrophic. Under such circumstances, an error probability of 1 in a billion cannot be tolerated. An almost errorless operation is required.

Most digital computers presently in production have a large number of hot vacuum tubes. These are the least reliable elements in a computer. Their filaments burn out; envelopes leak; or various fragile elements short.

During the last decade, a series of solid state elements has been developed which make it feasible to build a computer without vacuum tubes or moving elements. The diode, the transistor, the magnetic amplifier, the magnetic core and several other elements in this class can be expected, unless abused, to live and operate without mistakes practically indefinitely. Furthermore, they are considerably smaller, lighter, and less power consuming.

Consider a flip-flop, for example. Utilizing vacuum tubes, a flip-flop consists of at least a double triode, several crystal diodes, resistors, capacitors, plus the necessary hard-



Eric Weiss, nationally-recognized authority on computer philosophy and design, discusses the use of digital computers in process control.

ware to mount the same. Such an assembly normally occupied the same space as a king-size package of cigarettes, and the required accessory equipment, such as power supply or air conditioning, occupied a similar space. In contrast, a transistor flip-flop could be packaged in a volume of the size of a peanut shell with the corresponding power supply even less. The power consumption is so minute that the unit can be potted and it is quite likely in the near future a whole computer could be potted.

The major obstacle to the use of computers in control applications is the lack of understanding of the processes which are to be controlled. A scientist can play with a general purpose computer in a control system. He can code it by trial and error. Once the formulae have been determined, a special purpose computer that would be smaller, faster, and more efficient, can be built to control the process.

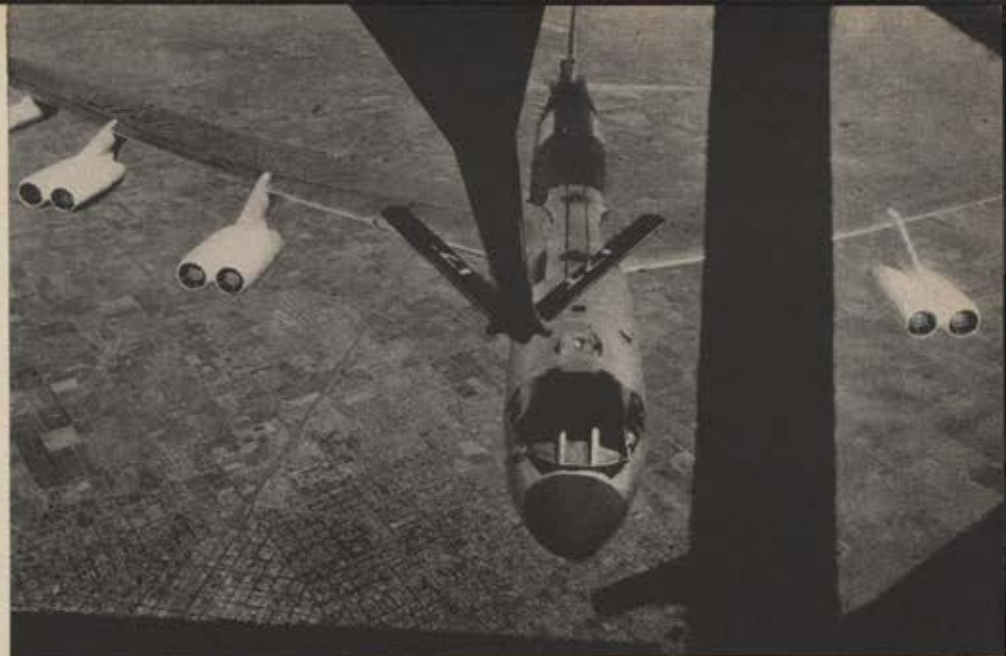
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Trickiest part of the refueling operation is making contact. Here the KC-97's boom approaches the B-52.



AIR FORCE CAREERS

NO. 6 OF A SERIES

Here's a Business That's Really BOOMING

By Flint O. DuPre



"Customer's" eye view of the airman on the tanker who lowers the boom.

THE art of in-flight refueling was never demonstrated more dramatically than late in 1956 and early this year when the Strategic Air Command staged three intensive combat training exercises involving long-range, non-stop flights.

The most dramatic was the round-the-world, non-stop flight of a trio of Boeing B-52 Stratofortresses, which landed in California in January after a 24,000-mile flight that took forty-five hours and nineteen minutes.

Earlier, eight B-52 jet bombers had flown continuous flights ranging from 13,500 to 17,000 miles in periods of twenty-six to thirty-two hours. And in another test of SAC flexing its muscle, more than 1,000 B-47 Stratojet bombers flew non-stop missions averaging 8,000 miles each during a two-week period ending in December.

These sustained flights were made possible by mass in-flight refueling, day or night, which caused one wag to remark: "Clancy has never lowered so many booms."

Clancy never did. Nor did any of the hundreds of other airman boom operators in the Air Force whose skill in handling their assignments in the

tanker planes helps make these mass training operations go smoothly.

Called boom operators, these airmen are classified in career field 43173 as "in-flight refueling technicians." They belong to tanker crews assigned to air refueling squadrons, primarily in SAC and Tactical Air Command. Besides knowing how to operate both the hose-type and boom-type refueling systems, they also must be able to inspect, maintain, and repair their equipment. In addition, they serve as trouble-shooters in case something goes wrong with the equipment—which seldom happens—and as members of the tanker crew they serve as scanners for other aircraft.

Like other specialists in the Air Force, they speak a language of their own. You're apt to hear such words as rudder controls, surge boots, nozzles, hydraulic pumps and valves, signal amplifiers, boom instrument gauges, and float switches. Most of these airmen have completed in-flight refueling courses and have had some experience in aircraft maintenance. They start in as airmen second class, can go up to staff sergeant or even higher in special categories and, of

course, they're all on flying pay status.

One of the top "Clancys" in the Air Force is a tech sergeant, Clinton Wallace, a boom operator who transferred 135,000 pounds of JP-4 fuel to a B-52 in a single day. Though this was done in a test operation, you might say it makes Sergeant Wallace a real gasser. Wallace also holds the record for transferring fuel rapidly in operations for the Air Proving Ground Command, where tankers are tested. In 1953 Sergeant Wallace became the first boom operator ever to refuel an aircraft over the North Pole. Like many of the current boom operators, he saw combat during World War II, when as a B-24 radio operator he flew more than fifty missions over France and Germany.

Another typical boom operator is SAC's M/Sgt. Daniel P. La Rouech, now stationed at MacDill AFB, Fla. He was at Hickam Field when the Japanese hit Oahu in 1941, and later flew combat in B-18s. He accompanied the first B-17 outfit to Guadalcanal. After a spell as gunnery instructor, in the States, he went to Italy and flew forty-two more missions. He left

(Continued on following page)



S/Sgt. Ray Lewis, a TAC KB-29 crewman, preflights his boom before take-off.



This scene is duplicated somewhere in SAC every three and a half minutes.



The KC-97's boom operator can, with a clear conscience, lie down on the job.

the AF after the war but was recalled in January 1951 and joined SAC's 306th Air Refueling Squadron. By now he knows the KC-97 Stratotankers inside-out. He should, for he's logged more than 1,500 hours, and has pumped more than 2,000,000 pounds of fuel in more than 600 aerial hook-ups.

Come along with Sergeant La Rouech while he and the rest of the KC-97 crew (pilot, navigator, engineer, and radio operator) gas up one of SAC's six-jet B-47s, which is moving along at 300 mph at an altitude of 15,000 feet. Sergeant La Rouech glances toward the jet fuel tanks along the tanker's port bulkhead, calculates he may have to fill most of the fifteen jet fuel tanks on the B-47 with perhaps 5,800 gallons of fuel. If you were actually on the flight he'd tell you that jet fuel is measured in pounds. This transfer would mean about 40,000 pounds of fuel, which La Rouech knows is a "good drink" for the B-47.

As the KC-97 flies above and slightly ahead of the B-47, La Rouech stretches flat on his stomach on the floor of the plane, resting on a sled-like platform. This puts him in a working position to lower the boom for the all-important hook-up. He wears radio earphones and a speaker attachment so he can talk with the tanker crew to time the "marriage" of the two planes. The boom he is operating—a metal tube twenty-seven feet long with a twenty-foot telescoping section—is equipped with control surfaces, so it can literally be flown. The metal boom—much more effective than the earlier British hose and reel devices—was developed by the Boeing Airplane Company. Boeing made early experiments with fire hose, until the idea of using pipe and lowering the boom was conceived. A Boeing engineer named Cliff Leisy and the AF's Lt. Gen. Clarence S. Irvine, now Deputy Chief of Staff for Materiel, can be credited with the early vision that eventually led to routine mass inflight refueling.

Back to Sergeant La Rouech. He has his right hand on the stick that controls the boom and his left hand on the telescoping section of the boom extension. Angling the boom to the right and to the left, and up and down, toward the slipaway doors which cover the fuel receptacle in the B-47's nose, La Rouech makes his play. The doors are released and the filler hole looks mighty small to him as he angles the boom for a hook-up.

(Continued on page 93)



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REFUELING _____ CONTINUED

Suddenly there's a loud WHAM as the metal tube slams into the hook-up hole. La Rouech then pushes a switch, and the fuel starts pumping hydraulically through pipes and into the refueling boom at a rate of 600 to 900 gallons a minute. The crew's flight engineer controls this operation.

After about fifteen minutes the operation is finished, and there is another loud WHAM as La Rouech disconnects the boom. Valves close automatically, and the pressure disconnects to complete an operation which is repeated somewhere by SAC about every three and a half minutes, around the clock.

SAC's bomber wings have their own tanker planes which go with them on routine training flights and to Europe or other parts of the world in rotational training.

Though SAC is the admitted leader in in-flight refueling, TAC is using this technique more and more to extend its range. Late last year TAC showed how fast it could move from one part of the world to another by flying three types of aircraft—North American F-100 Super Sabres, Republic F-84 Thunderstreaks, and Douglas B-66 Destroyers—non-stop to Europe from US bases. The refueling planes were B-29s and B-50s, converted to tankers. TAC also has made record flights across the United States—one in less than four hours—through the aid of in-flight refueling.

And now, to make the service at these aerial gas stations even better, the tankers are going all jet. Early last month SAC took delivery on its first Boeing KC-135 jet tanker. The KC-135 can fly at more than 550 mph and can operate above 42,000 feet. The sweptwing plane is built to refuel jet bombers or fighters while flying at speeds the KC-97s could never hope to attain.

So, through continuous cooperation between the military and industry, mass in-flight refueling operations have become routine. And Clancy takes on greater importance and a new sense of responsibility as jet-age aircraft maneuver high in the sky every few minutes for "just another drink."—END

ABOUT THE AUTHOR

Flint O. DuPre, the author of this series on airman careers, is a civilian employee in the Office of Information Services, Hq., USAF. He's been connected with AF information, both in and out of service, since 1942. Before then he was a reporter for the Dallas Journal and the Dallas News.

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The READY ROOM

RESERVE AND AIR GUARD NEWS



Brig. Gen. Jerry W. Davidson, left, commander of AFR's Lone Star Wing, and Lt. Col. Joe Earll, right, Hensley Flying Center commander, look over one of the new F-86Hs. In center is Maj. Bruce Baize, who delivered the Sabre.

The Air Force Association's fourth annual Earl T. Ricks Memorial Trophy event for Air National Guard jet pilots will be held this year on Sunday, July 28, from Fresno, Calif., to Washington, D. C.

The 1957 event will be restricted to Republic F-84F and RF-84F aircraft. Last year's event, won by Maj. David F. McCallister of the Delaware ANG, was run between San Francisco and New Orleans and featured North American F-86 aircraft. Approximately nine aircraft are expected to participate in the 1957 event.

The trophy event is held annually to point up the high level of proficiency ANG pilots maintain, and also to honor the memory of the late Maj. Gen. Earl T. Ricks, who was chief of the National Guard Bureau's Air Force Division at the time of his death three years ago.

The National Guard Bureau has made a major change in the operational part of the 1957 event. In past years entrants were permitted to select their own refueling stops. This year the Bureau has ruled that the pilots will fly a prescribed course. They will refuel at Air National Guard bases in Tucson, Ariz.; Dallas, Tex.; and Marietta, Ga. The change was made in the interest of increasing safety. With only nine aircraft in the event, spacing can be arranged to eliminate crowding at refueling points.

The event will begin from California's 146th ANG Wing area at Fresno Municipal Airport and terminate at Andrews AFB. The winner will receive the Ricks Trophy during the Air Force Association's annual Convention in Washington, which opens July 30.

Maj. Milton Graham of the 146th Wing has been named project officer at Fresno. Over-all project officer for the National Guard Bureau is Maj. Billy C. Means of the Operations and Training branch.

Previous winners, in addition to Major McCallister, are Lt. Charles Young of New Jersey and Lt. Col. James Poston of Ohio.

Three Reserve wings and an ANG unit in Tenth Air Force have won Continental Air Command's flight safety achievement awards for going through six months without an accident. The units are the 434th Troop-Carrier Wing of Indiana, the 437th Troop-Carrier Wing of Chicago, the 442d Troop-Carrier Wing of Kansas City, Mo., and the 131st Air Guard Bomb Wing of St. Joseph, Mo.

Air Force last month canceled out thirty-six additional paid drill periods for Reserve navigators who are not members of crews in tactical units.



At Northrop, in cockpit of mock-up of new T-38 trainer are Maj. David McCallister (front) and Brig. Gen. William Spruance. At left, Maj. William Means. At right, Col. Bob Martell, Col. Bob Campbell, and Northrop's Bob Love.

The thirty-six additional paid periods were authorized last year for rated members of the Reserve and Guard to compensate the flyers for the time they are required to spend at air bases in order to meet minimum flying standards.

All members of navigation squadrons throughout the country are affected by the ruling, which stems from an opinion of the Comptroller General that these flyers are not eligible for the additional paid periods since they do not train as aircraft crews.

Members of these squadrons had used the additional periods principally for training in night and celestial navigation.

The first North American F-86H Sabrejets to be delivered to the Air Force Reserve were turned over to the 448th Fighter-Bomber Wing at Dallas last month (see cut), the first time that any Reserve flying unit has been equipped with sweptwing fighter aircraft.

There are nine Reserve fighter-bomber units, and six are scheduled to be flying the new Sabrejets by the end of September. The remaining three will be converted to troop-carrier wings.

Units scheduled to receive the new fighters, in addition to the Dallas wing, are: 89th Wing at Bedford, Mass.; 319th at Memphis, Tenn.; 438th at Milwaukee, Wis.; 439th at Selfridge AFB, Mich.; and 482d at Dobbins AFB, Ga.

The Sabrejets will replace the older and slower F-80 and F-84 aircraft currently in the Reserve inventory.

Continental Air Command—which trains the twenty-four-wing Air Force Reserve and supervises training of the twenty-seven-wing Air National Guard—has been given another mission. In the future ConAC will act as federal coordinator of all search and rescue activities within the continental limits of the country.

Responsibility for coordinating search and rescue activities within the United States was given to the Air Force last spring as a result of recommendations made by President Eisenhower's Air Coordinating Committee. In announcing that ConAC had been selected as the Air Force agency to carry out the task, Lt. Gen. Charles B. Stone, III, ConAC commander, said the committee proposed a national network of all agencies having a search and rescue capability working together to give "assistance to military and non-military persons and property."

—EDMUND F. HOGAN

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of an integrated program in solid state physics. Studies of chemical, mechanical and surface properties of solid crystals and "sputtering" of metals under ion bombardment are among several other areas presently being researched in the Electron Physics Laboratory.

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How SECTION 5 Operates

By Col.
Ben W.
Lichty



THE first time you tell an old friend that you're serving in the Pentagon with the Section Five Committee, you can be sure to draw the raised eyebrow and the incredulous, "Five?"

Well, there is a Section Five Committee; in fact, there are two. There is a Section Five Committee for the Air National Guard and one for the Reserve. Each committee has six members, two alternates, and an executive secretary who, by the way, is the only member on extended active duty. I hold the job for the Guard committee, and Col. William Westlake is the executive secretary for the Reserve committee.

There is a third element of this committee. This is a group of Regular Air Force officers. It is composed in the same fashion as the Reserve and Guard groups; that is, six members and two alternates. Meetings are held jointly, at least twice each year, and when the three elements are combined the eighteen-man group becomes officially "The Air Staff Committee on Air National Guard and Air Force Reserve Policy."

The committee has its origin in Section V of the National Defense Act which appeared in its original form on the statute books in 1916. The committee's basic mission is to prepare policies and regulations affecting the Guard and Reserve. But its task is much broader. It reviews, qualifies, modifies, adapts, accepts, or rejects regulations and policies written or drafted for the two Reserve components of the Air Force.

Members of the Air National Guard committee are selected from lists of qualified officers submitted through the National Guard Bureau by adjutants general of the states. Reserve committee members are selected from nominations made by civilian organizations having a prime interest in Reserve activities, such as the Air Force Association. In fact, the chairman of the Reserve committee

and chairman of the joint committee is the president of the Air Force Association, Brig. Gen. John P. Henebry.

Few Guardsmen and Reservists know what the committee is, let alone how it gets the subjects it considers at each meeting. The agenda items come from six principal sources: committee members themselves, the Air Staff, local policy committees of Continental Air Command's four numbered Air Forces, ConAC headquarters, National Guard Bureau, and civilian organizations, such as AFA, representing the Reserve forces.

A case in immediate point is the thirty-six additional paid training periods authorized last year for rated members of the ANG and Reserve. This was the subject of a resolution adopted at the AFA national convention in San Francisco in 1955. The Association transmitted this resolution to the committee with a strong recommendation that it be approved. The committee considered and gave it the green light. The Secretary of the Air Force concurred and subsequently the policy was announced.

Our committee at the Air Force headquarters level leans heavily on the local committees. These are provided for in Air Force Regulation 45-5, which directs that a Guard and Reserve policy committee be established at the headquarters of each numbered ConAC Air Force. These groups are composed of six members each and meet separately or jointly with six active-duty officers of the particular Air Force.

The method of selecting members for the local groups is much simpler than for selecting members of our groups. The numbered Air Force commander appoints both the ANG members and the Reserve members. There is one restriction. At least one member of both the Guard and Reserve groups must be an airman. These committees solicit recommendations from local units and also act as advisors to the Air Force commanders on matters pertaining to the ANG and Reserve.

Early next month our Section Five group will meet to ponder a number of policies of direct concern to the Reserve and Guard. The Reserve members will be:

General Henebry of Chicago; Brig. Gen. T. B. Herndon of Baton Rouge, La., who is also chairman of AFA's Air Reserve Council; Brig. Gen. Paul S. Zuckerman of New York; Col. Daniel DeBrier of New York; Brig. Gen. John H. Foster of San Antonio; Brig. Gen. Clayton Stiles of New York; Col. John O. Bradshaw of Indiana; and Col. Newton H. Crumley of Nevada.

The Air Guard members will be:

Brig. Gen. G. Robert Dodson of Oregon; Brig. Gen. Lewis A. Curtis of Massachusetts; Brig. Gen. Allison Maxwell of Indiana; Brig. Gen. Philip P. Ardery of Kentucky; Col. Emmanuel Schifani of New Mexico; Col. Bernard M. Davey of Georgia; Col. Philip E. Tukey of Maine; and Brig. Gen. William W. Spruance of Delaware, who is an AFA Regional Vice President.

The Regular Air Force members will be:

Maj. Gen. Daniel F. Callahan, Maj. Gen. William S. Stone, Brig. Gen. C. Pratt Brown, Maj. Gen. Richard H. Carmichael, Brig. Gen. John S. Hardy, Brig. Gen. Maurice A. Preston, Col. L. P. Dash, and Col. Harry R. Page.

The Section Five Committee was designed to be used by Guardsmen and Reservists. They can make better use of it, we believe, if they know what it is and what it does. —END

ABOUT THE AUTHOR

Colonel Lichty has served as executive secretary for the ANG Policy Committee since October 1955. In WW II, he served twenty-eight months in the CBI. After the war, he commanded the Missouri ANG. In 1951 he commanded Bergstrom AFB, Tex. In 1954 he was transferred to England to head various SAC air base groups.

Tech Talk

By Bob Strobell

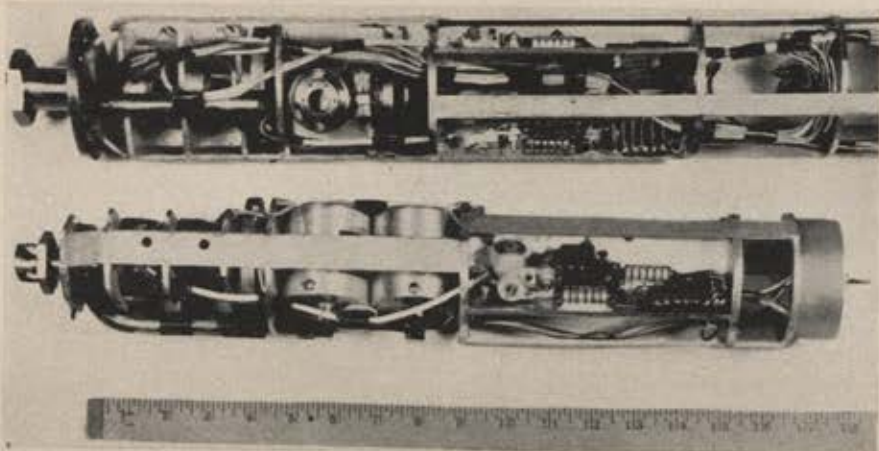


Lockheed C-130 on first flight with skis. In-flight behavior of the nineteen-foot skis was monitored by television mounted in pod under right outer wing.

The Lockheed C-130 Hercules made its first flight, in January, equipped with giant skis. The fifty-one-minute flight was the world's first for a ski-equipped propjet. The take-off and test flight were made in the "wheels down, skis up" position (*see cut*), from Dobbins AFB, which adjoins the Lockheed Aircraft Corp. plant at Marietta, Ga. A Lockheed T-33 jet chase plane followed the sixty-two-ton propjet throughout the test. In-flight behavior of the two main skis, which weigh 1,700 pounds each, and the smaller nose ski was monitored continuously by a television camera. A Farnsworth 600A television camera, with a wide-angle lens, was mounted in a two-foot-diameter Fibreglas pod under the right outer



Multi-purpose "pillow-tire" Tera-cruzer with eight-wheel drive—built by Four Wheel Drive Auto Co.—and Goodyear Aircraft's Translauncher trailer are designed to blaze their own trail to off-road launching sites for Martin Matador.



Close-up of small and rugged instruments (for measuring atmospheric pressure and density) which are completely contained within the pitot static tube of an Aerobee-Hi rocket. One Aerobee-Hi rocket launched recently reached an altitude of 125 miles carrying these instruments, which continuously measured both ram and atmospheric pressure despite heat and vibrations during the flight. They were designed by the Decker Aviation Corp. for upper atmosphere research programs.

wing. It gave the flight test engineer in the C-130 cargo compartment a continuous picture of the action of the skis on a ten-inch monitor screen.

The Hercules is in large-scale production for the Tactical Air Command. The ski-and-wheel version will be used for Arctic and Antarctic operations, while other versions of the C-130 will serve for heavy-duty hauling, cargo dropping, aerial ambulance, paratrooper plane, and for high-speed personnel carriers.

Air Force's new "pillow-tire" Tera-cruzer truck and Translauncher semi-trailer, for the Martin TM-61B Matador missile, were unveiled on January 21 at President Eisenhower's Inaugural Parade. Both truck and launcher

(*see cut*), ride on huge barrel-like tires and are capable of carrying the missile and all support and launching equipment to previously inaccessible launching sites because they can move over terrain impassable to standard military trucks. The Matador is transported on the launcher with its wings folded back against the sides of the missile. The ability to move the Matador in this condition means that it takes less time to assemble the missile at the firing site, and that it can, thereby, get into action quicker. The Tera-cruzer multi-purpose truck, made by Four Wheel Drive Auto Co., has an eight-wheel-drive system. Goodyear Aircraft Corp. built the Translauncher. Both vehicles have low-pressure Terra-Tires made by the Goodyear Tire & Rubber Co.

(Continued on page 101)

From the idea...



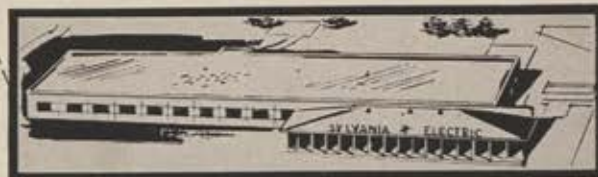
Headquarters for the Division, the Waltham Laboratories, in Waltham, Massachusetts, specialize in advanced systems related to guided missiles, avionics, radar, data processing and electronic warfare.



The Electronic Defense Laboratory, Mountain View, California, is a special development facility devoted to research, technical development and rapid fabrication of ground-based electronic warfare systems.



The Microwave Physics Laboratory, at Mountain View, California, is devoted to the investigation of new magnetic materials and ionized gaseous media for microwave control devices used in radar, communications and electronic countermeasures systems.



The Microwave Tube Laboratory, Mountain View, California, is engaged in developing and producing special tubes such as klystrons, traveling wave tubes, backward wave oscillators, and related devices.



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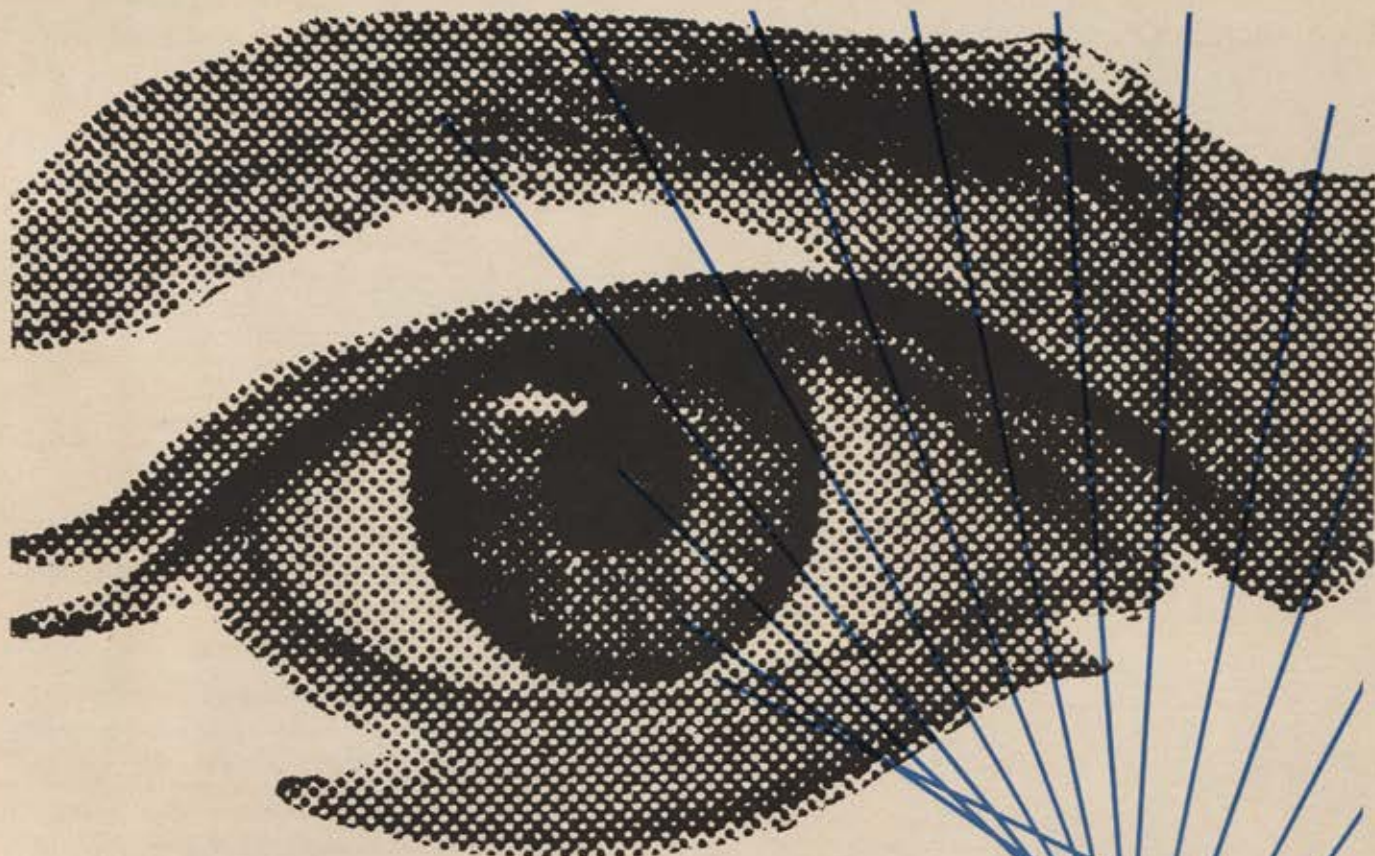
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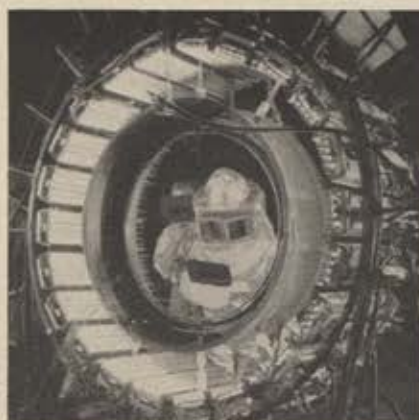
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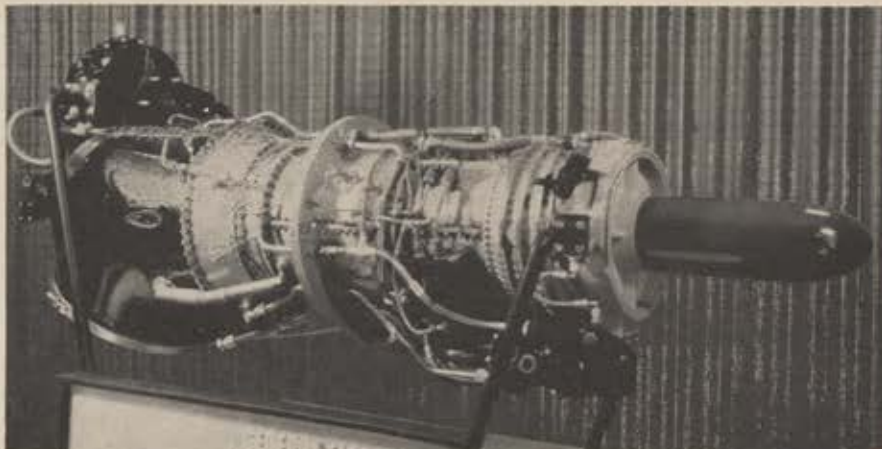
North American Aviation is probing the so-called thermal barrier in its Structures Test Laboratory, Los Angeles, Calif., where they are investigating the heat problems created by the speed of today's—and tomorrow's—aircraft and guided missiles. A metal ring simulating a portion of an aircraft's fuselage (see cut), is simultaneously heated, cooled, and subjected to stress in the triple-torture tests. The outside of the ring is heated to about 450 degrees Fahrenheit by a battery of infra-red lamps that encircle it, while the inside is cooled by cold air blown through perforated aluminum tubes. At the same time, hydraulic devices pull at the metal to simulate stresses that might be encountered in flight. Through the maze of tubes and wires runs power for the lamps, air for cooling, and electronic wires that carry impulses that automatically report strain and temperature data to batteries of recording devices.

A Lear miniature rate gyro, so precise that it supplies the split-second attitude references for the stability augmentation system on the Lockheed F-104, set a new record recently for standing up under rough treatment. For two hours it was strapped to a standard pneumatic pavement-breaking hammer under continuous operation, after which the gyro showed no deviation from specified performance. How rugged can it get?

The development of a computer that will play a decisive role in the launching of the Vanguard earth satellite next summer has been announced by Air Associates, Inc., Teterboro, N. J. The "coasting-time computer" will control the injection of the satellite into its orbit around the earth at precisely the right moment. It will collect flight data during the first stage and the thrust period of the second stage of the launching procedure. The launching vehicle gains sufficient momentum to coast to an altitude of 300 miles. Just before it reaches the apex of the trajectory, the computer generates a signal for the jettisoning of the second stage and the firing of the third stage. This gives the rocket the additional speed required for injecting the satellite into its earth-circling orbit. The task of the coasting-time computer is to gather flight data up through the second stage's thrust period and, from this data, compute the correct coasting time between the end of this thrust period and the jettisoning of the second stage and firing of the third stage. Air Associates have been



North American Aviation engineers in the Structures Test Laboratory study the triple-torture effects of simultaneously heating and cooling a metal ring simulating a portion of an aircraft's fuselage while subjecting it to stress. Test is part of company's investigation of the thermal barrier.



Full-size plastic model of General Electric's T-58 turboshaft jet engine is accurate in every detail. Aircraft manufacturers will use this model to plan airframe clearances and installation connections. Model is made of Fibreglas reinforced plastic resins which give excellent dimensional stability and will keep weight to a minimum. Atkins & Merrill, Inc., developed new techniques to mold and fabricate the model, saving considerable time over the old methods.



Hot rod! It's a bright red jet car (powered by four Allison J-33s), developed by All American Engineering Co. of Wilmington, Del., for the Navy, to test aircraft arresting gear. The driverless car roars down a test track at 200 mph, pushing a load equal to a twin-engine bomber, which is cut loose and slams into the arresting gear being tested.

working on this project since the Martin Co., prime contractors for Vanguard, awarded the subcontract last spring.

A pocket-sized live television camera has been developed by the Radio Corporation of America for military airborne, mobile, and field closed-circuit TV applications. The pocket-sized TV camera (JTV-1) weighs less than a pound and measures only 1 7/8 by 2 3/4 by 4 1/2 inches, yet surpasses standard vidicon-type industrial TV cameras in sensitivity. The tiny camera was made possible by a new design approach which combines transistors, specially developed transistor circuitry, and a new RCA half-inch vidicon camera tube. Used with an F-1.9 lens, it requires only ten-foot candles of scene illumination for clear, contrasty pictures.

It will open new fields of application for closed-circuit television, permitting direct observation and reconnaissance in places and locations heretofore inaccessible to existing TV camera equipment. In airborne and mobile use, the ultra-miniature camera promises quality television with savings in vital space and power. The camera can be operated in the palm of the hand, used with an attachable pistol-grip handle, bolted to wall or floor, or mounted on a tripod. It is the first TV camera of its type to incorporate a photoelectric iris control, which automatically activates specific camera circuits to compensate for changing light levels. The control enables the camera to accommodate changes in the order of one hundred to one.—END

AFA NEWS

SQUADRON OF THE MONTH

H. H. Arnold Squadron, Long Island, N. Y., Cited for its outstanding program designed to better acquaint the Long Island communities with their role in aviation, and to dramatize the importance of aviation in the American way of life.



At Long Island's H. H. Arnold Squadron program (see below), from left: Republic's Walter G. Bain; former GOP National Chairman Leonard Hall; Fairchild's George F. Chapline; and George S. Trimble of the Martin Co.



Lou Davis, right, Arnold Squadron Commander, chats with Ken Ellington and guest speaker George S. Trimble.

If its first formal program is any indication of things to come, you'll be hearing a lot about the H. H. Arnold Squadron on New York's Long Island.

Picking up the Jet Age theme, the Squadron is sponsoring a series of four programs designed to dramatize the importance of airpower and its relationship to the development of the community, and at the same time to focus public attention on Long Island's place in the nation's airpower picture.

The first program, held in December, was billed as "Air Industry Reports." Leading aviation industry representatives discussed the role industry plays on the Island and showed how that role fits into the national defense picture. Ken Ellington, vice president of the Republic Aviation

Corp., as program chairman, worked with Lou Davis, the Squadron Commander and public relations manager for Fairchild's Engine Division, in staging the event, which attracted a capacity audience of 375.

Mr. Ellington introduced the four speakers on the panel, who were: Carl A. Frische, vice president in charge of engineering for the Sperry Gyroscope Co.; George F. Chapline, vice president and general manager of Fairchild's Engine Division; Walter G. Bain, vice president and general manager of the Republic Aviation Corp.; and Robert L. Hall, vice president of Grumman Aircraft Corp. Each presentation was followed by a question-and-answer period.

The guest speaker at the dinner was George S. Trimble, Jr., vice president in charge of engineering for the Martin Co., whose topic was "The Expanding Horizons in Aviation."

Mr. Ellington, who served as one of the panelists at AFA's second national Jet Age Conference in Washington last month, has announced these plans for the remaining three programs: February 14—"Youth Looks at Military Careers," chairman: Carlyle Jones, director of public relations for the Sperry Rand Corp.; late March or early April—"Classroom in the Sky," chairman to be appointed by the Air Transport Committee; and May 20—"Long Island Pioneer Day," chairman: Jack Retaliatta, Grumman Aircraft public relations director.

The accomplishments of this unit earn it AFA's "Squadron of the Month" citation for March.

Dr. John F. Victory, Executive Secretary of the National Advisory Committee for Aeronautics, was the guest speaker at the January luncheon meeting of the Greater Miami Squadron, marking the second time that Dr. Victory has appeared before the Squadron. More than 150 members and guests were on hand.

Dr. Victory, who's been on the staff of NACA since 1915, is a walking encyclopedia of aviation history. He impressed on the group that this nation is rapidly losing the race with Russia for leadership in technological superiority. He also predicted that "within the lifetime of people in this room," men would fly to the moon and back safely.

Alan Cross, Florida Wing Commander, arranged the program. Dr. Victory was introduced by Grover Loening, a pioneer aviation engineer, designer, builder, and pilot, who now lives in Miami.

On March 2, Northern Californians will be treated to a "Manpower for Airpower" Symposium, co-sponsored by the Capital City and Sacramento Squadrons. It promises to be an outstanding program.

John R. Alison, a past AFA President and Board Chairman, and now a Director, will head the list of Association representatives. Speakers include California's Gov. Goodwin Knight; the Hon. David Smith, Assistant AF Secretary; Donald Douglas, Jr.; Brig Gen. Alfred Kalberer, 14th Air Division Commander; Dan Kim-

(Continued on page 105)



At McClellan AFB, Calif., Clive Davis of Capital City Squadron interviews Maj. H. M. Nix and M/Sgt. Jim Henderson for "Jet Age" weekly radio show.

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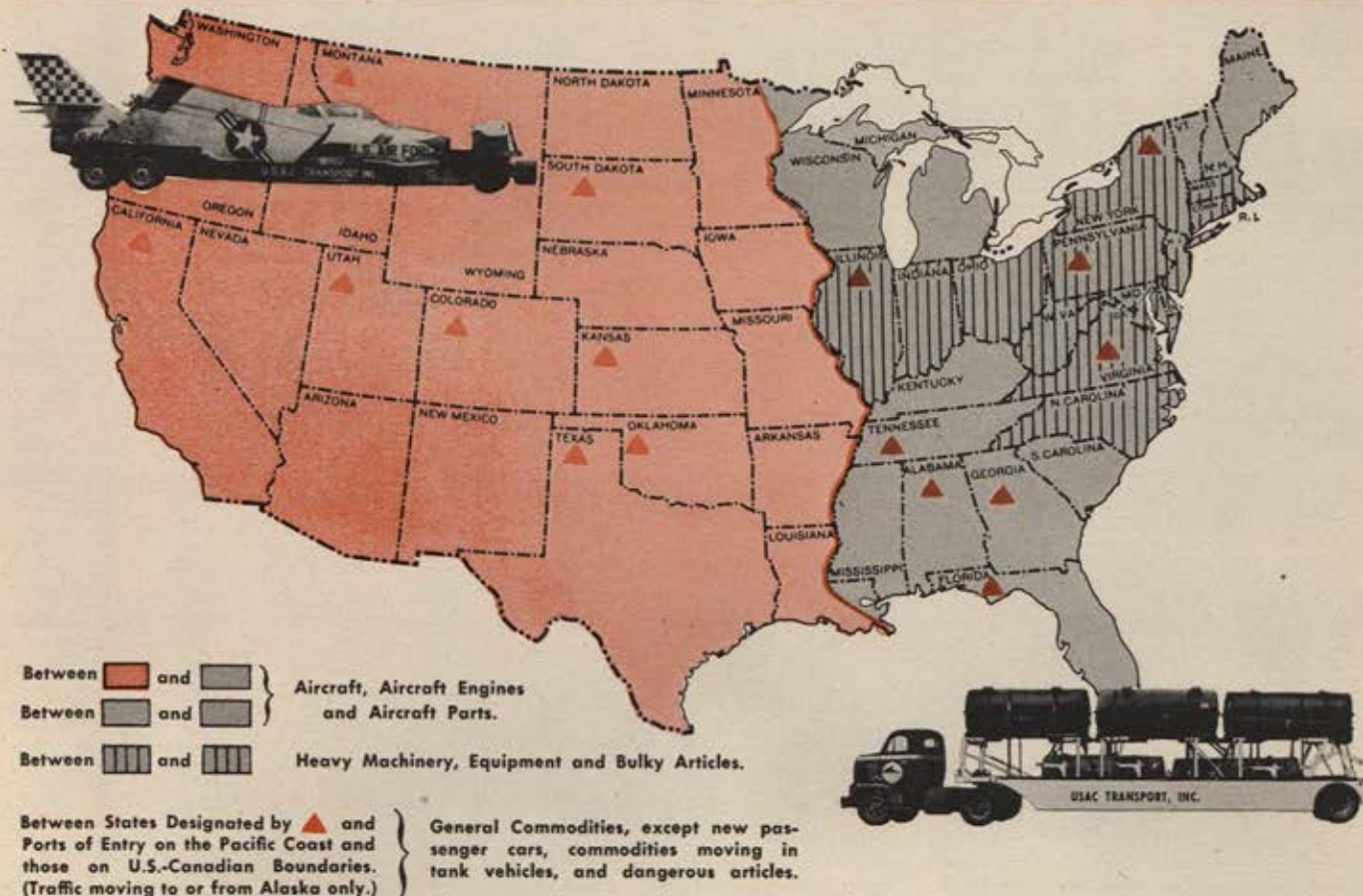
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ball, president of the Aerojet-General Corp.; Nicholas DeWitt from Harvard's Russian Research Center; and Brig. Gen. Kenneth Gibson, Commander, 8th Air Division.

The smooth-working combination of the well established Capital City Squadron and the recently reactivated Sacramento Squadron promises to be a tough one for other AFA units to match.

Col. Barney Oldfield, Air Defense Command information services officer, was the guest of honor in December at a luncheon sponsored by the Oahu AFA Squadron, commemorating the fifteenth anniversary of Pearl Harbor (see cut, below).

Plans for this memorial luncheon, which it is hoped will become an annual program, were made by Roy Lefingwell, AFA Vice President; Charles Fern, Wing Commander; Tom Rice, Squadron Commander; and Maj. Sammy West, ISO for the Pacific Air Force.

At one time Oahu was one of the most active Squadrons in AFA and was always well represented at the national conventions. We hope this program is an indication that the unit is on the way back to top activity.

Capt. Iven C. Kincheloe, the Korean jet ace and USAF test pilot who last summer set the 126,000-foot altitude record in the Bell X-2, was the guest speaker at the January 22 luncheon of the San Francisco Squadron, held at the Elks Club.

This was the seventeenth in the Squadron's highly successful "Airpower in Action" luncheon series. As a result of the series, the Squadron now is recognized as the airpower authority in San Francisco.

Also at the January meeting, nominations for 1957 Squadron officers



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TRANS WORLD AIRLINES

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were announced. The election was to be held by mail in order to give all 780 members of the unit a chance to participate in the Squadron affairs. The Nominating Committee, appointed by Commander Cliff Griffin, is made up of all ten past Squadron Commanders, only one of whom is unable to participate actively (he's on active duty with a SAC outfit).

The Squadron's big social event of the year—the annual Christmas party—was held at the Montclair Restaurant. More than 100 members and their guests attended the party, for which Bill Berman was program chairman.

At this writing, plans were being made for the third Squadron-sponsored tour for civic leaders of a nearby Air Force installation. The first two such tours resulted in a great deal of interest, publicity, and a number of new members for the San Francisco Squadron.

The Hoyt S. Vandenberg Squadron, of Detroit, since last summer has held seven successful major airpower programs. The most recent was held at Lessinger High School, in suburban Oak Park, where 145 students, their families, and guests, saw an F-86 Sabrejet, from Wright-Patterson AFB, on display, demonstrations of flight safety equipment by members of the 94th Fighter Squadron, films on air defense, and heard an address by Maj. Max Gurman, ISO for Tenth Air Force at Selfridge AFB. Russell Lloyd, Vandenberg Squadron Commander, also spoke, and presided at a reception given for area educators.

Mr. Clarence Baad, principal of the Oak Park high school system, was the honored guest. The program was planned to educate the youth of the area, and their parents, on the problems and challenges of the Jet Age.

CROSS COUNTRY. . . The Rob-
(Continued on following page)



At luncheon given for him by Oahu AFA Squadron (see text), Col. Barney Oldfield poses with (from left) Col. George Commenator, Hickam AFB deputy commander; Brig. Gen. Ralph Koon, Pacific AF vice commander; Colonel Oldfield; Tom Rice, Oahu Squadron Commander; and Chaplain (Capt.) Carroll N. Anderson.



The youngsters make a day of it as four members of the Greater Pittsburgh Squadron's Auxiliary (shown at the foot of the loading ramp) and Bob Patterson (at the top of the ramp), a pilot for Capital Airlines and a member of the Squadron, show one of Capital Airlines' new Viscounts to members of the Pittsburgh Squadron "Falcons" during the recent tour of the Pittsburgh airport.

ert S. Hart Squadron of New Orleans at presstime was hoping to duplicate its past year's success in the 1957 Mardi Gras parade. Last year the Squadron won first prize in its division with a float featuring a ten-foot model of the Convair F-102. . . . Miss Joanne Alford, AFA's "Miss Airpower," has recovered from her recent illness and is again on her lecture tour to the West Coast, then the Southeastern and Southwestern states. . . . Jack Gross, an AFA Director, has been chosen Chairman of the Harrisburg, Penna., Chamber of Commerce Military Affairs Committee. . . . Executive Director James Straubel is scheduled to speak to the Arnold Air Society Area C Conference in Washington in March; AFA President John P. Henebry will be a guest speaker at the National AAS Conclave at the Hotel New Yorker, New York City, on April 17. . . . New AFA Squadrons are being organized in St. Paul, Minn.; Orange County, Calif.; and Rochester, N. Y. . . . The Florida Wing, under the direction of Alan Cross, plans a Fiftieth Anniversary Salute to the USAF in Miami, tentatively scheduled for March 30.—END

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COLD SWEAT

in the Snow

By Maj. Robert E. Fuerst

RISING, McCracken yawned and stretched lazily. He walked to the door of the van and opened it and then shut it hastily. "Brrr," he said, shivering. "Still snowing like mad, Sam."

The other man looked up from his book and asked, "Heavy snow?"

"Yeah, real thick." McCracken looked at the weather board. "They're calling the ceiling zero and visibility a quarter."

"Do you think we could paint anything in this snow, Mac?"

McCracken shrugged. Radar was a funny thing sometimes. Thick snowflakes like these could be just as bad as heavy rain in a thunderstorm. "I don't know, Sam. But who's gonna be flying in weather like this?"

He wandered over to the thermos and refilled his cup. Yes, traffic was practically at a standstill on days like this. When he came on shift at noon there had been some talk of a Gooney Bird taking off in the afternoon, but it was almost three now. They had
(Continued on following page)

evidently decided to cancel the flight.

He turned toward Sam and asked, "How long has it been snowing, anyhow?"

"Three or four hours at least."

"No, I mean how many days. It seems like we've had snow every day for the past month."

"Last Thursday it didn't snow any. I think this is the fifth day now."

McCracken shook his head. "Misawa Air Base. They can give it back to the Ainus as far as I'm concerned." Misawa was no place to spend a winter; only one other Air Force base in Japan was farther north. Oh well, it was warm and cozy inside the GCA van.

"Rog. We'll have a chance now to see if this heavy snow interferes when we try to follow this bird out."

McCracken adjusted the radar equipment and stood before the glowing scope. To be truthful, he had his doubts about this one. Heavy precipitation could cause returns that blotted out a target completely. He'd seen it happen. And it was a frightening thing to watch the radar become useless just when it was needed most, in heavy rain or snow. Good thing this ship was going out instead of arriving.

"He's rolling now," said Sam over his shoulder.

McCracken nodded, and stared in-

Sam took off his earphones, stood up, and walked to the scope. Seeing the unmistakable crawling echo of the C-47, he shrugged and said, "It's a beaut, all right. Surprising." A transmission from the tower splattered the silence, and he returned to his chair and put the headset on and listened.

Mac continued to watch the blip as it slowly drifted westward and then began gradually turning to the left. In the middle of the turn the blip stopped curving and crawled along a straight line again. Mac was puzzled. And then out of the corner of his eye he saw Sam waving at him excitedly. Apparently there was something interesting going on and he slipped on the headset.

"... to Misawa. I say again, this is Air Force 5559 declaring an emergency. My left engine is inoperative and I am returning immediately to Misawa. Over."

"Wow," said Mac, glancing at Sam. "Rough." He studied the blip intently now; it had begun a slow turn to the right.

"Roger, 5559," said the tower. "Understand that you have an emergency. Do you . . . ?"

The phone broke in and Mac lifted an earphone and answered, "GCA. Sergeant McCracken."

"Tower, Mac. There's a Charlie four-seven in trouble about ten miles west. He's got one engine. . . ."

"I know, Andy. We've been monitoring your frequency. We have radar contact with him now and can take him whenever he's ready. It's a good contact."

"Roger, Mac. He's calling for GCA now. He's got thirteen passengers on board. Four crew members."

"Okay, Andy. GCA out."

The C-47 continued its slow turn to the right and the pilot, finishing his conversation with the tower, switched to GCA frequency. "Misawa GCA from Air Force 5559. How do you read?"

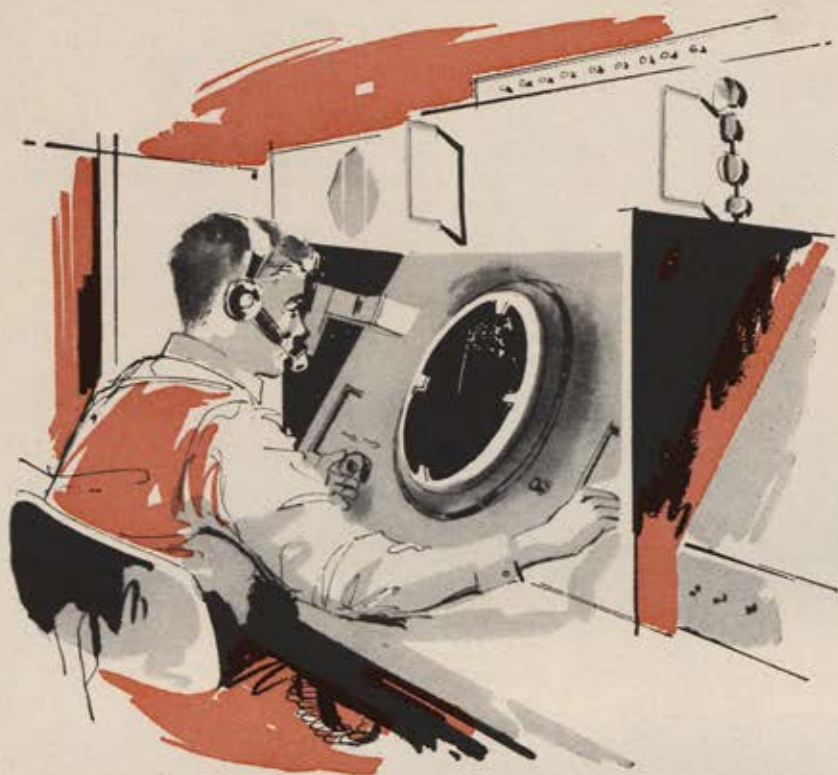
Mac squeezed the mike button and answered, "Air Force 5559, Misawa GCA. Read you five by five. Over."

"Roger, GCA. This is an emergency. I'm about ten miles west in a C-47. I have one engine feathered and a load of people on board. And I'm on instruments, picking up ice almost as fast as I can break it off. Request GCA assistance."

"Roger, 5559. Continue your turn to a heading of one-five-zero degrees and descend to two thousand feet. We have excellent radar contact."

"Roger, GCA. Will do."

(Continued on page 113)



As the electronic arm swept around the scope, a flat blip glowed abruptly.

He picked up a magazine and returned to his chair. "You know, Sam, there's one thing about this. . . ."

The phone interrupted his words and he reached for the instrument. "GCA. Sergeant McCracken."

"Mac, this is Andy up in the tower. There's a Charlie four-seven taxiing out for take-off. Triple-five nine."

"Rog, Andy. Thanks."

Sam looked up. "Business?"

"An outbound." He strode to the door and took another glance out and then returned, shaking his head. "The Gooney Bird. He's going after all."

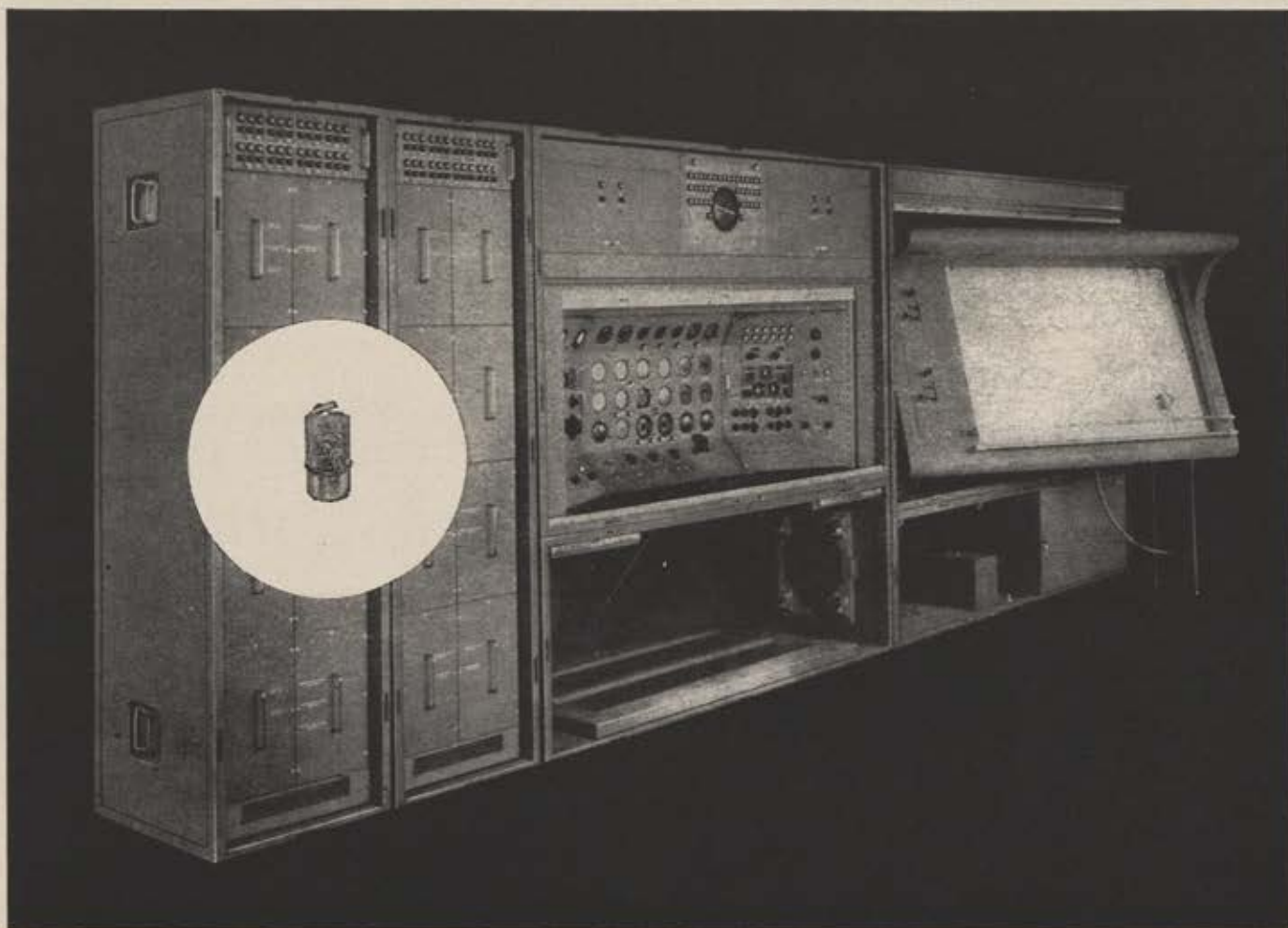
Sam moved to the VHF set and pushed the channelization button. "I'll monitor the tower."

tently at the scope. There were no weather returns, nothing on the glass circle except the usual ground clutter. It was too early to pick up the plane yet. Or was it? As the electronic arm swept around the scope and passed a point to the west, a flat blip glowed abruptly, a thin greenish line that became rejuvenated whenever the arm swept past it on a steady circuit as the skies were scanned. A clear, clean blip.

McCracken scratched his head. "I don't believe it."

"What?"

"Sam, this thing's giving one of the nicest returns you could ask for. Come over here and see for yourself."



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COLD SWEAT—CONTINUED

Mac looked at Sam for an instant and then returned to the scope. Things looked rough for triple-five nine. It was bad enough to be faced with a let-down in weather like this under ideal circumstances. With only one fan churning, it was a real perspiration job.

"GCA from 559, what is the present Misawa weather? Over."

Mac glanced at the weather board. "Five-five-nine from Misawa GCA. The 1530 observation is precipitation ceiling one hundred feet, sky obscured. Visibility three-sixteenths of a mile. Heavy snow. Wind west at eight knots. Over."

There was a moment's silence and he could picture the pilot's frown as the report came through. Presently the pilot answered, "Roger, GCA, understand."

The blip moved in closer and Mac waited a little longer and then said, "Five-five-nine, turn left now to a heading of one-zero-zero. This is your downwind leg."

Slowly he watched the blip crawl on, moving over the green scope like a tiny motorboat crossing a large smooth lake.

"Descend to 1,000 feet now," he said.

"Roger."

He glanced at the precision scope nearby. No weather returns on it either. They needed every break they could get; with weather down this low and engine trouble aloft, it would be too much if the radar equipment itself failed or was sabotaged by the weather. He returned to the search scope and called again.

"Five-five-nine from GCA. Turn left now to a heading of zero-one-zero degrees. This is your base leg."

"Roger, GCA."

There was a frantic waving from Sam. He looked up and saw Sam write a weather observation on the board. Special at 1542, down to zero-zero! Mac felt a dryness in his throat and asked, "What are they forecasting?"

Sam extended his right hand, thumb downward. "No change. Continued zero-zero for the rest of the afternoon and evening."

Slowly Mac shook his head from side to side and then reached for the microphone. "Air Force 559 from GCA. Over."

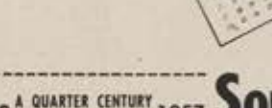
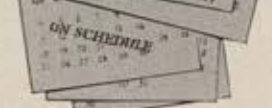
"Go ahead, GCA."

"Special weather observation at 1542. Ceiling zero, sky obscured. Visibility zero. Heavy snow. Over."

There was a pause and again he suffered with the man up in the



USAF aerial pickup of overhauled, canned J-33's at Southwest Airmotive engine plant.



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middle of it, the man at the controls. He was all alone, separated from the rest of the world, and he was in bad trouble.

"Roger, GCA. What is the forecast for the next hour?"

"No change."

"Roger, understand. I can barely maintain altitude so we'll continue the approach."

It was at times like this that he felt an admiration for the men who were in the flying game. Here was a guy really on the spot. He was hobbling along in a crippled ship, fighting through ice and snow, responsible

for the lives of sixteen people, facing a dangerous let-down to zero-zero conditions, and knowing there was plenty of chance that during the next few minutes he would wind up in a flaming mass of molten metal. And yet his voice was calm, he spoke without fear, and for all practical purposes it was routine. How many men in other jobs, in other walks of life, could quietly meet danger in this same fashion?

Well, it was about time to turn him over now. One last instruction. "Five-five-nine from GCA. Turn left now to (Continued on following page)

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COLD SWEAT

CONTINUED

a heading of two-eight-zero. This is your final."

"Roger, GCA."

The blip began a slow curve to the left and Mac nodded at Sam. "He's in the gate, Sam. Take him away."

He received Sam's wave in acknowledgment and leaned back for a breather, although he couldn't get rid of the tenseness. Time was growing short.

"Air Force 559 from GCA. This is your final controller. How do you read?"

"Read you loud and clear, GCA."

"Roger, 559. You need not acknowledge any further transmissions. If for any. . ."

Mac slipped over for a coffee refill as emergency instructions were issued. Very likely the pilot could never swing an emergency go-around even if he had to. No, he'd better be right the first time.

"You are now six miles from touchdown, approaching the glide path. Begin a standard rate of descent."

Mac stared at the blips. Everything seemed normal. And no clutter from weather returns. He was a little high, but not serious.

"You are slightly high on glide path, 559. Increase your rate of descent."

It's a wonder he wasn't twice as high, thought Mac. Lots of guys who lost an engine had a tendency to linger a hundred feet or more above the glide path.

"You are right on course, 559. One mile from touchdown now."

A fine run so far, thought Mac. Glancing sideways, he noticed it was still zero-zero. And still heavy snow. He crossed his fingers. The old boy needed all the help he could get. Only seconds to go now.

"You are approaching the end of the runway."

Was the blip drifting to the left, away from the centerline? Don't make

a mistake now, buddy. Don't slip up when you're almost down. Ah, there it was, in the middle again, splitting the center line exactly. Good height too. Just hold it.

"You're over the end of the runway, 559."

Mac stared hard. The blip was merging with the ground line now and he couldn't tell what was going on. He slipped off the headset and dashed to the door and opened it, but couldn't see more than a few feet. Straining, he tried to catch the sound of engines but could hear nothing except the swish of the falling snowflakes.

And then abruptly he heard crackling through the headset lying on the desk and at the same time heard the muffled noise of engines as the ship came abreast of the GCA van. The pilot had made it!

Swiftly he returned to his earphones and listened.

". . . and here we are. A mighty fine job, GCA. Thanks."

"Roger, 559, GCA out."

He smiled at Sam who was wiping imaginary sweat off his brow in relief. Sam put down his earphones and walked over for coffee.

Still smiling, Mac removed the headset and glanced at the scope. Startled, he leaned forward. "Hey, Sam," he called over his shoulder. "Come over here a second."

He waited until Sam stood behind him and then motioned toward the scopes. They were covered now with large echoes, slow-drifting blobs of weather returns.

The two men stared for a moment and then Mac grinned and said, "We were lucky, Sam. Good thing he didn't have to go around."

"Yeah, we could never do it now."

Mac shivered and then strode to the coffee jug. Filling his cup, he said, "A man needs a drink after one like that!"—END

ABOUT THE AUTHOR

Adventure is a common thing in the flying business, and real-life flying yarns often rank with the most dramatic stories fiction has to offer. Such is the case with this story, which is based on an actual AACS "save" that took place at Misawa AFB, in northern Japan, just over a year ago. At that time the author, Major Fuerst, was with the 1809th AACS Group, on Okinawa. In his story he has changed the names of the GCA operators who were on duty, since he was not able to talk with them personally. Major Fuerst has written one other article for AIR FORCE—"Grace Was a Killer" in the September '55 issue, in which he told the story of a typhoon that swept over Okinawa. Since January of this year Major Fuerst has been with the 501st Tactical Control Group in Europe. We're pleased to be able to print his latest offering for us at a time when his new book, *The Typhoon-Hurricane Story*, is going on sale (see review in "Airman's Bookshelf," on page 12).

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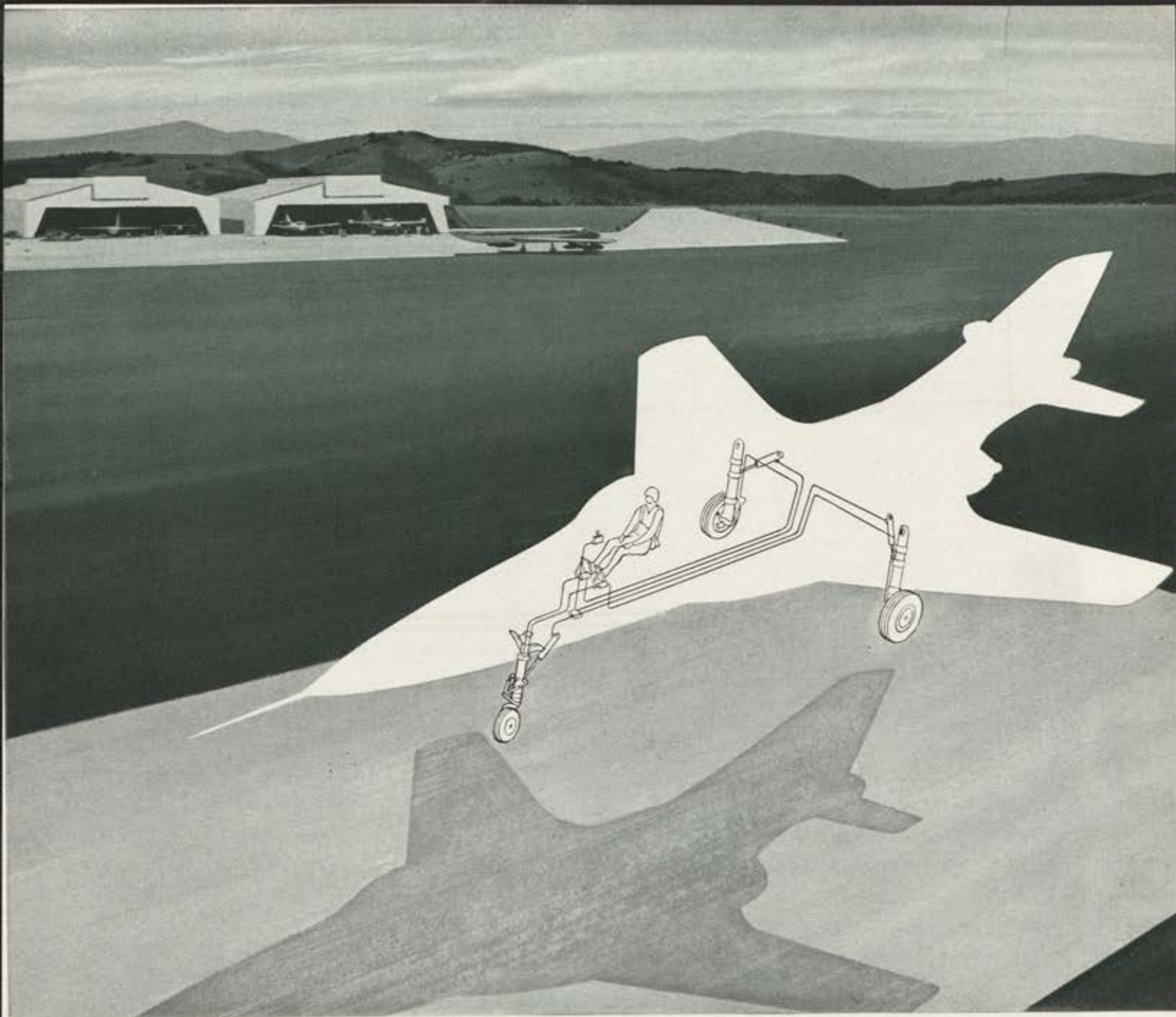
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