

































# AIR FORGE

THE MAGAZINE OF AMERICAN AIRPOWER

December 1956 \* 35c



# WINDOW INTO SPACE

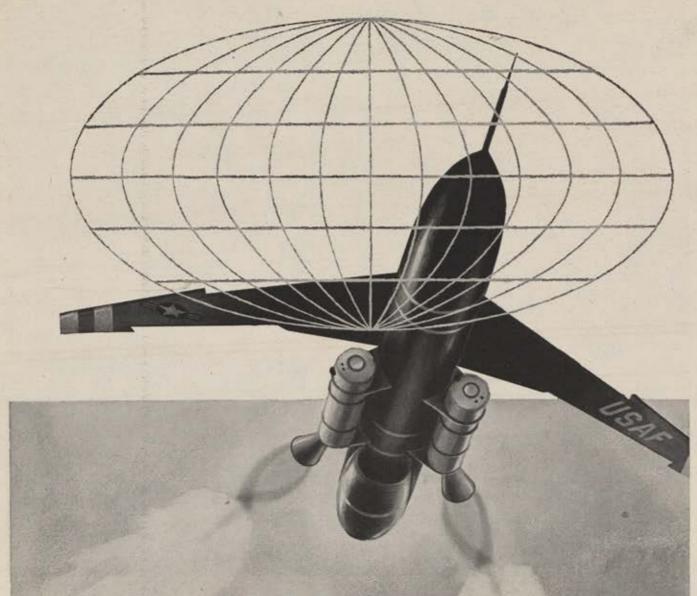
Aero-Medicine's Peeping Toms



Boeing's mighty B-52 and its new tanker sister, the KC-135, will add enormously to the Air Force's long-range power. These jet-powered giants use Hamilton Standard equipment. Years of aviation experience, the highest engineering skills and unsurpassed facilities lie behind the basic equipment produced by Hamilton Standard for turbine and piston-engined aircraft.

WHEREVER MAN FLIES





#### Who puts the "Soup" to the Snark?

Special Cells Engineered by Goodyear Stow Fuel for the Snark's Intercontinental Range

New propellants used by today's-and the future'smissiles and pilotless bombers pose awesome problems.

While we cannot discuss these problems in public print, we can point with pride to accomplishments of Goodyear's Aviation Products Division which has solved touchy fuel handling problems.

A good case in point is Northrop's sixty-seven-foot Snark, the only U. S. guided missile which can match the striking radius of strategic jet bombers.

Other examples in the same category include special Goodyear advancements which have made it possible to stow and safely utilize new monopropellants—and to safeguard dangerous fuel- and oxidizer-systems against premature detonation.

If you are working with new fuels, it will pay you dividends to call on the facilities, skills and experience of Goodyear Aviation Products. We have found new materials and methods for taming the new "flighty" propellants and have produced fuel cells, diaphragms and expeller bags of standout success in action against corrosion, oxygen and temperature extremes.

Call on the Goodyear Fuel Cell Engineer for information. Complete details available to properly cleared personnel. Write: Goodyear, Aviation

Products Division, Akron 16, Ohio, or Los Angeles 54.

California.

GOOD YEAR

FACILITIES + ABILITIES = EXTRA PLE IN PERFORMANCE



#### The nation's first jet transport-tanker is in the air

First production model of the Boeing KC-135 jet transport-tanker is shown above on a test flight. The Air Force has announced that production will be stepped up to a rate of 20 per month earlier than originally planned.

The KC-135 is a sleek, swept-wing craft capable of speeds in the 500-mile-an-hour range. It will refuel jet bombers and fighters while flying eight miles or more above the earth—at speeds best suited to jet flight. It is a versatile aircraft, convertible in a matter

of hours from tanker into a military transport. As a transport it offers the full potential of jet-age operation for carrying personnel and critical cargo.

Design of the KC-135 is based on that of a prototype model which already has behind it more than two years of intensive flight testing. The KC-135 incorporates many design advances that could come only from such a flight test program. This experience background enabled Boeing to cut production time on the first KC-135 by 20 per cent under normal estimates for a first production model,

The new Boeing transport-tanker also benefits from the knowledge Boeing has gained developing and producing more than 1400 B-47 and B-52 multi-jet bombers, the backbone of the Strategic Air Command's nuclear weapons carrier forces. In the not too distant future, this team of revolutionary Boeing bombers will be joined by the newest Boeing jet, the KC-135 transport-tanker.





# AIR FORCE

Features\_

#### THE MAGAZINE OF AMERICAN AIRPOWER

-Volume 39, No. 12 December 1956

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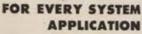
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"Long Haul" Means "Down Hill"	
AN EDITORIAL	36
an aprivate	30
Window Into Space	
ED MACK MILLER AND HUGH DUNCAN	43
To Mars and Back-How Soon?	
DR. JAMES G. GAUME AND CAPT. EMANUEL M. ROTH	47
The "Silent Service" Speaks Up	
CAPT. JAMES F. SUNDERMAN	54
Who Are the Communists—and Why?	
A SPECIAL FEATURE	60
Constantial Consta	
Caught With Our Planes Down	
LT. COL. FRANKLIN HIBEL	81
AFA Committees Named for 1956-57	91
Air Police	
FLINT O. DU PRE	05
	,,
Contrails	
MAJ. GROVER HEIMAN, JR	108
Departments	_
Index to Advertisers	4
Air Mail	8
Wing Tips	15
Airpower in the News	16
What's New With Red Airpower	25
Airman's Bookshelf	26
Shooting the Breeze	31
Jet Blasts	74
Rendezvous	86
The Ready Room	88
Tech Talk	99

This Is AFA..... 118

# Kearfott Components





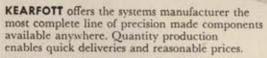












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Bulletins giving physical and technical data of the various Kearfott Products will be sent on request. The Kearfott organization is available to assist in the development and manufacture of other precision components you may require.



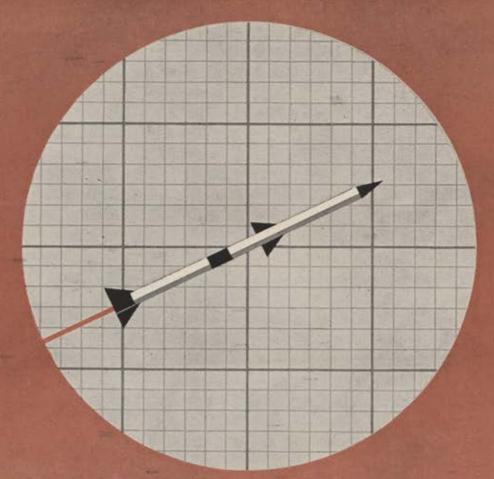
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#### INDEX TO ADVERTISERS

Aircraft Radio Corp	
Arma Div., American Bosch Arma Corp	
B & H Instrument Co., Inc.       91         Bausch & Lomb Optical Co.       86         Beech Aircraft Corp.       98         Boeing Airplane Co.       2         Burrough Corp.       2	
Boeing Airplane Co	
Cannon Electric Co	
Chandler-Evans, Div. of Pratt & Whitney Co., Inc 90	
Colline Electric Manufacturing Co 116 Collins Radio Co., Inc 6 and 7	
Corp	
Canadair, Ltd	
Curtiss-Wright Corp	
Daystrom Instrument Div., Daystrom, Inc	
Douglas Aircraft Co., Inc Cover 3 Dow Chemical Co	
Fairchild Engine & Airplane Corp.,       42         Guided Missiles Div.       42         Fenwal, Inc.       64         Ford Instrument Corp., Div. of       102         Sperry Rand Corp.       102         Funk & Wagnalls Co.       116	
Ford Instrument Corp., Div. of	
Funk & Wagnalls Co 116	
General Electric Co., Aircraft Products Dept 28 and 29	
General Electric Co., Aviation & Defense Industries	
General Electric Co., LMEED 84 General Electric Co., Malta Rocket	
General Electric Co., Missiles &	
General Electric Co., Aircraft Products Dept	
Hamilton Standard Div., United Aircraft Corp	
Hoffman Semiconductor Div of	
Hoffman Electronics Corp 59	
Hamilton Standard Div., United Aircraft Corp	
International Business Machines	
International Business Machines Corp., Military Products Div	
International Business Machines Corp., Military Products Div	
International Business Machines   Corp., Military Products Div.   71	
International Business Machines   Corp., Military Products Div.   71	
International Business Machines   Corp., Military Products Div.   71	
International Business Machines	
International Business Machines   Corp., Military Products Div.   71	
International Business Machines   Corp., Military Products Div.   71	
International Business Machines   Corp., Military Products Div.   71	
International Business Machines	
International Business Machines   Corp., Military Products Div.   71	
International Business Machines   Corp., Military Products Div.   71   International Telephone & Telegraph   Corp.   110   International Telephone & Telegraph   110   International Telephone & Telephone   111   International Telephone   112   International Telephone   113   International Telephone   114   International Telephone   115   Inter	
International Business Machines   Corp., Military Products Div.   71   International Telephone & Telegraph   Corp.   110   International Telephone & Telegraph   110   International Telephone & Telephone   111   International Telephone   112   International Telephone   113   International Telephone   114   International Telephone   115   Inter	
International Business Machines   Corp., Military Products Div.   71   International Telephone & Telegraph   Corp.   110   International Telephone & Telegraph   110   International Telephone & Telephone   111   International Telephone   112   International Telephone   113   International Telephone   114   International Telephone   115   Inter	
International Business Machines	
International Business Machines   Corp., Military Products Div.   71   International Telephone & Telegraph   Corp.   110   International Telephone & Telegraph   110   International Telephone & Telephone   111   International Telephone   112   International Telephone   113   International Telephone   114   International Telephone   115   Inter	
International Business Machines Corp., Military Products Div. 71 International Telephone & Telegraph Corp. 110  Jack & Heintz, Inc. 113  Kearfott Co., Inc. 4  Kelly Field National Bank 104  Lear, Inc. 37  Lear, Inc. 137  Leavyt Manufacturing Corp. 13  Link, Inc. 37  Lockheed Aircraft Corp., Georgia Div. 23  Martin, Glenn L. Co., The. 27  Motorola Communications & Electronics, Inc. 68  Northrop Aircraft, Inc. 17  Orenda Engines, Ltd. 38  Potter Aeronautical Co. 53  RCA Engineering Products Div., Radio Corp. of America. 94  RCA Tube Div., Radio Corp. 69  Rallroads of the United States 117  Raytheon Manufacturing Co. 9  Reaction Motors, Inc. 35  Receves Instrument Corp. 105  Rocketdyne, a Division of North American Aviation, Inc. 56  Ryan Aeronautical Co. 106  Smith, A. O., Corp, Aeronautical Div. 83  Stroukoff Aircraft Corp. 72  Southwest Airmotive Co. 11  Sperry Rand Corp. 76  Stewart-Warner Electric, Div. of Sperry Rynoscope Co., Div. of Stewart-Warner Electric, Div. of Stewart-Warner Corp. 80	
International Business Machines Corp., Military Products Div	



### BALLISTIC MISSILES

on target
a continent away
through Burroughs
computation

For some time, Burroughs has been participating in the U. S. Air Force Ballistic Missiles program in the field of guidance. This program consists of two intercontinental ballistic missiles: Atlas and Titan, plus an intermediate range missile, Thor.

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We welcome inquiries regarding defense contracts in all areas of our demonstrable responsibility and competence. Write, call or wire Burroughs Corporation, Detroit 32, Mich.

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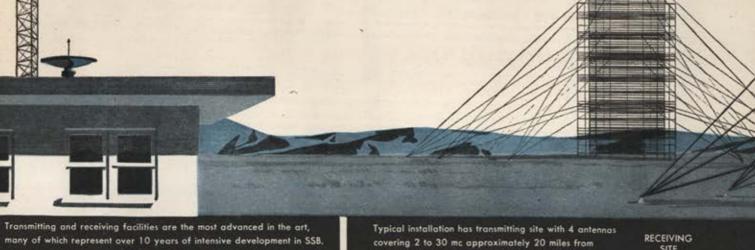
# This is BIRD

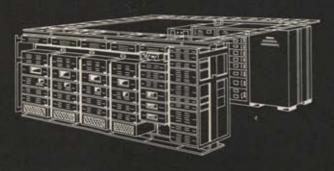
Single Sideband employed in new Air Force project to improve

Birdcall is the nickname of the U.S. Air Force's new project to advance greatly the effectiveness of intercontinental communication. The System will handle the increased traffic now dictated by national defense, and employs single sideband as the primary technique to improve the quality and reliability of the long range (HF) signal.

Collins Radio Company, pioneer of SSB, is providing the entire research, manufacturing and installation on a systems engineering basis for ARDC's Rome Air Development Center.

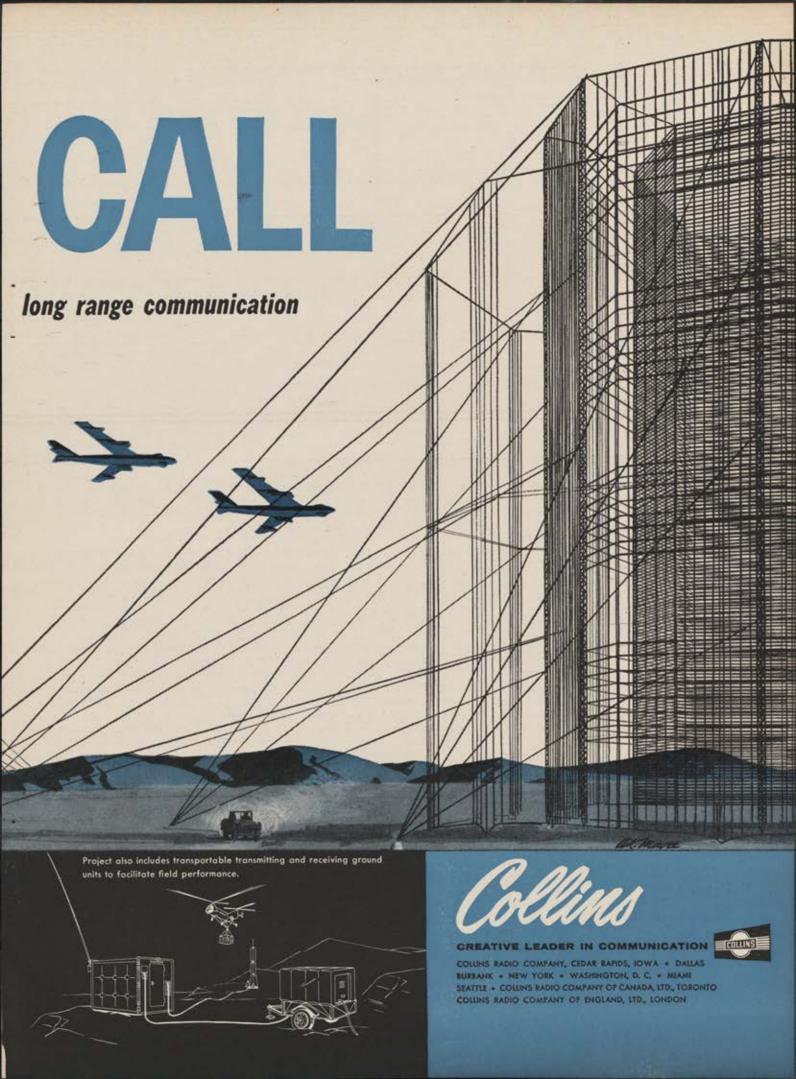
Collins is integrating existing equipment with new Collins designs, both airborne and ground, of all radio, remote control and antenna facilities—three types of which are illustrated here—to assure the highest possible performance.

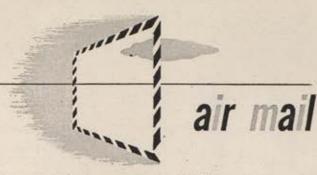




Typical installation has transmitting site with 4 antennas covering 2 to 30 mc approximately 20 miles from receiving site with 3 pairs of steerable and omni directional antennas. Control circuits by microwave connect command console.







#### On Exhibit

Gentlemen: We have included your publication in our Commercial Library which was displayed throughout the world in all Trade Information Centers at the International Trade Fairs. We shall send you in the near future a progress report of its role in these Trade Promotion Programs.

Plans are now in the formative stage for more visits by Trade Missions of US businessmen and more display of business publications at Trade Information Centers in the near future, We would like very much to have your continuing participation in these exhibits and could use twenty-five more copies of your publication.

We appreciate your continuing cooperation in our Trade Missions Program.

Edward J. Krause, Actg. Director Trade Missions Program Washington, D. C.

#### AF's Angel of Mercy

Gentlemen: I wish to congratulate Am Force Magazine on the very fine article in the November issue on "The Air Force Nurse." The thought occurred to me that if young student nurses could have access to and read this article, a large number of them would develop an early consideration for an Air Force career.

I was happy to learn that 3,000 reprints of this article will be used in the Air Force's nurse procurement program. I feel sure that this will be a great asset in stimulating an interest in Air Force career nursing.

Brig. Gen. Edward J. Tracy USAF (MC) Wright-Patterson AFB, Ohio

#### Passing the Buck

Gentlemen: The pictures in "Airpower in the News," October '56 issue, of SAC's eighth annual bombing, navigation, and reconnaissance meet winners, had me confused until I realized that the captions were misplaced. I noticed the name Col. Howard Moore and decided he had certainly changed and then noticed the real Colonel Moore in the picture directly beneath his caption.

Since I like to claim I am the best secretary who ever worked for him (strictly my opinion), I'd like to see his name under his picture. I am sure that friends of Lt. Col. M. H. Middleton would also like to see his name under his picture.

Mrs. Jack (Florence) McDougall Clovis, N. M.

 Afraid SAC will have to take the rap. They were captioned wrong when we received them.—The Editors.

#### 'Egg Heads in Hard Hats'

Gentlemen: My issues of AIR FORCE have proven extremely informative and readable and certainly give a wonderful picture of American airpower.

In particular, I want to thank you for Ed Mack Miller's article on our flight operations in your October '56 issue ["Egg Heads in Hard Hats"]. We have received many favorable comments and much correspondence as a direct result of this article, as well as having heard from many old acquaintances with whom I had lost contact.

Many thanks again for a job well done and my hope for continued good fortune in your task of depicting the US Air Force and American airpower.

> Clarence A. Shoop Hughes Aircraft Company Culver City, Calif.

#### Three-fold Interest

Gentlemen: Enclosed is my check and the completed application form.

My interest in airpower is threefold: (1) as an ex-AAF member, (2) as a former engineer for NACA, and (3) as an active civilian plane owner and pilot. From these three vantage points, it naturally follows that I have ideas and criticisms relating to aviation.

I am particularly interested in any organization that will initiate and promote plans aimed at retaining a higher percentage of Air Force technicians and specialists in service. To my mind, this is the foundation on which an expanded and more efficient air arm must be built.

Lee Taylor St. Petersburg, Fla.

#### We Hope They've Read It

Gentlemen: Your article in the No-

vember issue entitled "What Kind of Forces for What Kind of War?" is of immediate importance to all of us who give thoughtful consideration to the problem of military capability versus cost and manpower. It is a thoughtful article which I believe should be read by members of the Congress. I would like to suggest that copies of it be sent not only to members of the House and Senate Armed Services Committees, but to all of the members of the new Congress.

Congratulations on a splendid boildown of an extremely complex and explosive problem.

Col. William F. Heimlich Washington, D. C.

 All members of Congress receive copies of Am Force Magazine each month.—The Editors.

#### Glad to Hear From You

Gentlemen: Although a charter member of the AFA, this is the first time I have taken the opportunity to write.

Being a great advocate for a stronger United States Air Force, I want to thank you, the active workers of AFA, for the outstanding job you have and are accomplishing, putting across to the laymen of our country the great need America has for the world's strongest air arm, so that we may retain those freedoms Americans have fought for for almost 200 years.

I believe that Am Force Magazine is a great publication, not only to the members of AFA, but to all who have taken the opportunity to read the many interesting and educational articles that have been published in the past ten years.

My congratulations to the entire editorial staff for a job well done, and to all members for the great fight for a stronger Air Force.

> Walter B. Grosh, Jr. Orlando, Fla.

#### Hole in His Head, Maybe?

Gentlemen: Having a keen interest in aviation medicine, I thought that the following incident which I witnessed might be worth repeating.

While I was visiting my brother several weeks ago at a nearby Air (Continued on page 11)



and jet aircraft. The heat comes from friction of air and from electronic equipment.

Heat from friction cannot be eliminated, but heat from electronic equipment can be greatly reduced by using transistors. However, existing transistors could not be used because they would not operate at high enough temperatures. Now, Raytheon's new PNP silicon transistors function reliably at high temperatures in jet and missile equipment-give 90% savings in size, weight and power.

By helping to solve this difficult problem, silicon transistors by Raytheon are making a significant contribution to the efficient operation of the latest airborne military equipment.

There are more Raytheon transistors in use than any other make.

RAYTHEON MANUFACTURING COMPANY Waltham 54, Massachusetts







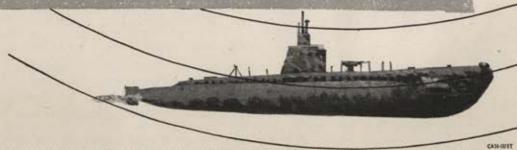
Soon, the oceans around Canada will be patrolled by the first aircraft developed specifically for Canadian maritime reconnaissance duties...the Canadair-designed CL-28.

Developed from the Bristol Britannia class by Canadair, this is the largest aircraft ever to be manufactured in Canada and we at Canadair regard it as a tribute to our capabilities that the RCAF selected us to do the job.

Size, of course, is not the only factor, for we are equally at home in the design and production of jet fighters, training planes, airliners, guided missiles or even components for other aircraft. What counts most is our outstanding record for cost performance, on-time deliveries and quality of manufacture.



A subsidiary of GENERAL DYNAMICS CORPORATION, New York, N.Y.-Washington, D.C.



bearest Peg:

Force base, an F-89 landed and before proceeding to the parking area taxied out to the end of the runway near the place we were parked in a car. With brakes on and engines going, the observer took off his helmet, got out of the plane, and proceeded to disarm the rockets. While performing this task he had to alternately hold his ears and do his job. The noise, even where we were parked, was almost deafening.

The point of the story is . . . why didn't the observer keep his helmet on, or wasn't he cognizant of the effect of high-intensity noise on his hearing apparatus? If he wasn't, he and/or

the pilot should have been.

After climbing back into the cockpit and before putting his helmet back on the observer held both of his ears and shook his head several times, as though his ears were bothering himas indeed they must have been.

Dr. F. E. Hallidy Portland, Me.

#### We're Sorry, Too

Gentlemen: Sorry. Cross me off your "Charter Member" list. I can't say I've agreed with your recent crusades to bankrupt our country.

Adequate protection and progress can be achieved with something less than the blank check which you seem to be constantly requesting.

John P. Haves Indianapolis, Ind.

#### The Very Same

Gentlemen: My family and I greatly enjoy your magazine and more power to you! We read each issue from cover

I especially enjoy the articles by Ed Mack Miller. I wonder if you could tell me if he is the Ed Miller who was my flight instructor at Stockton Field, Calif., in 1943? I lost track of him when I went overseas and am sure he is the same one I knew then. He was the most capable instructor I ever flew with.

Clayton E. Bejot Ainsworth, Nebr.

· Ed tells us he's your man-and that you were a mighty fine student. He'd like to hear from you.-The Editors.

#### More Encouragement to Would-be Writers

Gentlemen: After that magnificent Tenth Anniversary issue of AIR FORCE Magazine, I was expecting a let down on story content for the next couple of months, Instead, you produced another masterpiece in the September It's with heavy heart and orous years, SAC this month ends its world-famous "gir. Silver Jubilee ads may be even more exciting--and no However, I'm cheere by a pledge that their 195 from the nation's aviation special Christmas blessing After five glorious, glam write you the tragic news from Southwest Airmotive: who've smiled out at me every one! And a very entirely un-feminine. cheered, too, by five of wonderful memories God bless all the lovely ladies magazines.



representing each of our five series: L. to R., Sally Merrill, Dee Brock, AS A MEMENTO This is it! Our grand finale here shows a princess FREE BROCHURE WITH ALL WRITE NOW FOR YOURS! Gibson, and Barbara Allard. THE SUPPLY IS LIMITED. Nancy Boyd Daddy's right. Peggy Martin, b OUR COUNTLESS F DADDY". THE SU

SOUTHWEST AIRMOTIVE COMPANY . LOVE FIELD . DALLAS, TEXAS

"National Convention" issue, and the October issue was superb.

M/Sgt. Frank J. Clifford's article "The Silent Service," in your October issue, was terrific and of particular interest to me. I have long been of the same opinion, in that many great stories about the Air Force have yet to be told. The seeds for these stories lie in the minds and imaginations of many people presently or formerly connected with the Air Force.

I also agree with Sergeant Clifford that military writers in the Air Force just don't write in quantity like the members of the other services. I per-

sonally think this also applies to civilian writers in the Air Force (other than purely technical engineering writers). The stories presently being written about the Air Force are of "Jet Age" quality but only of "Jenny Age" quantity.

As a matter of information to fellow AFA members who are interested in writing or in learning how to write for pay, in addition to the fine information furnished by Sergeant Clifford in his article, there exists an excellent writer's organization for service-connected personnel. This organization is

(Continued on following page)

AIR FORCE Magazine . December 1956

known as the Armed Forces Writer's League. It is an unofficial non-profit organization of, by, and for serviceconnected authors and artists.

Additional information about the AFWL may be obtained by writing to Lt. Cmdr. R. S. Ewing, USN, National Secretary, The Armed Forces Writer's League, 3542 N. Utah St., Arlington 7, Va.

John P. Baker Springfield, Ohio

#### **Future Air Strategist?**

Gentlemen: I am a senior in high school and have been an Associate member of the AFA for about ten months. Recently, when assigned to write a brief to resolve a current controversy, I selected the aircraft carrier arguments.

Of course, I wrote in behalf of the abolishionists. It is an easy cause to support. That is why I'm writing to you. It's too easy! I've been arguing these points for about a year, and in all that time I've not hit a solid argument on behalf of the flat-top. I approached a teacher in my school who is in the Naval Reserve and asked him

what he thought about the question. He didn't know anything concerning the Navy's view on the matter; he instead referred me to the Navy Department.

What I decided to do was consult you as well as the Navy Department. What I want is a well-rounded account, in any form, on both the views toward the aircraft carrier, each by an expert or at least an authority in his field, using only enough statistics to prove a point (and proving each point with statistics), keeping away from obsolete World War II situations (although if these situations have equal modern counterparts, that's fine).

An interesting application of the data I hope you will be able to send me will be with a friend of mine. He is as avid in "navalism" as I am in aviation. I've presented him with my arguments many, many times. Although he admits the arguments are convincing, he refuses comment until he gets his eyeballs on the other side's preparations.

Also, I'd like to make a little comment on our magazine. Of course, I realize that it's too much to expect for you to admit Army and Naval aviation on an equal basis with that of the USAF (although you have to admit that the result would truly be a "Magazine of American Airpower"), but you could at least have ten or twelve pages in the latter portion of the magazine. It need just contain data on their aircraft, not necessarily the workings of their organizations. I believe that these innovations would make for a more authoritative magazine.

Mark Krain Far Rockaway, N. Y.

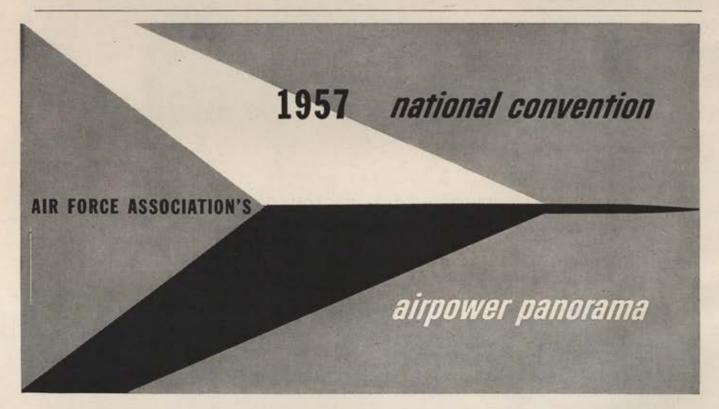
#### He's One of Our Regulars

Gentlemen: Enjoyed your October '56 number. It sure was good to see such an item-packed one after the surprising August Anniversary Issue.

Glad you finally got around to giving the careers a plug. I refer to "Secrets of Inner Space," by Flint O. DuPre. Seems I recall his name from previous issues—think he's on the right track in this series.

Keep up the good work. We guys like to know what's going on.

> Bert Ellison Winter Park, Fla.



WASHINGTON, D. C. the Nation's Capital JULY 30 through AUGUST 4

Celebrating the GOLDEN ANNIVERSARY of the UNITED STATES AIR FORCE



Operating Prototype

#### Lewyt cuts delivery time for complex electronic equipment

In developing complex electronic systems for the military, TIME is often the most critical factor. The gap between idea and volume production must be constantly narrowed.

At Lewyt, experienced engineers are at work cutting months from "time in development." Involved equipment, such as Lewyt's Coordinate Data Monitor, urgently needed in the SAGE System, progressed from design stage ... to breadboard ... to engineering model ... to operating prototype, IN RECORD TIME! Through background and previous experience, Lewyt engineers are particularly qualified to carry out research and development projects in Data Processing and Data Transmission, UHF and VHF Communications. Navigation Guidance, Infra-Red, and related fields. Lewyt Manufacturing Corporation, Long Island City 1, N. Y.

# Skyways

# Lunways

A small clearing in the jungle . . . an ice floe in the arctic . . . a mountain plateau-a cruiser deck, a rooftopthese are some of the airbases of Vertol aircraft.

Free from the restricting dimensions of distant airfields and costly runways, Vertol helicopters have led the way in developing a new kind of mobility. Their tandem rotor performance has withstood the test of Army field service. Naval duty and of global Air Force missions ranging from arctic tundra to equatorial forests.

Revolutionary aircraft now taking shape at Vertol will combine helicopter ability to hover, to rise and land vertically, with the performance of current jets. Now, at Vertol, the Skyways-without-Runways concept is being taken to its ultimate phase: high speed aircraft capable of vertical takeoff and landing.

Engineers, join Vertol's advanced engineering team!



VERTOL

Aircraft Corporation

FORMPRIA PLASECKI HELICOPTER CORPORATION



The present federal-aid airport program, the largest in aviation history, makes available a quarter of a billion dollars to be matched by local sponsors. Projects involving \$1,250,000 each have been approved for Atlanta, Chicago's O'Hare, Los Angeles's International, Miami, Minneapolis-St. Paul, New Orleans, New York International, and Oakland.

London, the busiest airport in Europe, handled fewer plane movements in 1955 than Norfolk, Va. Paris air traffic, second heaviest in Europe, was on a par with Chattanooga, Tenn.

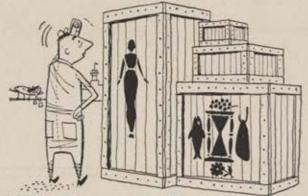
Teterboro Airport in New Jersey, which handles no scheduled airline traffic, accounted for more plane movements in 1955 than London, Rome, and Brussels combined.

The CAA reports that there are now 724,000 pilots in the US, of whom 298,000 with current medical certificates are classified as active. California, with 38,000 active

pilots, has nearly twice as many as second-place Texas. Close runners-up for third and fourth honors are New York and Illinois.

Last year's seventeen percent increase in air travel throughout the world was accomplished with a 2.5 percent increase in the number of aircraft. One explanation: four-engine aircraft increased by 100, while fifty twoengine planes were retired.

New international warning symbols have been adopted for certain types of air cargo. Perishable goods will bear



a label that shows a carcass of beef, a cluster of grapes, a fish, and a flower, all surrounding an hour glass with the sand running out. You are expected to get the general idea wherever you happen to be.

The international symbol for fragile air cargo gets to the point quickly with a picture of a cracked wine glass.



RECOGNIZED FOR QUALITY



# REIGHTON

REGULATION AIR FORCE OXFORD SHIRTS

# AIRPOWER IN THE NEWS

■ In light of the recent uprisings in Hungary, it might be worthwhile to take a look at the airpower picture there.

The Hungarians, according to the terms of their peace treaty with the four major powers (signed in Paris in 1947), were allowed no more than ninety fighter and transport aircraft, and no bombers. However, since 1951, the Communists have been building an air force as part of the Hungarian "People's Forces." By January 1956, the Hungarians had 550 aircraft, all Soviet types, including several squadrons of MIG-15s.

Among the satellites, the Hungarian Air Force was the third largest—after those of Poland and Czechoslovakia. The Hungarians had four fighter wings, or "regiments," according to the Russian organization table, of which three had a planned strength of 120 combat aircraft and the fourth had fifty combat aircraft. Following World War II the Hungarians got a large number of YAK-9s (NATO code-named Frank), but these were later replaced



Wide World Photos, In

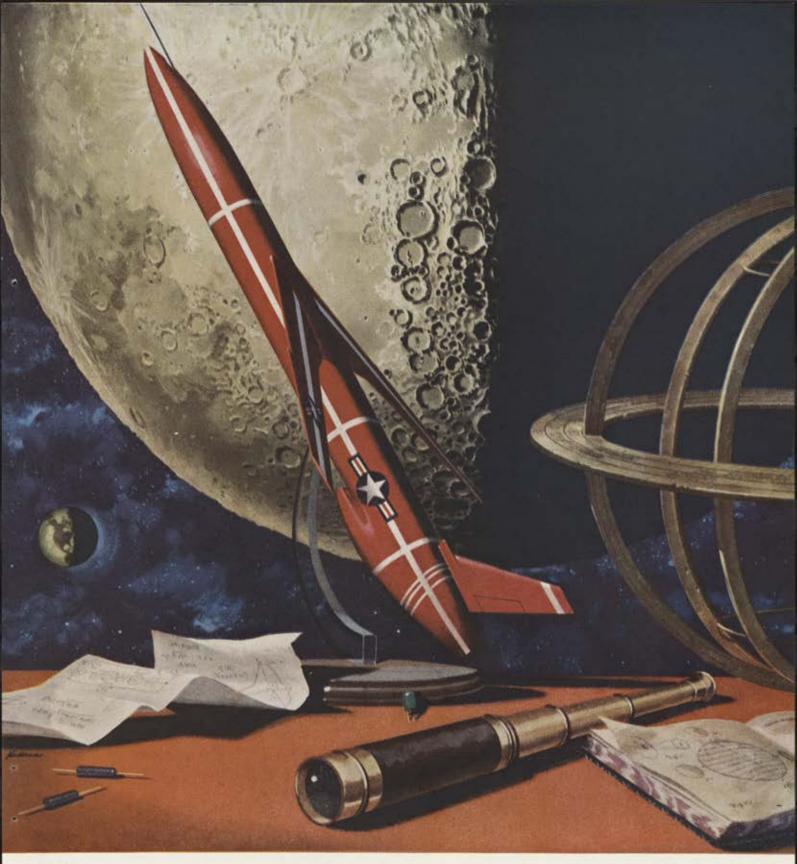
President Eisenhower presents the Harmon trophies. Winners, from left: British Group Capt. John Cunningham, for first commercial jet trip around the world; French Mme. Jacqueline Auriol, for being the world's fastest woman jet pilot; and Lt. Cmdr. Charles A. Mills, for a daring icing experiment with a Navy lighter-than-air craft.

by MIG-15s (Fagot). Hungary had been planning production of its own MIG-15s at Adyliget.

In addition to the Hungarian Air Force, the Soviets had two air divisions of their own constantly stationed in the country from 1948 through 1955. One division allegedly was withdrawn when Soviet forces withdrew from East Austria, while the other division remained near Budapest, in keeping with the terms of the Warsaw Pact. By and large, both the Soviet air units and those of the Hungarian Air Force are for air defense purposes, though in 1956 the Hungarians got some four-engine types that they used for training. (In fact, earlier this year one of the four-engine types—thought to be a TU-4, or Bull—evidently tried to escape from Hungary, but was hindered from entering Austria by Soviet-manned MIG-15s.)

At least some units of the Hungarian Air Force went over to the side of the rebels during the recent revolts. They called themselves the National Hungarian Air Force, and for a time they used MIG-15s to machine-gun Russianmanned or pro-Soviet anti-aircraft batteries in Budapest. On October 30, the National Hungarian Air Force issued an ultimatum to the Soviets that they were to leave Budapest by four a.m. the next day. It was about this time that the Russians began to negotiate with the Hungarian rebels for removal of Russian troops from Budapest. Then, while the negotiations were under way, the Russians moved in more troops.

- AFA national director James H. Doolittle has been named chairman of the National Advisory Committee for Aeronautics, succeeding Dr. Jerome C. Hunsaker who has held that position for the past fifteen years. General Doolittle was elected at the annual meeting of the Committee in Washington. Leonard Carmichael, Secretary of the Smithsonian Institution, was reelected vice chairman.
- An \$8,800,000 medical center, to house the USAF's School of Aviation Medicine, will be built at Brooks AFB, San Antonio, Tex. The new center will allow the AF to conduct more extensive research into the medical aspects of today's supersonic flight problems. Emphasis will be placed on developing means of protecting flyers at the high speeds and altitudes now encountered, or expected to be in the future. The center, scheduled for completion by the end of 1958, will replace the school's facilities, now at Randolph AFB, Tex., and Gunter AFB, Ala.
- Col. Bernt Balchen, Special Assistant for Arctic Affairs, Hq., Northeast Air Command, and internationally known polar regions expert, retired from the AF at Pepperell AFB, Newfoundland. A native of Norway, Colonel Balchen began his colorful career when he joined the Norwegian Air Force in 1920 as a second lieutenant to attend flying school. In 1925 he flew as a pilot on the Amundsen-Ellsworth Relief Expedition to Spitzbergen, and in 1926 was a member of the Amundsen-Ellsworth-Nobile Arctic Expedition. That same year he left Norway to visit the US and became one of the pilots on Admiral Byrd's flights across the Atlantic. He was also chief pilot of the Byrd expedition to the Antarctica, and became a naturalized US citizen in 1931. He joined the Army Air Force in 1941, went back to Norway to reorganize the Norwegian Airlines after World War II, and was recalled to active duty with the AF in 1948.
- The Dependents' Medical Care program, designed to assure hospital care when needed by the wives and children of active-duty personnel, goes into effect on December 7. The new law contains a provision authorizing the use, at government expense, of civilian hospitals and facilities for the immediate families of servicemen. In addition, care will be provided in government facilities on a space-available basis.
- The Tactical Air Command has activated its first tactical missile wing at Orlando AFB, Fla. The wing, consisting only of a headquarters, is designated the 4504th Tactical Missile Wing (Training), and will train and administer TAC missile units. The new wing, under the Ninth AF, will be commanded by Lt. Col. Albert D'Orsi, commander of the 17th Tactical Missile Squadron, also at Orlando.
- Early next year, volunteers of the Air Research and (Continued on page 21)



FORESIGHT—Northrop Aircraft's long-range vision is continuously focused on new horizons. Advanced planning by Northrop scientists, engineers and administrators has resulted in the development of formidable aerial weapons for our national safety. Among them are the atom-armed Northrop Snark SM-62s, first intercontinental missiles to be disclosed by the U.S. Air Force, and the Northrop Scorpion F-89 interceptors, lethal guardians of our defense perimeter. In addition, Radioplane Company, a Northrop subsidiary, has delivered over 40,000 pilotless aircraft for use by all branches of the military. At Northrop, today's goal is tomorrow's starting point. In this forward-looking spirit, Northrop is continually achieving scientific breakthroughs which contribute to our national progress and welfare.









# The fatal sting...

defending the B-52 intercontinental bomber is the Arma MD-9 fire control system that picks up, tracks, and with uncanny accuracy fires at its target.

Developed and produced by Arma, the MD-9 is just one of Arma's capabilities in advanced weapon systems.

If you have an "ARMAment" requirement, or would like to work with a leading engineering team, contact ARMA... Garden City, N. Y. A division of American Bosch Arma Corporation.

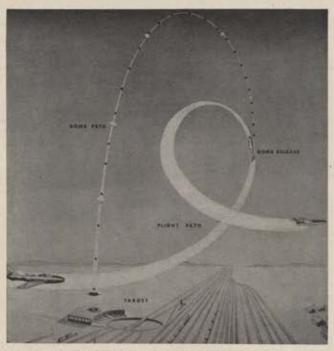


Division of American Bosch Arma Corporation

ADVANCED ELECTRONICS FOR CONTROL



Development Command will spend five days and nights in a confined, grounded aircraft cabin as a test of their efficiency and endurance under long-range flight conditions. An enclosed airplane cabin, in which the men will eat, sleep, and "fly" for 120 consecutive hours, is being built at ARDC's Wright Air Development Center, Wright-Patterson AFB, Ohio. The "flight" will be made under actual mission conditions, and each of the five—all pilots with long-range mission experience—will sit in individual, emergency escape capsules when working. The cabin will contain a recreation and rest area as well as a working area. The aircrew will be divided into two groups: the pilot, co-pilot, and engineer will be interchangeable so that one can rest while the other two work; and the other two men—the navigator and defense director—will also be interchangeable with one serving as navigator



Observers at the AF Weapons Meet in Las Vegas, Nev., saw demonstrations of the Low Altitude Bombing System. It allows pilot to make a fast, low approach to a target, drop his bomb and get safely away from the atomic blast.

while the other rests. One of the primary objectives of the test will be to determine the ability of five men to work and live together for long periods. Studies will also be made of their efficiency during those five days and nights by giving them numerous tasks and emergency situations. The 120-hour test, a continuation of previous human endurance tests, is a project of the Stress and Fatigue Section of the WADC Aero Medical Laboratory. Project director is Charles A. Dempsey who has been a volunteer subject during the previous tests.

- The X-15 rocket-powered research aircraft mentioned in this department last month, will probably be controlled by small rockets on the wing tips. Normal aircraft controls will be almost useless at the extremely high altitudes—above 200,000 feet—the plane will operate at. The 4,000 mph aircraft is under joint development by the National Advisory Committee for Aeronautics, the AF, the Navy, and North American Aviation, Inc.
- Winning Air Force-wide rocketry and gunnery meets

is getting to be old hat for the Eastern Air Defense Force and the Air Training Command. They've done it again this year—EADF for the second straight time and ATC for the fifth year in a row.

The EADF rocketry team, hailing from Selfridge AFB, Mt. Clemens, Mich., outstripped the Western Air Defense Force by more than 2,000 points in the world-wide rocketry competition at Vincent AFB, Yuma, Ariz., to winthe Richard I. Bong Memorial Trophy. The Northeast Air Command finished third and the Far East Air Force took fourth place.

In the gunnery competition at Nellis AFB, Las Vegas, Nev., the Air Training Command finished almost 700 points ahead of US Air Forces, Europe. The Far East Air Force took third spot, and a surprising Air National Guard team from Colorado finished fourth.



At the AF air-to-air rocketry meet at Vincent AFB, Ariz., Gen. Thomas D. White, left, AF Vice Chief of Staff, presents trophies to Col. Norman S. Orwat, captain of the winning Eastern Air Defense Force team (story in text).

Individual high scoring in the Arizona meet wound up in a tie. Lt. Robert Long of EADF, flying a North American F-86D, scored 4,800 points to deadlock the Alaskan Air Command Northrop F-89D team of Col. David Graham (pilot) and Lt. B. R. Thompson.

Capt. Asa Whitehead, veteran of 125 F-86 combat missions in Korea, was the individual kingpin of the Nellis meet—in dive bombing, air-to-ground and air-to-air gunnery.

This year the Air Force took the wraps off its special weapons delivery competition. This is the art of delivering A-bombs from fighter aircraft (see cut) and, until this year, the range outside of Las Vegas had been closed to the public. USAFE's team topped the competitors in delivering simulated A-weapons.

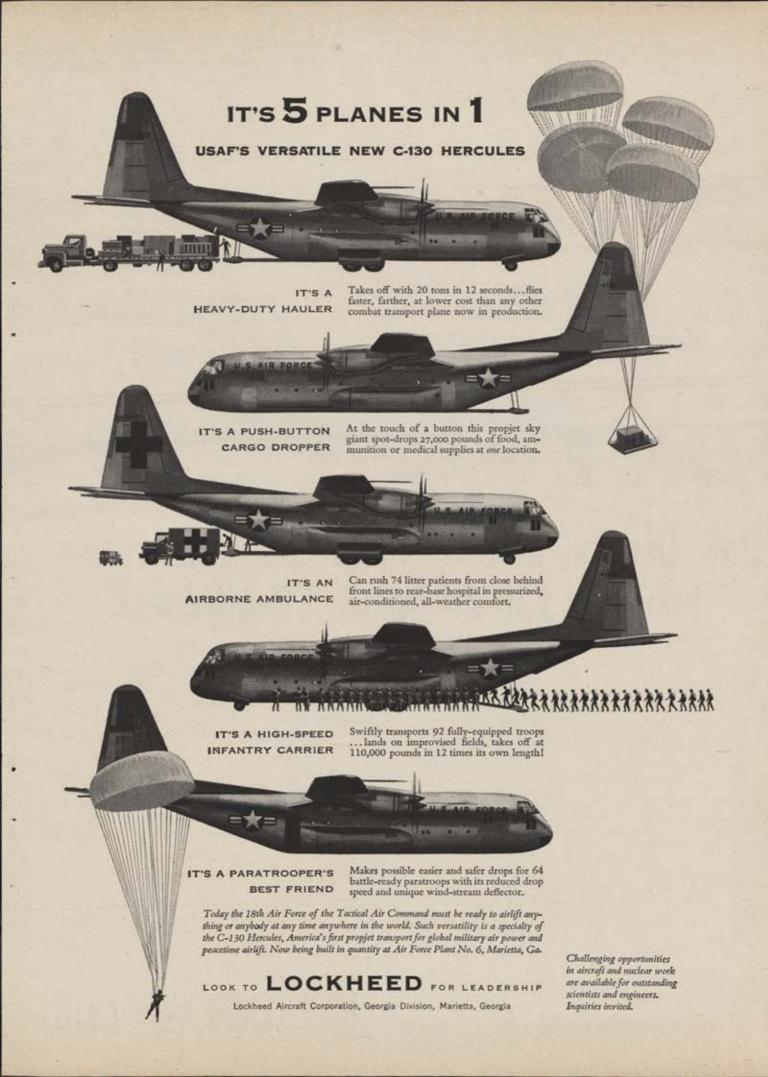
■ The Fourth Allied Tactical Air Force walked away with top honors in the first international aerial photo reconnaissance competition at Lahr Air Base, Germany, October 12. In the competition, twelve crews from five (Continued on page 23)

nations flew simulated combat missions in high-altitude and low-altitude events. British, Dutch, and Belgian flyers from the Second Allied Tactical Air Force opposed the French and Americans of the Fourth. Three targets in Southern France were used in the events, and scoring was based on timing, finding the target, accuracy of the photo coverage, and photo interpretation. The winners received the Gen. Alfred M. Gruenther Trophy (named in honor of the former Supreme Commander, Allied Powers Europe), donated by Republic Aviation Corp.

- Two Navy scientists rode a balloon to an altitude of 76,000 feet last month, setting a new world's record for manned balloons. The two, Malcolm D. Ross, a civilian employee, and Lt. Cmdr. M. L. Lewis survived a spinning, out-of-control drop, and stepped out of their pressurized aluminum gendola near Kennedy, Nebr., about 150 miles from their ascent at Rapid City, S. D. Purpose of the flight was to gather scientific data in the stratosphere.
- HONORS AND AWARDS. . . . 1st Lt. George A. Frederick was posthumously awarded the Distinguished Flying Cross during a special parade of the Cadet Wing at the Air Force Academy, Lowry AFB, Colo. Lieutenant Frederick, an Air Training Officer at the Academy, sacrificed his life last summer by attempting a deadstick landing rather than abandon his flamed-out F-86 Sabrejet over a thickly populated area. . . . John M. Ferry, Special Assistant for Installations to the Secretary of the Air Force, was awarded the Exceptional Civilian Service Award in a Pentagon ceremony. The citation honoring Mr. Ferry, who supervises a construction program totaling more than a billion dollars, said: "His efforts have been a major contribution to the marked improvement in the Air Force construction program and its present orderly state." . . . Lt. Col. William H. Hathaway, Jr., Joint Plans and Operations Division on the staff of Adm. Felix B. Stump, Commander in Chief, Pacific, received the Distinguished Service Medal for his service as Special Projects Officer, Operations Programs, Hq., USAF. The commendation said that "the efforts of Colonel Hathaway have resulted in a major improvement in Air Force Management and have reflected credit upon himself and the United States Air Force." . . . Ray O. Mertes, Director of the School and College Service Department of United Air Lines has won the 1956 Frank G. Brewer Trophy, in the field of youth aviation education and training. During the past thirteen years, Mr. Mertes has contributed to the development of a program of motion pictures, slide-films, booklets, maps, charts, and services at educational levels from kindergarten through high school.
- AIRPOWER NOTES. . . . Weathervision, a system of weather briefing through the use of closed circuit television, is being tried out at ADC's Grandview AFB, Mo. . . . A new system of supply was started last month with a shipment of jet engine spare parts directly from the General Electric Evendale, Ohio, plant to AF users at Hamilton AFB, Calif. Usually, parts are shipped to various Air Materiel Command supply depots for storage and distribution. . . . ARDC estimates that its nylon ribbon runway crash barriers have saved more than \$78,000,000 in thirteen months. The barriers snap planes that are in danger of overrunning the runway on landing. . . . The Radio Corporation of America has established annual trophy awards for proficiency achievements of radar controllers of the USAF. They are named in honor of Brig. Gen. Clinton D. Vincent. . . . A forty-six-ton steel cham-

ber at Wright-Patterson AFB, Ohio, can simulate altitudes above 150,000 feet.

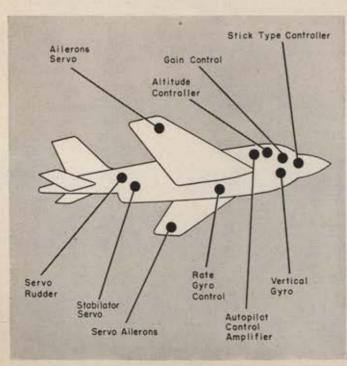
■ STAFF CHANGES. . . . The following officers recently retired from the AF: Brig. Gen. Darr H. Alkire, Commander, 3101st USAF Logistics Control Group (Atlantic); Brig. Gen. Clinton W. Davis, Director of Research Studies Institute at the Air University; Maj. Gen. John T. Sprague, Commander of the 3415th Technical Training Wing, ATC; Brig. Gen. Oscar F. Carlson, 897th AB Group, March AFB, Calif.; Brig. Gen. John H. McCormick, Commander, 3700th Military Training Wing, ATC; Brig. Gen. John C. Crosthwaite, formerly Deputy Commandant of the AFROTC unit at the Air University; and Brig. Gen James W. Andrew, Special Assistant to the Commander, Hq., Western Air Defense Forces, ADC. . . . Maj. Gen Harlan C. Parks, Assistant Chief of Staff, Far East Command, FEAF, will become Chief of the Army-Air Force Exchange Service in December, . . . Brig. Gen. Joseph R. Holzapple, Commander, 47th Bombardment Wing, USAFE, has been assigned to Hq., USAFE, as Deputy Chief of Staff for Operations. . . . Maj. Gen. James H. Davies has replaced Lt. Gen. Frank A. Armstrong, Jr. as Commander, Alaskan Air Command. . . . The President has approved the appointment of Maj. Gen. John A. Samford to the temporary grade of lieutenant general, and his assignment as Director, National Security Agency. Effective date will be announced later. He is now Vice Director of the National Security Agency. . . . The following officers have been promoted to the temporary rank of major general, USAF: Albert G. Hewitt, Hq., USAF; Herbert L. Grills, ATC; Richard T. Coiner, Jr., Hq., USAF; William P. Farnsworth, Hq., USAF; Charles H. Anderson, SHAPE; Olin F. McIlnay, Hq., USAF; Otis O. Benson, Jr., AU; Charles J. Bondley, Jr., Hq., USAF; Harvey T. Alness, ADC; Russell L. Waldron, FEAF; Alvin L. Pachynski, Hq., USAF; James H. Davies, Alaskan Air Command; Troup Miller, Jr., ARDC; Richard J. O'Keefe, USAFE; Thomas S. Moorman, Jr., MATS; Harold R. Maddux, Assistant Secretary of Defense, DOD; John B. Cary, Hq., USAF; Leighton I. Davis, ARDC; James H. Walsh, SAC; Thomas C. Musgrave, Jr., Hq., USAF; William T. Hudnell, AMC; Howell M. Estes, Jr., ARDC; Richard H. Carmichael, Hq., USAF; Joseph J. Nazzaro, SAC; Lloyd P. Hopwood, AU; William P. Fisher, SAC; John D. Stevenson, TAC; John D. Ryan, SAC; William H. Blanchard, SAC; Henry R. Spicer, TAC; James Ferguson, Hq., USAF. . . . The following officers have been promted to the temporary rank of brigadier general, USAF: Richard D. Wentworth, Secretary for Joint Chiefs of Staff; Ezekiel W. Napier, Caribbean Air Command; Stephen B. Mack, TAC; Victor A. Byrnes, OTSG; John R. Copenhaver, Alaskan Air Command; William J. Bell, USAFE; Allen W. Rigsby, SAC; Christian F. Dreyer, SAC; Joseph E. Gill, Hq., USAF; Harry C. Porter, AMC; Cecil P. Lessig, FEAF; William L. Rogers, Hq., USAF; Lawson S. Moseley, Jr., Hq., USAF; Albert P. Clark, Jr., USAFE; Von R. Shores, ADC; Herman A. Schmid, ISA; John A. Hilger, APGC; Robert W. Hall, OSD; Paul W. Scheidecker, ADC; Paul T. Preuss, AFSWP; Donald W. Saunders, SAC; Raymond A. Davis, Hq., USAF; Sam Maddux, Jr., ATC; Elliott Vandevanter, Jr., SHAPE; Marvin L. McNickle, TAC; Osmond J. Ritland, ARDC; Paul S. Emrick, SAC; Frank B. James, Air Attache, England; Glen W. Martin, SAC; James W. Wilson, SAC. . . . Simultaneously, the President appointed ten officers to the permanent grade of major general and twenty-four officers to the grade of brigadjer general.-End





The Navy's new fighter-interceptor, the McDonnell F3H-2N Demon, joins the Pacific Fleet, with General Electric G-3H Flight Control System.

# How General Electric Flight Control System Improves F3H-2N Demon Effectiveness



G-3H Automatic Pilot Components and their location in the Demon

The Demon is a more effective fighting weapon because the General Electric G-3H Flight Control System makes it a stable gun platform, and provides automatic pilot relief and maneuvering functions . . . leaving the pilot free for other vital duties.

Serving as an electronic "co-pilot" in this one-man fighter-interceptor, the autopilot can be set to hold a constant altitude, heading, climb or bank angle. By providing flight stabilization, the G-3H system steadies the Demon without increasing drag—improves performance—helps the Demon to more effectively accomplish its mission.

To find out how a G-E Flight Control System can be designed or adapted to fit your needs, contact your nearest G-E Aviation and Defense Industries Sales Office. General Electric Co., Section 221-8, Schenectady 5, N.Y.

Progress Is Our Most Important Product



# 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.

Official name of the East German Air Force is Luftstreitkrafte. Earlier this year it put on its first public display at a Culture and Sports Festival held at Cottbus, a city not far from the Polish border, on September 29.

Present were several high officers (who were not identified by name) of the Soviet, Czechoslovakian, and Polish Air Forces.

The East German Air Force showed off a squadron of YAK-18s (NATO-code-named Max), which are used for training purposes, and three Antonov AN-2s (Colt) biplanes, widely used in Russia in the Arctic and mountain areas as "bush" airplanes. At Cottbus the AN-2s carried paratroopers, a small number of whom made descents during the festival before their commander-in-chief, Maj. Gen. Heinz Zorn. This was the first time that General Zorn had been identified officially as chief of the East German Air Force.

General Zorn was a wing commander in the Luftwaffe during World War II, and took part in the civil war in Spain in 1936 when he saw action as a bomber pilot in the "Legion Condor."

The East German Air Force, like the East German government airline, has taken over the insignia of its West German counterpart. In the case of the two airlines, both were named *Lufthansa*. The West German *Lufthansa* is filing complaints in the courts in East Germany to see what can be done to prevent the East German airline from using the same name. However, when the East German Air Force adopted the insignia (a square executed in black, red, and gold) of the West German Air Force, the latter promptly switched over to the traditional German iron cross insignia in black, with white trimming (see "Airpower in the News," Air Force, November '56).

The East German Air Force does not have MIG-15s as yet, though about 300 East Germans were trained to fly this aircraft in the USSR some three years ago. It is expected that the East Germans may have their own MIG-15s before long.

The light, twin-jet, supersonic bomber shown General Twining and other USAF officers who visited Moscow for Soviet Aviation Day last summer has been code-named Blowlamp by NATO.

Series production of the plane has been under way since at least March of this year. The first sighting report of the new aircraft was at Voronezh, where Plant Number 64, operated by the Ministry of Aircraft Production, is located. There are already three versions of the plane—Blowlamp, Blowtorch, and Blowpipe.

Very likely an Ilyushin design, Blowlamp is a complete break-away from his earlier IL-28-2.

The two axial-flow jet engines are carried in pods beneath the wing, as in the B-47. The wing is thin and has about fifty-five degrees of sweepback. The tail surfaces are swept rather sharply, and the horizontal tail is set very high. Span is about sixty feet.

The landing gear is similar to that of Flashlight, i.e., a main tandem gear with double wheels retractable into the slim fuselage and two assisting wheels retractable into fairings at the wing ends. (This landing gear layout first was used in the USSR in the EF-150V prototype, built about 1950 or 1951 with much German help.)

The wing of Blowlamp has a so-called high-speed airfoil section and a leading edge with a fixed droop—the latter allegedly helps overcome the nose-up pitching tendency at transonic speeds.

The sighting reports from the air show at Tushino Airport near Moscow on June 24 indicated that two "Super-Farmer" type aircraft were shown.

The first of these, with sweptback wings, was reminiscent of the single-seat supersonic fighter designed by Mikoyan and Guervich, the so-called MIG-19 Farmer. The new plane has been NATO-code-named Faceplate. Only one example of it was shown and, like Farmer, it has two small axial turbojets.

However, the second Super-Farmer is a quite distinct design and has only one engine, though it has the same general appearance. Pavel O. Sukhoi is the designer.

Sukhoi also is the designer of the delta fighters shown at Tushino. Three were shown—each of them experimental prototypes. They have been NATO-code-named Fishbed A, Fishbed B, and Fishpot. A fourth version of the same series was not shown, but in Russia is designated the SU-D-4.

The Russians have been working on deltas for many years and have flown designs far more radical than those displayed at Tushino this year. In fact, there is reason to believe that the prototypes that were shown may have been rather outmoded by Soviet standards.

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While the Russians did a pretty good job of publicizing the withdrawal of their air force equipment from several East German locations, they have not been able to cover up the fact that some of the old equipment has been replaced with new, more modern aircraft.

Some IL-10s and IL-28s were sent back to Russia, and allegedly the Russian pilots flew home in transports as two second-rank Russian air divisions—the 200th and 221st—were demobilized. The latter division was equipped with some seventy IL-28s (Beagle) and U-IL-28 (Mascot) trainers for bomber pilots.

Now the Soviets have begun to send in the new supersonic Blowlamp light bombers as replacements for the IL-28s that left, and MIG-17s (Fresco) and one MIG-19 have been seen in East Germany as replacements for the MIG-15s the Russian Air Force has been using there. Furthermore, the first YAK-25 Flashlight has been seen on a Russian airport at Finow in East Germany. It was the all-weather version of Flashlight, which apparently is to become a replacement for the radar version of the MIG-15.—End



### airman's bookshelf

Two personal narratives top this month's list of airpower non-fiction books. Both center around World War II.

The Flying Years, by Lou Reichers (Henry Holt, \$4.50), is the story of an adventure-filled aviation career in the years from Jennies to jets. Reichers, a military pilot and professional airman-of-fortune, started out flying PT-1s in the old Air Service at "San Antone" when Lt. Nate Twining was a flight instructor there. Fascinated by flight and the adventure the new air age promised, Reichers put aside his military wings to join the barnstorming, daredevil flyers of the Thirties who spurred the progress and technological readiness of American aviation before World War II. Highlights of Reichers's career during this period included breaking the Spaatz-Eaker endurance record by flying 313 hours with Bob Black in a Stinson to set a new mark for aerial refueling operations; making the first nonstop flight from Montreal to Havana; attempting to duplicate Lindbergh's transatlantic hop in the Bernarr Mac-Fadden-sponsored "Miss Liberty" (which landed at sea in a fog fifteen miles off the Irish coast); and carrying a 1935 Ford to 10,000 feet over New York City, strapped under a UB-20 to "prove" the starting power of one brand of gasoline at zero temperature.

Recalled to active duty just before World War II, Reichers flew Russian Ambassador Constantine A. Oumansky and the US Lend-Lease Mission to Moscow from Bolling AFB in a B-24. The leg from Prestwick, Scotland, north over the Arctic and down to Moscow, where German armies were pounding at the city gates, was over 3,400 miles—the longest non-stop flight to that date. The return to Bolling AFB was via Iraq, Arabia, central Africa, and across the South Atlantic to Natal, Brazil, pioneering what was to become a widely used military ferrying route. Reichers now is retired from the AF and lives in New York

City.

All told, The Flying Years is a good picture of Reichers's life as a pioneer in the sky. It is the kind of book that helps fill the gaps in our record of greatness in the air.

. . .

Col. Barney Oldfield's Never A Shot in Anger (Duell, Sloan, and Pearce, \$5), is a sure bet to be widely read. Setting down the story of the invasion of Hitler's Festung Europa by hundreds of war correspondents—who trailed willy-nilly with, behind, sometimes in front of allied forces wherever they went—is no small job. But then neither was it easy to be top public information man for the airborne invasion, responsible for the army of unpredictable correspondents. Colonel Oldfield, who's now ISO for the Air Defense Command, has done both well. And one result is his entertaining account of the men and events behind the news and the features that came out of World War II.

Many familiar names appear in the book, in moments of irrepressible humor, strange fellowship, and solemn tragedy. In recounting the role of reporters and photographers and their colorful adventures with the military, Colonel Oldfield describes World War II as the best "covered" war in history and suggests that any atomic-and-missile war of the future would probably offer no "traditional" front from which to observe and report. We recommend Never A Shot in Anger mainly because it is a good way for a reader to get a factual record of an important but little-discussed side of war.

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Several months ago we praised the official Air Force Dictionary, which was published by the Air University and received limited official distribution within the AF. Now the same book is out in a commercial edition and available in bookstores throughout the country. The commercial model of The United States Air Force Dictionary (D. Van Nostrand, \$4.75), differs from the original only by having an attractive blue-gray cloth cover with the title in silver lettering. It makes a distinguished volume that anyone can be proud to own.

. . .

Eric Sloan, who has written a string of books about weather, now has added a graphic narrative on this subject in his latest work, *The Book of Storms* (Duell, Sloan and Pearce, \$3.50). Dramatic drawings help explain what storms are and how they are formed. Cyclones, tornadoes, hurricanes, warm and cold fronts, thunderstorms, and line squalls are just a few of the phenomena Eric Sloan describes. Air travelers especially should be interested in this book. Even pilots who require precision knowledge of meteorology will find it extremely informative and useful.

. . .

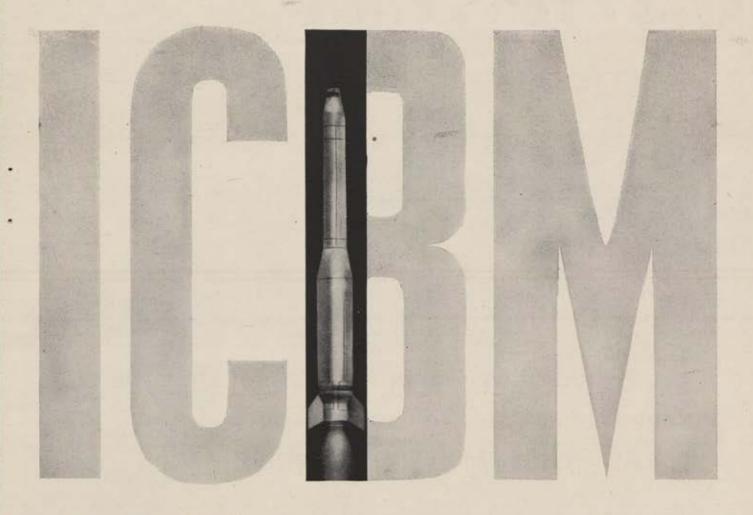
A whole new generation is growing up in the jet age. And it is to these young people that Lewis Zarem and Robert Maltby direct their photo book on military aviation, New Era of Flight: Aeronautics Simplified (E. P. Dutton, \$3.75). The authors, who are in the information office of ARDC's Wright Air Development Center, have written a clear, understandable narrative on all types of USAF operational, research, experimental, and training aircraft now in use. Chapters on propulsion, aircraft equipment, principles and problems of jet flight, and guided missiles round out this well illustrated volume.

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The distaff side comes in for a double dose of "how-to-do-it" this month. Nancy Shea's 1957 edition of *The Air Force Wife* (Harper and Brothers, \$3.50), is considerably revised over the earlier version and up-dated to keep pace with the changing Air Force. A new guide to service life and traditions is *The Complete Guide for the Serviceman's Wife*, by Elizabeth Land and Lt. Col. Carroll V. Glines, Jr., USAF (Houghton Mifflin, hard cover—\$5; paper cover—\$2.75). This is a veritable encyclopedia for the little lady, a service wife's "bible," dictionary, and complete reference rolled into one. If the answers can't be found here, they probably don't exist. Written for wives of both enlisted and officer personnel, it applies to all branches of the armed forces. The appendix includes a term glossary, a thirty-four-page section to preserve the family record and history, and a useful bibliography of related books and periodicals.

0 0 0

If you're planning a trip to Europe, vacation or transfer, you'll find Aboard and Abroad: Olson's Complete Travel Guide to Europe, 1957, by Harry S. Olson (J. B. Lippincott, \$4.95), an invaluable investment and companion. This 660-page illustrated book with a complete set of maps is endorsed by top travel experts. Skillfully organized, delightfully readable, it is packed with information and answers to questions based on the author's twenty-eight years of experience in the European travel business.—End



"LIFE INSURANCE" The preservation of the peace and security of this nation depends upon two things: Our diplomatic wisdom in a troubled world, and the power to protect ourselves if peaceful negotiation should fail.

Point 2 is part of our responsibility. This is

the Martin-U.S. Air Force TITAN program...
one of the most advanced and critically important development projects in America today...
an Inter-Continental Ballistic Missile conceived in peace and dedicated to the proposition that no aggressor shall ever take the life of this country.



# READY FOR ACTION

DOUGLAS B-66, ALL-WEATHER TACTICAL BOMBER TAKES OFF FOR PRACTICE MISSION

## B-66, Protected by General Electric Automatic, Electronic Tail Armament Gives TAC Greater Mobility, Flexibility

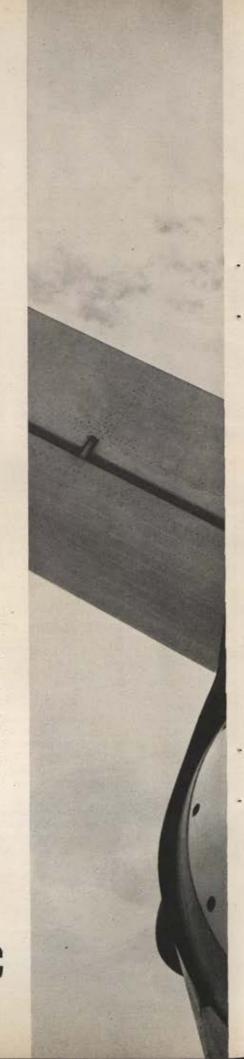
Built for high-speed interdiction and reconnaissance, the Douglas B-66 is the latest addition to the Tactical Air Command's offensive power. General Electric's MD-1, electronic tail armament system provides an accurate, defensive punch to help the all-weather bomber accomplish its mission.

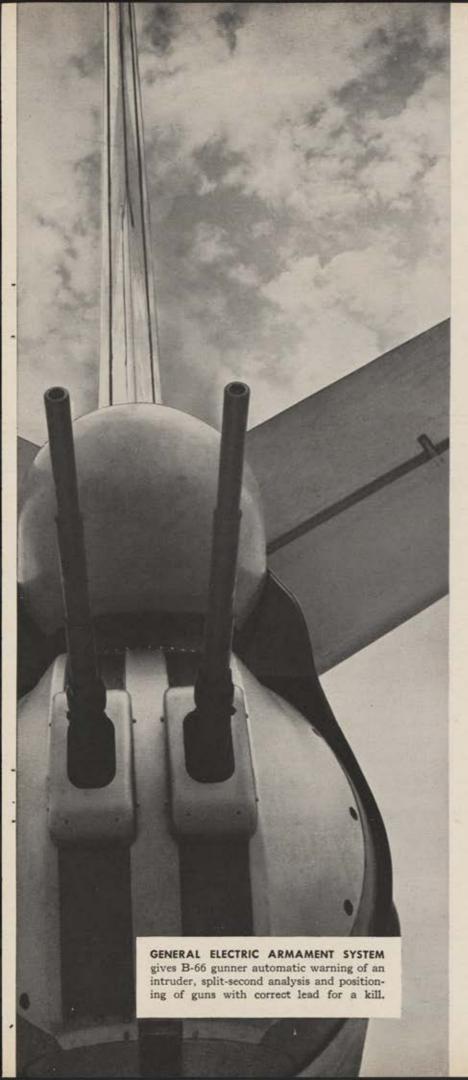
To assure optimum integration of components and continuously high performance of the equipment in the field, the system is completely assembled and tested at the factory and followed through operational usage by highly skilled General Electric technicians. General Electric's complete, follow-through service helps keep the B-66 tail defense system truly "ready for action"—ready to counter with speed, precision, and reliability.

ENGINEERS: Expanding electronic bomber defense projects at G.E. are creating opportunities for you. Contact C. E. Irwin, Aircraft Products Department, General Electric Company, Johnson City, N.Y.

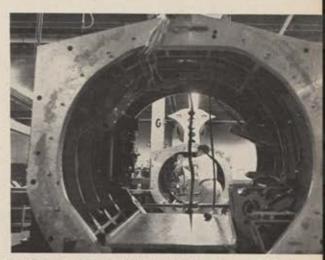
Progress Is Our Most Important Product

GENERAL ELECTRIC

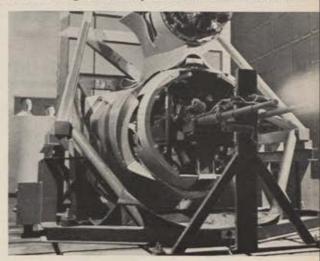




# OVER-ALL CAPABILITY OF G.E.'s AIRCRAFT PRODUCTS DEPARTMENT ASSURES READY-FOR-ACTION SYSTEMS



COMPLETE TAIL TURRET PACKAGE, made up of G-E radar computer and gun turret, is assembled for shipment to Douglas for incorporation into B-66 airframe.



FIRE TESTING of assembled tail turret in indoor range assures delivery of "combat ready" defense system for the aircraft's first flight.



SERVICE ENGINEERS help Air Force attain maximum armament maintenance standards, provide G-E designers with field data to speed improvements.

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HEN THIS HAPPENS, YOUR FLIGHT PAY STOPS.



And it could happen to you-any time. Injury or illness can suspend your flight pay for months. What do you-and your familydo then?

Worry? Go broke? It could happen, because-if you're like most of us these high cost days-you're living right up to your income, including flight pay.

But now you can stop worrying. For the first time, you can guarantee your flight pay against loss through the Air Force Association's Exclusive Flight Pay Protection Plan, underwritten by the AETNA INSURANCE COMPANY of Hartford. Conn.

Clip and mail the coupon today for full details of this exclusive plan for AFA Members. If you're not an AFA Member, check the appropriate box, and we'll send you complete information about Association membership.

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SERVICE (USAF, ANG, ETC.)

MAILING ADDRESS

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underwritten by THE AETNA INSURANCE COMPANY Hartford, Conn.



# SHOOTING THE BREEZE-

WITH THE EDITORS OF AIR FORCE MAGAZINE

Open letter to John O. Taxpaver:

How would you like to see six and one-half wings added to the effective force of the Strategic Air Command without it costing an extra nickel of your hard-earned money?

Sounds like the biggest bargain since the Indians traded Manhattan Island for a basketful of trinkets. SAC experts say it can be done, however, through a realistic approach to the critical manpower shortage. With comparatively small outlays to keep trained men in the service, says General Lemay's staff, SAC could keep 500 more aircraft ready for action than now is possible and, through reducing personnel turnover, save large chunks of public cash at the same time.

The SAC answer is in the best American tradition—to create financial incentives for men to become trained specialists and to stay on in the service to keep their skills at the Air Force's disposal. A five-point program would do it, says SAC.

 Pay. Not just an across-the-board raise but a system that would give more pay to those technicians with scarce and needed skills, a supply-and-demand proposition.

Housing. SAC now has 84,400 families, housing for only 16,842.

 Improved commissary and base exchange privileges.
 Formerly an important fringe benefit, servicemen can now get better prices in super-markets and discount houses.

 Education. Many airmen and officers leave the service to go to college. If a man could get at least a limited amount of college training while on active duty more would stay in.

5. Improvement of individual rights and privileges. This includes a general upgrading of prestige for the military service and recognition on the part of the government and the public of the sacrifices many military men make every day.

Total cost of such a program, say the SAC experts, would come to \$148,940,417 for SAC alone, including \$100,838,717 for housing, \$47,360,700 for an incentive pay system, and \$741,000 for educational privileges.

Estimated returns to the government would be:

1. A higher reenlistment rate, probably sixty-five percent instead of the present thirty-five percent.

Higher retention of short-term officers, from the present twenty-five percent to an estimated fifty-five percent.

More than 500 aircraft, equal to six and one-half wings kept ready for action, rather than idle because of personnel shortages.

 A cut of ten percent in troop spaces through increased stability of personnel, with resultant savings in recruiting, replacement training, and travel.

5. Large savings in quarters allowances.

Estimated savings, without including increased combat efficiency, would total \$435.5 million as against the \$148.9 million that such a program would cost.

Dollars are important but most vital would be stopping

From the News Bureau of the General Electric Company comes the picture of our "Breezecake" girl for December. She's described as "quite a figure with figures," which is easy to understand since she's a designer of jet-engine compressors for the General Electric Company. Her name is Virginia Haywood, and GE is putting her up for the title of "Prettiest Engineer." She now lives in Marblehead, Mass., and since 1954 has been with General Electric's Small Aircraft Engine Department, in Lynn, Mass. Virginia was born in Boston, GE tells us, and was graduated from Boston University and Northeastern University, also in Boston, with bachelor's and master's degrees in physics and mathematics. The picture at the right was made this fall at the meeting of the Society of Automotive Engineers in Los Angeles, Calif., where Virginia helped dress up the exhibit of General Electric's Aircraft Accessory Turbine Department. She's standing between a jet-engine turbostarter (at the right) and a turbodrive. The turbostarter, General Electric says, "has the twin-jet engines of the USAF Martin B-57 medium bomber idling and ready for take-off within twenty-five seconds." The turbodrive can "turn thin air into electricity," when teamed with an alternator. The turbodrives used on the Boeing B-52 could supply enough electric power to light 2,500 homes.



the present drop in the experience level of SAC men. By the end of this year only 8.4 percent of SAC's airmen will have more than four years in the command.

"That," say SAC leaders, "does not make for a professional force. And we must have a professional force. The

nation cannot afford anything less.

At this writing the Cordiner Committee is studying the pay structure of the armed forces. It is due to submit its report and recommended changes on December 1. The SAC plan has been presented to it. It will be most interesting to see how the Cordiner Committee recommendations check out against SAC's alarming statistics.



The New Idea Division of the AVCO Manufacturing Corp. is located in Coldwater, Ohio.



Keeping pace with AFA's rapidly expanding industrial program, Bob Stro-bell (left) of AFA's headquarters staff has been named Director of Industrial Affairs. In the same department, Marcella Warner will continue as Assistant for Industrial Affairs. Bob, who joined the staff last January, will con-tinue to write "Tech Talk" and other material for the magazine.

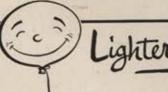
The Sunday before this issue went to press, the Columbia Broadcasting System presented the first program in its new, twenty-six-week television series "Airpower." During the previous week, we'd been in a group of Washington newsmen who were invited to an advance screening of two other programs from the forthcoming Sunday evening series. Based on the debut and the preview, we feel "Airpower" is going to be a first-rate series, and we urge all our readers to camp before their TV screens at 6:30 p.m., E.S.T., Sunday evenings from now on. CBS news correspondent Walter Cronkite narrates the show, which CBS describes as "depicting the development of flight and its impact on the Twentieth Century." The series was produced with the full cooperation of the US Air Force.



Aircraft from Shaw AFB, S. C., recently flew an unusual mission. They went out to count fishermen on lakes in the area. Seems that the state Wildlife Resources Department wanted an estimate of the number of fishermen who use the lakes in a month so they could formulate regulations. By counting the fishermen on any one lake three or four times a day, they were able to get a pretty good estimate of the fishermen per month.



A report from Vincent AFB, Ariz., says that A/IC Donald Sparks, whose home is at 1670 Electric Ave., Venice, Calif., is an electronics mechanic. Airman Sparks was at the rocketry meet at Vincent with the Alaskan Air Command's team.



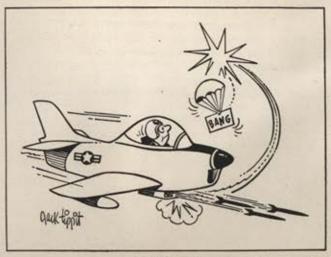
# Lighter than Air

"I had the pleasure of training with Dutch and Danish officers and cadets in North American T-6s at Goodfellow AFB, Tex., back in 1950. One of the standard operating procedures while flying the T-6 in the landing pattern was the "GUMP check" (gas, undercarriage, mixture, and prop). During landing practice one morning, one of the foreign students awoke from a bit of wool-gathering to hear his instructor screaming into the earphones, "GUMP, dammit, GUMP!" Never one to argue with his instructor, the student promptly grabbed the ripcord D-ring and bailed out."

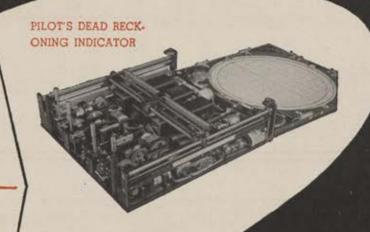
FRANCIS L. KAFKA Menlo Park, Calif.

This chuckle-and-snort corner is devoted to true unpublished anecdotes about AF life. Send us yours. We'll pay five bucks for each one published. All stories used become our property.

Advance proofs of our front cover this month, showing the spaceman's view of earth, was variously referred to around the office as either a housewife's view of her Bendix washer in action or a station break on CBS television. The line "Aero-Medicine's Peeping Toms," under the heading "Window Into Space" had what struck us as a rather interesting evolution. In the editorial bull session which produces such titles, we came up with these workaday gems, which were rejected about as soon as they were offered: "Interplanetary Travel - Fact or Fiction?"; "How AF Medics Are Exploring the Threshold of Space"; and "Randolph AFB-Where AF Medics Are Picking the Lock on the Secrets of Space." Then, in a more frivolous mood, we slipped these on for size: "Join the AF and See the World-From the Moon"; "Air Force Medics Have Space Open for Young Man Who Desires to Travel"; and even "Randolph AFB-The Air Force's Universal Joint." For more about the "universal joint" at the base in Texas where the AF's aeromedics are hard at work, see the lead article, beginning on page 43, and the following interview with two leading space authorities, on page 47.-END



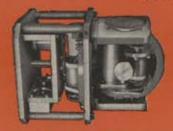
true flight! This Pilot's Dead Reckoning Indicator will track an aircraft's true flight over ranges up to 50 miles... and will indicate the position, motion and heading of the aircraft in which it is carried by a spot of light ½ inch in diameter, projected onto the surface of a translucent grid disc. In the center of this spot of light is an arrow that indicates the direction of the aircraft's heading... which will rotate through 360°. Using transistors and other miniature components and techniques our Pilot's Dead Reckoning Indicator is the smallest of its type.





Division of Daystrom, Inc. ARCHBALD, PENNA. This precision instrument is but one of many which Daystrom engineers have developed—and Daystrom's shop has produced for the Armed Services and industry. You, too, can depend on the "know-how" of Daystrom in development, design and production . . . upon Daystrom's reputation for meeting rigid quality standards and high reliability. Drop us a line, and we'll be glad to have our representative call on you. Or, better still—pay us a visit, and see our modern plant and complete facilities.

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Aircraft All Attitude Indicator



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Weight-saving magnesium sheet (white areas) is used for leading edges, empennage, wheel doors and many other parts of F8U-1 Crusader.

# 25% of external skin on record-breaking F8U-1 made with magnesium

In Chance Vought's F8U-1 Crusader, fastest U.S. fighter by official record, many precious pounds are saved by using magnesium. Designers called for a total of 166 magnesium external skin parts—25% of the wing and fuselage surface area. 275 magnesium sand castings ranging in weight from a few ounces to thirteen lbs, were used inside the skin.

Weighing one fourth as much as steel and only two thirds as much as aluminum, magnesium gives you the best combination of strength and rigidity per pound. Its stiffness-toweight ratio is the highest of any structural metal. Magnesium permits clean, simplified designs—eliminates many stringers and detail parts. A selection of finishes provides remarkable protection against corrosion. Machinability is excellent, too. Fabrication, fitting and joining problems are always at a minimum.

Magnesium can help you make better designs for fuselage, wings and interior parts. Sheet, extrusions, and castings can be readily produced to meet your requirements. Call your local Dow sales office, or write to THE DOW CHEMICAL COMPANY, Midland, Michigan, Department MA363JJ.

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### \* KEY

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Ap .... past accomplishment

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ARP.. advanced rocket power

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DENVILLE, NEW JERSEY

# 'Long Haul' MEANS 'DOWN HILL'

The Air Force's cost of living is rising faster than money is made available to it. When that happens to you, you pull in your belt.

And that is exactly what the Air Force is facing.

RECENT history should be enough to prove that war is never prevented by running away from it. There is all the difference between a policy aimed at preventing war and one in which the main preoccupation is to avoid war."

The words are those of a veteran airman, Marshal of the Royal Air Force Sir John Slessor. They were written before the fall of Dien Bien Phu, in Indo-China, in

Nothing that has transpired since then appears to contradict Marshal Slessor's premise. In our anxiety to avoid involvement, we have been reluctant to make use of our military strength as a deterrent to the so-called "little war," situations that could well lead to our inability to deter a global conflict. For the two sides of the deterrent coin are, first the military capability to deter, and second the will to use such capability. Like love and marriage, "you can't have one without the other."

Today we find the key NATO powers split, with France and Britain acting on their own in the Middle East. The western alliance is coming apart at the seams over the Suez situation. In Hungary the blood of freedom-loving people is flowing in the streets, as Soviet forces ruthlessly repress this threat to the solidarity of their satellites. Each new incident serves as another spark to transform local brush-fires into a world-wide conflagration.

Against this gloomy backdrop, the future of our defense establishment is, at this writing, being decided in the Pentagon as the Fiscal Year 1958 budget is being prepaged.

Secretary Wilson had made it quite clear that there would be no official public discussion of this new budget until after the election. Any controversies over our military spending would inevitably rock the national boat, and there were controversies—many of them—which could have had political repercussions. Mr. Wilson and Department

of Defense spokesmen have studiously abided by the information clamp-down. Unlike previous years, when there was little reluctance to talk about the Administration's fiscal-military goals, there has been almost no official discussion, even in general terms.

But behind the curtain of silence rages a bitter battle. The core of it is the fact that the first estimates of the three military departments adds up to more than \$48 billion. This is thirty-five percent up from last year's \$35 billion, or better than a \$13 billion increase, Mr. Wilson did break his self-imposed silence long enough to call these estimates extreme and foolish. But there is no indication, particularly in view of the steadily deteriorating international situation, that the services will back down. In fact, the tone of service Congressional testimony over the past year indicates, rather, an intense determination to stick by their guns.

There is little question but that the over-all demands of the services are inflated. This follows necessarily from the fact that there are three of them, each solidly convinced of the overriding importance of its individual mission. Under the present organization of the Department of Defense, duplication, overlapping, and waste are inevitable. But until the military establishment is reorganized along sensible lines, with a single military service organized to conform with reality rather than tradition, this will continue to be so.

With that in mind, let's take a look at the needs of the Air Force. Fiscal Year 1958 is a "do or die" year for the Air Force. Last year both Secretary Donald A. Quarles and Chief of Staff Nathan F. Twining accepted their FY 1957 budget with grave reservations. They agreed that last year's budget met their minimum needs. But they solemnly warned that to keep this minimum program going, and to attain and maintain the proclaimed goal of

(Continued on page 39)



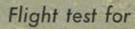
## THE CORD HAS BEEN CUT

Man has at last severed the tie that bound him to Mother Earth. Gyroscopic stable platforms and inertial navigation systems can now free him from all terrestrial sources of information . . . In the outer regions, where the terms Up, Down, East and West are meaningless, these fantastically accurate instruments compute position, course, and attitude entirely without reference

to maps based upon the earth's surface . . . Lear has pioneered the design and production of inertial stabilization and navigation systems. Today these devices guide and stabilize man's most advanced missiles and aircraft. Tomorrow they will

orient and control spacecraft yet to be developed.

masters of master reference systems for all aircraft



## IROQUOIS,

of a B-47 bomber, will be next step in the development schedule of Orenda's supersonic turbojet.





MALTON, CANADA

MEMBER: A. V. ROE CANADA LIMITED & THE HAWKER SIDDELEY GROUP

137 combat-ready wings, the Air Force would have to have more money in FY 1958. General Twining added that this would have to be a "considerably higher budget" than the one under which the Air Force currently is operating.

General Twining did not spell out all of these increased costs. He mentioned particularly three specific areas—aircraft procurement, public works (construction), and research and development. These alone would account for substantial increases needed for the coming fiscal year. But there are other areas as well which help to boost the requirement for increased appropriations this year.

The federal budget is an imposing document. You can buy a copy from the Government Printing Office for a dollar and a half—1,165 pages of it. It is filled with technical fiscal phrases and bureaucratic gobbledegook. But it does provide a patient researcher with the means to analyze what has been happening to our defense dollars in the past and furnishes a guide to what we will need in the future. Even though the Administration's requests for FY 1958 have not been announced at this writing, it is possible to arrive at a yardstick, against which to measure the budget when announced. It should not be difficult to determine whether the Air Force will, in fact, get enough money to carry on its program or, as we have consistently predicted, our programmed Air Force strength will actually decline.

A good starting place is the total Air Force appropriation requested. Last year the Administration asked for \$15.43 billion for the Air Force, plus \$1.2 billion for public works. Congressional action upped this to \$17.7, largely as a result of the investigations of the Symington

airpower subcommittee.

This year the Air Force's first flash estimate totals \$23.6 billion. Obviously this figure represents what many Air Force people believe to be a minimum requirement. Some readjustment is always possible, of course, even if it means delaying certain programs. But this much seems certain. If the amount requested by the Air Force for Fiscal Year 1958 falls below \$22 billion, the Air Force will lose strength and effectiveness. Both its force in being and its program of new weapon systems and bases will have to be cut back. The basis for this prediction lies in the money needed for aircraft procurement, for missile development and procurement, for maintenance and operations (to train and operate the force), for public works (to construct air bases and facilities), and in the vital field of research and development. A look at the record of the past few years in these fields will confirm this.

New Aircraft: In Fiscal Year 1957, aircraft procurement funds were up \$2 billion over FY 1956. But the number of aircraft scheduled for procurement was less than two thousand—down almost a thousand from the previous year. The impact of this is clear. If the force is to be kept modern, a significant increase in money for new aircraft

(on the order of \$2 billion) is indicated.

Missiles: As missiles move from the research and development stage into procurement, their costs will skyrocket. Already a substantial amount of the money spent on the intercontinental ballistic missile program—a program we cannot afford to delay—is in procurement rather than development. In FY 1955 only half a billion dollars was ticketed for missile procurement. By FY 1957 this sum was tripled, and the program is still expanding mightily. At least \$1 billion more than last year will be needed in this field alone.

Maintenance and Operation: These are the funds which buy the fuel and repair and maintain the force. As the force grows and is modernized, M&O costs must keep pace. It is obviously false economy to build a force and not provide the money needed to keep it flying. In FY 1955 we had 121 wings, 189 operational bases, and 119 aircraft control and warning sites. By June of 1947 we are programmed to have 137 wings, 224 bases, 547 AC&W sites. And these numbers are scheduled to climb.

Jets take more fuel, so fuel costs must go up. Logistical support must be expanded. As the force becomes more modern, it becomes more complex. More money is needed to operate the radar network and the communications system, weather, and air rescue units needed for continuous operations. Units are being rotated overseas oftener. Add another billion dollars for maintenance and operations.

Public Works: Two major requirements combine to boost the construction price tag—the DEW line and the base dispersal plan, neither of which is susceptible to cut-backs or delays. Last year public works funds amounted to \$1.2 billion, and General Twining repeatedly stated he could have profitably used at least a quarter of a billion more.

In addition to these major categories, other costs are rising all along the line. The Reserve program is expanding. Pay and allowance will require more money as the force expands and particularly if needed adjustments are made to help solve the pressing personnel problem. Ground handling equipment and training equipment costs are rising. Last year it took half a billion dollars just to modify existing equipment.

These, then, are the major factors General Twining had in mind when he predicted a greatly increased budget for Fiscal Year 1958, and the original Air Force estimate of \$23.6 billion would appear to be a reasonably realistic

reflection of these needs.

Our present military program is professedly geared to the long haul. The assumption is that expenditures will be kept to a mildly rising plateau. If this philosophy is adhered to we cannot help but fall behind. If your salary goes up six percent and the cost of living rises thirty percent, you can't stay even. You pull in your belt and reduce your standard of living. The Air Force is in the same boat. If it cannot get the money to support its programs, it will have no choice but to cut its programs.

Unfortunately, military programs can be geared realistically only to the job to be done. They can be cut below these minimums only by gambling with our ability

to do the job.

We are sometimes accused of wanting only more and more money for the Air Force. This is so, if only because the facts of life call for more and more money. We also feel, however, that pyramiding costs for decision-rendering weapons cannot continue to be piled onto pyramiding costs for obsolete or duplicating weapon systems for all three services.

Increases in military spending in certain fields cannot be avoided if we are to maintain freedom of action in an uncertain world. They can be cut to a minimum by a relentless campaign against waste and duplication, by a realistic reassessment of our military structure, starting, we believe, with a single service and a single promotion list. But in the meantime, until this millennium is attained, we would be less than honest if we did not present a realistic assessment of Air Force needs under the present ground rules.

The ultimate in reducing one's standard of living is to starve to death. Starving our airpower could have equally fatal results for millions of Americans.—End.

## How to get reliability

Got the automation jitters?...worried about turning complex manufacturing operations over to an "electronic brain"?... worried about what can happen when one component in the control system fails?...

Reliability takes on a new and different meaning as American industry becomes more and more automated. Here are a few thoughts on the importance of reliability and how it can be controlled.

All of us are going to have to pay more attention to "reliability."

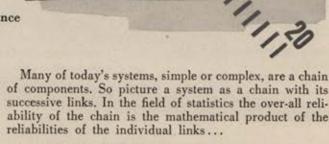
We'll have to pay more attention to individual "devices" within a system.

We'll have to guard ourselves carefully when we design the entire system.

The industrial pendulum is swinging more and more toward automatic controls, servo-mechanisms, computers, and automatic "watchers." As it does, the reliability factor becomes more and more important. Let's see why. For example, you probably have three radios at home. If one fails because a soldered joint comes apart, your home life is probably not disrupted to any alarming degree. But . . . consider the automatically controlled steel mill. One soldered joint failing, unless all controls are installed in duplicate (which is expensive) could tie up the entire production process for valuable minutes, if the maintenance crew has second sight. For hours, if automatic troubleindicating and locating systems are not installed (and these are expensive, too). Last, but not least, lend a thought to the dependence of guided missiles and man-made satellites upon the reliability of electronic circuits and components. So . . . let's start to examine "reliability." Let's begin by looking at this definition which is currently popular in the technical field:

The reliability of a particular component or system of components is the probability that it will do what it is supposed to do under operating conditions for a specified operating time.

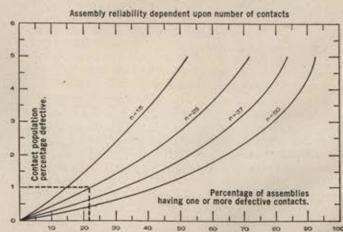
Now ... this is a relatively well-accepted definition, and it offers the key to the problem of coping with failure control. Take the word "probability" in this definition. Let's discuss its implication.



Now, let's consider a system made up of 100 different components, each of which has a reliability of 99%. In applying the formula, multiplication of .99 by itself 100 times gives an over-all reliability for the system of only 36.5%. Two out of three systems you have put together will probably fail!

Overall Reliability, Ro=r1 x r2 x r3...ra

Cannon becomes involved with this problem because our main business is making electric connectors. So, let's look at the following chart that covers contact reliabilities and reliability of the assembly in which they are mounted.





This chart illustrates the reliability of four connectors having 15, 25, 37 and 50 contacts respectively. As an example, assume that the contacts have a contact population of 1% defective (1 in 100 defective . . . this percentage is considered a fairly high standard in most fields). On the 15-contact assembly, we find from our chart that 14% of the connector assemblies would have one or more defective contacts! With 25 contacts, 22% would have one or more defective contacts. With 50 contacts, 411/2%...is your hair starting to curl? Obviously, a 99% contact reliability standard for guided missile components is absolutely unacceptable. And, in between the simplest system and that of a guided missile, are hundreds of assemblies and systems whose reliability factors must be analyzed with

But all is not lost! There's another side to the picture. With proper care, analysis, and control, our Cannon organization has actually achieved, in special "missile quality" contacts, a known level of only 2.85 x 10-3% defective . . only 1 part in 35,000! Naturally, we don't achieve that with all our contacts . . . but we do try to design and manufacture the utmost in reliability required for specific applications.

We have pictured this chart to show the direction we must all take, whether we're talking about connectors, other components, or systems. It boils down to two steps . . .

- The number (n) of components must be kept low ... simplicity.
- The level of component reliability must constantly be improved ... hard work for all of us.

Now...if we refer to our reliability definition on the previous page we note the phrase "do what it is supposed to do." So be sure you define these objectives for your component assembly, or system . . . failure to do so carefully can cause undue failure or the expenditure of unnecessary dollars for needless, excessively-reliable parts or design.

Further on in the same definition, we note the words "operating conditions." This brings up many new points for consideration. Here we are concerned with such things as temperature, pressure, humidity, corrosive atmosphere, stray electric and magnetic fields, low and high frequency noise, shock and vibration. Do your design standards need upgrading? Are your components designed and then tested to meet the operating conditions you specify...or are they designed to meet "average" conditions? Are you using adequate "safety factors"?

In a simple component, manufacturers have always looked for, recognized, and corrected faults when they occurred. We use component quality control to achieve and maintain Cannon's world famous product quality. But in complex systems such component quality control is not enough. Actually . . .

Reliability control over the system is needed. It should be all-encompassing. When you get right down to it, reliability is the product of procedures, equipment, and people ... in

the design, manufacture, testing, control of quality, transportation, and use of products or systems.

#### Do you have a reliability control system?

Here are a few of the steps that are needed to get a reliability control system operating:

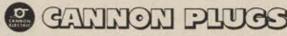
- 1. Determine Your Requirements. Specify the environment, operating time, performance limits, and the percent of reliability required. Allow an adequate safety factor keeping in mind the end use of the finished product.
- 2. Collect Reliability Data. Set up facilities for the continuous accumulation of data on component or system failures and their causes.
- 3. Establish quality control and test procedures which show high degree of correlation with end-use conditions.
- 4. Analyze. Determine if reliability requirements are being met. Establish the most important causes of failure by analyzing the data you collect.
- 5. Improve. Take action to eliminate the most important defects or causes of failure. Reduce the failure rate to the required level.
- 6. Maintain Continuous Vigilance. You have emphasized system design...you have used statistical analysis of failures...now exert continuous and critical control to be sure your "improvements" actually improve reliability. Examine new and unforeseen failure sources. Review and modify your requirements with changing conditions.

We at Cannon Electric are proud of our historical emphasis on quality and reliability. Since 1915 we have adhered to a design philosophy embracing the highest quality and reliability in each and every Cannon Plug for the specific application for which it is to be used. If we can't design to that principle, we don't make it! In manufacture, we are proud of our know-how in depth, proud of our fine quality control systems, proud of our personnel and proud of our reliability control group.

Whenever you have an electric connector reliability problem...in design, engineering, production, or prototype phases...we would appreciate the opportunity of discussing it with you.

Cordially,

CANNON ELECTRIC COMPANY 3208 Humboldt St., Los Angeles 31, California



Eight plants around the seven seas! Please Refer to Dept. 429











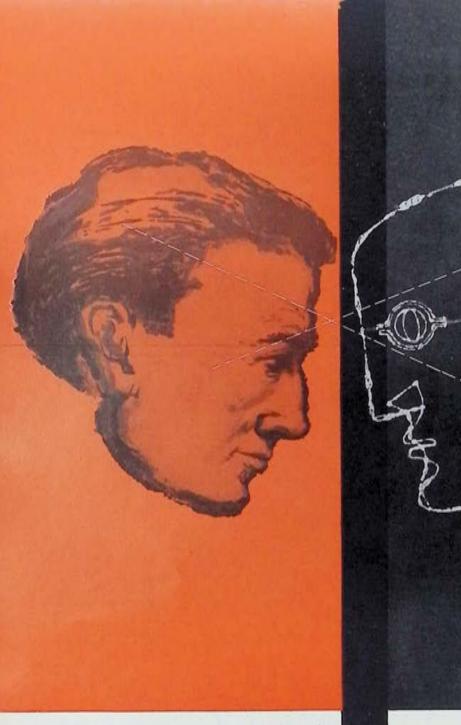


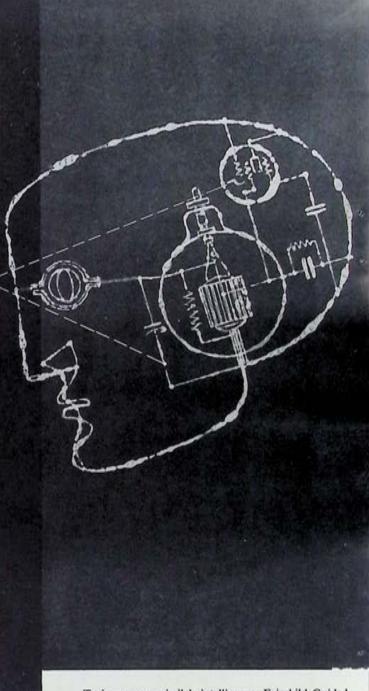












HOW
TO IMPROVE
A MISSILE'S
IQ

Today's guided missile is an amazingly sophisticated and intelligent instrument, capable of complex thought and precise action. Tomorrow's must have an even higher IQ.

To improve a missile's intelligence, Fairchild Guided Missiles Division engineers and scientists have developed radical new concepts for guidance and control, transferring their intelligence into the missile's guidance center.

Through sound research, inventiveness and imagination, FGMD engineers and scientists continue to make great strides in all fields of missile development...putting more brain-power into more missile power.



QUIDED MISSILES DIVISION - WYANDANCH, LONG ISLAND, N. Y.

A Division of Fairchild Engine and Airplane Corporation

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



Capt. Emanuel Roth (left) and Dr. James Gaume monitor one of their experiments in the AF's space-cabin simulator.

## Window Into Space

At one of our bases in Texas, aero-medics are exploring man's last frontier

By Ed Mack Miller

AND

Hugh Duncan

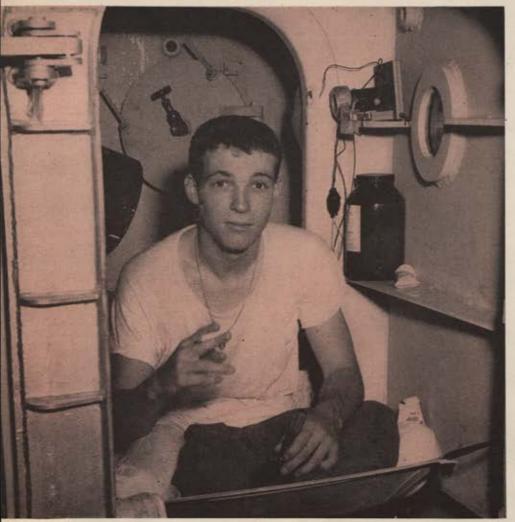
VEN for April it was humid in the flat mesquite-lands and runty hills around San Antonio.

It was especially warm and uncomfortable for a young man at Randolph Air Force Base, for he was preparing to "leap" for the moon.

Wondering just a bit how this was all going to come out, the young man walked to the door of a bulky metal device that looked like a cross between a bathysphere and a science-fiction illustration. About the size of a furnace, the unit had a heavy, submarinelike door and thick glass portholes.

Dalton F. Smith, Jr., the young teen-age airman from New Orleans who had volunteered as "guinea pig" on this venture, took a deep breath, grinned at the technicians, and stepped inside. Scientists closed the bank-vault-like doors, sealed them, and the long-est "endurance-in-space" test yet attempted was under way.

Inside, Airman Smith settled back for a twenty-four-hour trip which, it was calculated, could have taken him (Continued on following page)



Airman Dalton F. Smith, Jr., settles back in his metal cocoon. His "trip" in the space-cabin simulator could have taken him "one-third the way to the moon."

#### WINDOW INTO SPACE.

CONTINUED

"a third of the way to the moon." Actually, however, he would never leave the precincts of the School of Aviation Medicine, which occupies nearly fifty buildings at Randolph, for his "vehicle" was the space-cabin simulator, built to find out how far man's environment could be projected into space.

In his metal cocoon, Smith lived for a day exactly as though he were flying through space. Throughout the test, the simulator worked perfectly, supplying oxygen, removing waste products by chemical means, and recirculating body moisture to cool and condition the cabin—and at the same time purifying it for drinking water.

Smith's one thin line of communication with the outside world was an intercom system to physicians monitoring the experiment. The doctors carefully watched Smith through the glass windows and kept tabs on instruments recording the airman's pulse and respiration, as well as the temperature, humidity, and other cabin factors. But even with these lifeguards hovering on the outside, danger crept through the sealed doors after some eighteen grueling hours of testing. At nine o'clock on the morning of April 1, 1956, while Smith was "drowsing in space," he accidentally disconnected the carbon-dioxide absorber. One of the doctors noticed that Smith's pulse and respiration had started to soar.

At first Airman Smith was too drowsy to understand what the doctors were trying to tell him: "Connect the CO<sub>2</sub> absorber!" Then he reached down slowly and sleepily reconnected the hose. His pulse and breathing were soon back to normal again as the absorber droned on, eliminating the dangerous toxic gases around the "guinea pig."

After it was all over, space-pioneer Smith allowed as how he wouldn't mind making a three-day trip to the moon-but first he wanted to get a good night's sleep.

The School of Aviation Medicine

was first organized by the air arm in 1918 "to investigate all conditions which affect the efficiency of military pilots, and to consider all matters pertaining to their selection and their physical and mental fitness."

The school was first known as the Central Medical Research Laboratory, but, after being transferred to Mitchel Field, Long Island, in 1921, its name was changed to the School of Aviation Medicine. In 1949 Maj. Gen. Harry G. Armstrong (later Surgeon General of the Air Force, then Commandant of the School of Aviation Medicine) established a Department of Space Medicine at the school, and placed at its head a distinguished aviation physiologist and physician, Dr. Hubertus Strughold. (General Armstrong was succeeded by Brig. Gen. Otis O. Benson, Jr., who after a three-year tour in Washington has returned as its head.)

Today the school is a branch of the Air University and works on its mission of aeromedical education, research, and specialized medical practice. Naturally, the most "photogenic" department of the school in recent years has been Dr. Strughold's space division, where a group of expatriate German scientists and American space medics have teamed up to keep the US ahead in researching ways of sending man's environment deep into the wilderness yonder.



Dr. Hubertus Strughold, who heads the AF's Department of Space Medicine.

With tremendous powerplants pushing aircraft to the extremes of man's ability to ride along, the space medics have been hard pressed to keep up. And, in addition, there is always the wonder about the advances being made behind the Iron Curtain. It is known that the Russians have an institute of astrobiology, and it can be safely assumed that they, too, are pushing back the frontier of space.

There can be no doubt that there is now a "race for space," for the nation that can control the far heavens most surely will assume the position of the nation that controlled the seas in the ages before the airplane,

After World War II, when Communist Russia was stealing a good part of the cream of Germany's engineering brains, it was America's good fortune that German medical experts looked toward the US for freedom and encouragement in their experiments. Fifty-eight-year-old Dr. Strughold, one of those who came to this country after the war, is one of the pioneers of aviation medicine. As a professor with a Ph.D. from the University of Münster and an M.D. from the University of Würzburg, he taught physiology and aviation medicine in Germany, until he became a director of the Aeromedical Research Institute of Berlin. He is probably best known for two of his books, Basic Principles of Aviation Medicine and The Green and Red Planet, a study of the possibility of life on Mars. For his work on space medicine, Dr. Strughold was awarded the 1954 Hermann Oberth Medal of the German Rocket Society at a meethold and his staff have reached far out -farther than man has ever reached before-into the nebulous world of outer space, science has still gone only a figurative arm's length toward the unknown. There is still a tremendous amount of spade work to be done before man dares even inhabit an earth satellite, much less dream sanguine dreams of the moon. And this is because man is a hothouse flower, who must needs carry an envelope of his own atmosphere with him if he ventures outside of his earthly greenhouse. In outer space his two big problems will be finding a friendly environment and providing shielding from meteors and cosmic rays.

Toward the end of solving these problems, extensive tests have been made by both the Randolph people and other agencies using mice, turtles, and monkeys—and, in controlled hermetic environments, using man himself. Each advance brings with it new "bugs," so that the problem becomes to pick a priority for the channels of the maze that must be probed, for the temptations are great to wander into

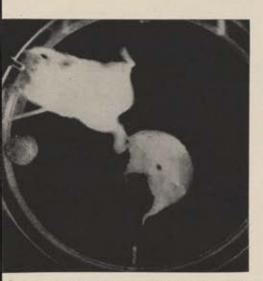
the highways and by-ways and miss the main objectives.

Some of the experiments now being hurdled include the design of pressure suits, oxygen equipment, and escape capsules, the probing of the mysterious features of weightlessness, heat radiation, the heavy primaries of cosmic bombardments, visual disturbances beyond our envelope of air, and the manifold problems of sustaining life in a tiny, speeding cell sunk deep in the hostile seas of the firmament.

To men of less courage and foresight the problems yet to be faced might seem unsurmountable, but the men of the space medicine unit take them calmly and in stride, untangling the ribbons of research one by one.

A token of their optimism that the skein of mystery will one day be unraveled was offered in a speech given recently in Rome by Dr. Gerathewohl, who told delegates to the Seventh International Astronautical Congress that, although many more tests had to be conducted before it could be said with certitude that men could strike

(Continued on following page)



Mice floating in zero-gravity conditions during flight of an Aerobee III.

ing in Innsbruck, in western Austria. Dr. Strughold's chief assistants in the Space Medicine Department of the school include Dr. James G. Gaume and Capt. Emanuel M. Roth (see biographies in companion story). Also working with the group is Dr. Siegfried J. Gerathewohl, a German psychologist who studied at Dresden, Breslau, and Munich, became a major in the German army, an advisor to the German Aviation Research Institute, and a postwar member of the US. Army Air Force Aeromedical Center in Heidelberg.

Although, research-wise, Dr. Strug-



Monkey who rode a rocket forty miles up takes a dim view of WADC scientists.

out on their own in space, he did believe that the great problem of zero gravity would not stop selected crews from operating efficiently. Dr. Gerathewohl also added another problem to be overcome: space-sickness. Certain people, he said, will become nauseated up among the stars just the way some people get butterflies in a rowboat.

Detailing the personal experiences of some sixteen subjects who were exposed to short periods of weightlessness in high-speed dives in jet aircraft, the German scientist said at least one subject had become a fast convert of the weightless way of living. He quoted the pilot as saying: "Actually, I've never been so comfortable in all my life. I think if I had my choice of places to relax, a weightless condition would definitely be it."

ized medical practice—and most of the research done in other departments—are focused on the safety and efficiency of the present-day jet pilot.

Long-distance, hypersonic, spaceequivalent flights are tomorrow's military necessity, and space medics must keep pace with speed engineers to keep the weakest link in the speed package—the human being—togged and masked, girdled and capsuled, so he can stay alive to perform his duties of guidance and intellection.

Not only do General Benson and his staff at the school search into the everunfolding problems, but it is also their two-pronged responsibility to train flight surgeons and medical officers. As time and space converge, the duties of all departments of the School of Aviation Medicine are brought closer perienced officers can both be indoctrinated in the daily discoveries of aviation medicine. The Primary Course student is completely familiarized with the basic aeromedical sciences, all branches of clinical specialties, including dentistry, physiology, biophysics, internal medicine, space medicine, neuropsychiatry, and the many other facets of the trade of a doctor with wings. The primary student receives several hours of flight indoctrination, including time in conventional aircraft and in jet-flight simulators. He uses all types of flight equipment and becomes accustomed to low-pressure conditions. No physician is considered qualified to treat aeromedical reactions until he has completed this course, no matter how much professional training he may have previously

The school also offers an advanced course in aeromedicine for the specialist. In this curriculum the student is given extensive training in a variety of basic studies, plus actual clinical practice and nearly 400 hours of practical aircrew support training.

As for the space medicine research work, it is just that—research, for as operational planes go much above 60,000 feet (and the X-2, with Capt. Iven Kincheloe, Jr., at the controls, went to 126,000 feet in September) the sealed cabin becomes a necessity. And once the hermetic cabin becomes a reality, then space flight can become a reality and space medicine will change from a research art to a practical science.

But the modern-day mission of the School of Aviation Medicine is to "lay emphasis on the specialized medical care required to reduce the mortality rate from flying accidents and to protect the flyer's health and increase his efficiency."

The job is one that becomes increasingly difficult with each stride science takes toward the stars.

But with men like Doctors Strughold, Gerathewohl, Gaume, and Roth, and courageous airmen like Dalton Smith working hard and long to give the US mastery of space, the results will not be long in coming, for these men are not just marking time in an interesting chapter from a sciencefiction story.

As one observer at Randolph said: "The science is still here, but the fact has surpassed the fiction. Down here, if you listen carefully, you can hear the walls that bind man to his earth being tumbled down. These are awe-some experiments for awesome times." —End



Nibbling at the edge of space. Bell X-2 research plane (which crashed this fall) is dropped from its B-29 "mother" in start of an experimental flight.

Although the Department of Space Medicine offers, perhaps, the most inviting and most interesting work being done at the Texas center, space research is by no means the primary mission of the School of Aviation Medicine. The school's functions in educating flight surgeons and specialtogether, for already the high-flying Century Series fighters and Fifty Series bombers are nibbling at altitudes above 60,000 feet, where the crews find that more than ninety percent of the earth's atmosphere beneath them.

Through the school, new and ex-

#### ABOUT THE AUTHORS

Ed Mack Miller is one of our most regular authors. His most recent offering was the article "Egg Heads in Hard Hats" in the October '56 issue. He lives "in a big house on a small lot" in Denver, from which he conducts his various enterprises, one of which is his work as a flight instructor for United Air Lines. A major, with more than 7,000 flying hours, he flies for the Colorado Air Guard. And as a free-lance writer, he employs one full-

time and five part-time researchers, who this summer traveled 100,000 miles in nine countries. Ed's got a book forthcoming on the Strategic Air Command. Married, he's the father of three boys and three girls. His full-time researcher, the lad with whom he wrote this article and the following interview, is Hugh Duncan. Hugh, a native of Wyoming, splits his time between doing research for Ed and cracking the books at Regis College, Denver, where he's a student.



# To Mars and Back HOW SOON?

(Working as a team, Am Force writers Ed Mack Miller and Hugh Duncan assembled the stories on the Space Medicine Department of the School of Aviation Medicine at Randolph Air Force Base, San Antonio, Tex. Following is an interview by recorder with Dr. James G. Gaume and Capt. Emanuel M. Roth, USAF [MC], on the practicality and problems of space flight.)

Q. Within a short period of time, will we have manned rockets traveling from one continent to another?

Dr. Roth: The world's foremost authority on the medical aspects of rocket flight is Dr. Hubertus Strughold, the head of our department. He believes that we will.

Q. Approximately how soon?

Dr. Roth: Probably within the next five or ten years.

Q. What can you project as to space flight beyond these limitations? That is, when will space flight be interplanetary, or between here and the moon?

Dr. Gaume: That time is estimated to be within the

next twenty years.

Q. Approximately how fast will a rocket have to travel to escape the earth's atmosphere and enter the realm of outer space?

Dr. Gaume: A rocket would have to travel what is called the "escape velocity," which is seven miles a second, or about 25,000 miles per hour.

Q. Would a manned satellite probably precede space

flight?

Dr. Gaume: Yes, a manned satellite probably will, since one will place man sufficiently close to earth that he could return should something go wrong. The first satellites will contain no living things; the next ones will contain small animals, and then manned satellites will follow.

Q. Approximately how soon will you have manned

satellitesi

Dr. Roth: That's a difficult question. The unmanned spheres should go up in 1958, and animal satellites several years thereafter. I would say about five to ten years for human satellites. Closer to ten, most probably.

Q. Would a venture into outer space proceed from the

satellite, or from the earth?

Dr. Roth: Most probably from the earth. That's my own opinion, though I know many experts feel that the take-off will be from a satellite. It's difficult enough to get a small satellite out and have it stay out there; it becomes another problem to provide more thrust from the satellite. Therefore, I would say that our first ventures into outer space will be direct, though at this point it's hard to say, since we don't know what kind of propulsive system we'll be using.

Q. What types are you considering?

Dr. Gaume: Several systems have been suggested, among them nuclear propulsion, ion propulsion, and photon propulsion.

Q. Would the vehicle be guided by its passengers, or would it be guided electronically from a satellite or from

the earth?

Dr. Roth: Most of the guidance systems will be precomputed on an IBM-type device, and man will just be a monitor of this device. In other words, man would just monitor those devices which the machine cannot compensate by its intrinsic mechanism.

Q. What experiments have you conducted in your

space-cabin simulator.

Dr. Gaume: In the space-cabin simulator we have kept a volunteer subject for a twenty-four-hour period; this was just a pilot study, and many of the conditions within the cabin were not ideal in relation to temperature and humidity control, odor control, and other factors. We have subsequently been working on these problems. However, as far as oxygen and toxic gases were concerned, he got along quite well for twenty-four hours. In future studies we shall use much more refined equipment, and we should be able to keep him going for days, or even weeks at a time.

Q. Will the cabin be pressurized?

Dr. Gaume: Yes, but not in the ordinary sense by compressing outside air. It will have its pressure sealed in.

Q. What is the difference between the "pressurized"

cabin and the "sealed" cabin?

Dr. Gaume: The pressurized cabin is a cabin pressurized by the compression of the air outside the craft. The sealed cabin is pressurized from entirely within the craft; that is, the outside air is not used in pressurization of the sealed cabin.

Q. What is a hermetically sealed cabin?

Dr. Roth: That is a rather redundant term in that a hermetically sealed cabin is one that is completely sealed off from the outside. A tin can, for instance, would be a hermetically sealed cabin for a small organism.

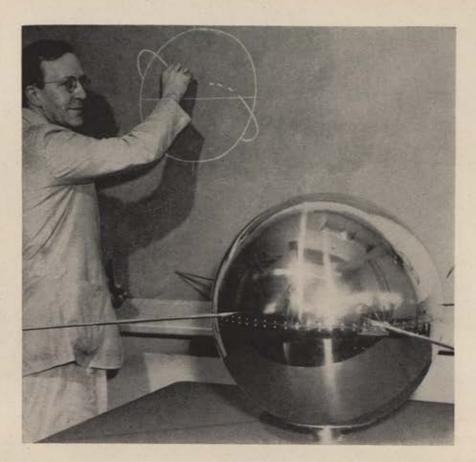
Q. What atmospheric pressures will be within the ship?
Dr. Roth: The pressure in outer space is just about zero.

The pressure within the cabin, however, will probably be about one-half an atmosphere, or seven and one-half pounds per square inch. Therefore, you will have a pressure differential of half an atmosphere between the interior and the outside, when you arrive in space. At 18,000 feet, they will be equal.

(Continued on following page)



Dr. John P. Hagan, director of Project Vanguard, with full-scale model of the earth satellite. The twenty-inch globe will be launched by a three-stage rocket and will circle the earth at a speed of 18,000 mph.



#### TO MARS AND BACK-HOW SOON?

CONTINUED

Q. What sort of an atmosphere will be needed within the cabin of a space ship?

Dr. Roth: Well, the atmosphere found within the cabin of a space ship would, ideally, be the same as that found on earth. However, engineering limitations impose certain restrictions on this. The lower the pressure within the cabin, the thinner the cabin walls, and therefore less weight in the rocket. The engineers would like to have us hold as small a pressure as possible within the cabin.

If we assume that we are restricted to a one-half atmosphere in the cabin, then to get a pressure of oxygen similar to that within our atmosphere we have to double the oxygen concentration, so that we would have a half an atmosphere pressure within the cabin with about fortytwo percent oxygen concentration. We are presently studying factors of other gases involved in the cabin. There is a tendency for carbon dioxide to increase in concentration, and this would have to be kept below one and onehalf percent. In oxygen production, we are studying the process of photosynthesis.

Q. What is the process of photosynthesis?

**Dr. Roth:** Photosynthesis is the process utilized by all green plants and some bacteria whereby these organisms are able to convert carbon dioxide into starches and sugars for their own use. It involves the utilization of sunlight, and in many cases oxygen is given off, Therefore, we are conducting algae experiments.

Q. What are the "algae experiments"?

Dr. Roth: The algae experiments now being conducted are for the purpose of determining how much oxygen is produced by the algae, and whether the algae, in absorbing carbon dioxide from man's respiration, can produce sufficient oxygen to balance the respiratory requirements of one man. Q. This, then, will probably be used to furnish oxygen for the occupants of a space ship?

Dr. Roth: Yes, eventually.

Q. What changes will the occupant himself produce

upon such an artificial atmosphere?

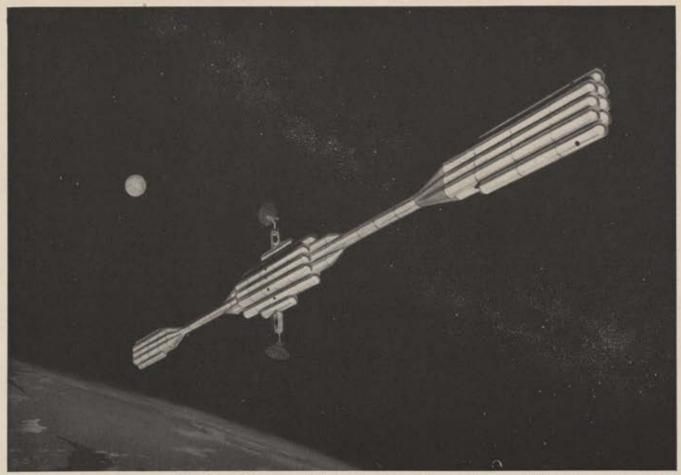
Dr. Roth: The human occupant will have a tendency to deplete the cabin of oxygen and fill it with carbon dioxide. Actually, the factor that would limit his survival within the cabin would be carbon dioxide. Man can tolerate a maximum of only five percent carbon dioxide, while his oxygen content can drop from twenty-one percent down to twelve percent before he begins getting marked symptoms of hypoxia. He will also produce other gases within the cabin, such as gases from the gastrointestinal tract, which must be taken care of before they increase to toxic proportions. However, the time for these gases to increase to toxic proportions is measured in terms of hundreds of days or years, instead of hours, as for carbon dioxide. A more important factor there is to see that unpleasant odors do not produce nausea.

Q. What would be the effect on the passenger of such a ship if, suddenly, the cabin lost its pressurization?

Dr. Gaume: You mean by collision with a meteor, or a similar reason?

Q. Yes.

Dr. Gaume: This would depend upon the size of the opening in the cabin, and the pressure differential across the cabin wall, and the volume of the cabin. With a large hole and high pressure, sudden decompression would be much more rapid, and the effect would be much greater and more rapid upon the passenger. With a small hole and lower differential, the effect would be more gradual, and there might be time to repair the opening within the cabin wall.



Artist's conception of a manned earth satellite that might act as a fueling station for space flights. It would be built up from third-stage fuel tanks of many automatic supply ships. Designer of this satellite is Krafft Ehricke, now of Convair's guided missile engineering staff, who was one of the designers of the German V-2 rocket. Mr. Ehricke's proposed satellite is 400 feet long and would weigh about 400,000 pounds. It would revolve slightly more than twice a minute, producing an artificial gravity one-third that of earth. Crew members would live at either end of the paddle-

shaped vehicle, standing so their heads were toward the center of the satellite. Crewmen could go from one end to the other by ladders, climbing "up" toward the axis and "down" the opposite side of the spoke. At the center, they would be virtually weightless. Here the power supply would be housed and the supplies and equipment stored. Space ships arriving at the satellite would approach the axis of rotation, and the visiting space crewmen would wait for the satellite entrance to revolve to the proper position for boarding. Then they simply step from spaceship to satellite.

The effect on the passenger, of course, is directly proportional to the rate of decompression. In case of sudden decompression to zero pressure, the loss of oxygen pressure would give the individual about fifteen seconds of useful consciousness; the loss of the pressure within the cabin would cause the so-called boiling of the water vapor in the body, and this would give him a useful consciousness of about five seconds. The possibility of collision with a meteor of sufficient size to penetrate the cabin wall is remote, however, and Dr. Fred L. Whipple of Harvard University has suggested a "meteor bumper" as protection from these larger meteors.

Q. What is this "meteor bumper"?

Dr. Gaume: This meteor bumper is a shell around the craft, probably composed of a metal such as aluminum. The meteor would strike this, instead of the inner hull itself, and there would be a mutual destruction of the meteor and the point at which the meteor strikes the shell.

Q. Are there other elements of the atmosphere which could be harmful to the human upon exposure?

Dr. Roth: Well, the structure of the atmosphere approaches space from a level of about 52,000 feet on up. At 52,000 feet the oxygen is under so little pressure that air cannot enter the body from the lungs, and so man has reached an oxygen limit at this altitude. He can go higher than this, but will have only a fifteen-second sur-

vival time so far as his oxygen is concerned. At 63,000 feet you encounter an area where the fluid of the body begins entering the vapor phase, and will boil at body temperature. Therefore, in this general region, you have a limit so far as pressure goes. At an altitude of 70,000 to 80,000 feet the air becomes so rarified that it is not feasible to pressurize it; therefore, we must turn to a sealed cabin. Also, at the area from 60,000 to 80,000 feet, you encounter an area which is highly enriched with ozone, a toxic product of ultraviolet light striking oxygen molecules within the atmosphere.

This ozone has been studied by the Department of Physiology here at Randolph, and the Armour Research Foundation of the University of Illinois Institute of Technology. It is found to be a rather toxic gas, much more toxic than hydrogen cyanide. This is another reason why we would not want to take the air from this region and pressurize it within the cabin. This layer gradually fades out at around 120,000 feet, and the ozone concentration becomes somewhat negligible as far as the human is concerned. At around 75,000 feet we begin losing the blanketing effect of the atmosphere against cosmic radiation. Above this, cosmic radiation occurs in its primary form; below this altitude, it is secondary radiation that we tend to get.

(Continued on following page)

As we go higher, the air becomes more rarified, and so we have less and less of the ultraviolet light being absorbed. The ionosphere is the region in which the shortwave ultraviolet radiation is filtered out from the lower atmosphere.

When we get to the region around forty to sixty miles, we reach a point where most of our meteors are dissolved due to friction heat. We are protected by this little blanket of air; above this, we run into the full blast of the meteors. At around eighty miles, we reach the point where the molecules are far enough apart so that sound cannot be transmitted; first, the higher frequencies of sound disappear, and then the lower frequencies disappear.

At around 100 miles, one no longer has sound propagation, and all communication must be through electronics equipment. When we reach 120 miles, we are touching the friction limit of the atmosphere; above this point, friction is almost negligible. A body set in motion here can continue in motion for rather prolonged periods of time.

Although friction decreases gradually from here, the 120-mile line is generally accepted as being the frictional border. At 120 miles, the air is so rarified that heat produced by friction has a hard time passing from the outside air into the craft by convection, and so you have a border of heat transfer. Also, at 120 miles, we reach the area where zero gravity becomes the normal condition in the space craft, since there is no longer any lift or air resistance.

Above 500 miles we are in the exosphere. This is the outer limit of our atmosphere, and is a rather nebulous region in which the molecules are actually traveling from the earth into space rather freely, and so we consider this the "fringe zone."

Q. What is this "zero gravity" that you spoke of?

Dr. Roth: Zero gravity is the complete absence of weight; that is, a body will no longer be affected by gravity. The gravitational pull of the earth will be neutralized by centrifugal pull arising from the motion of the craft.

Q. In relation to zero gravity, how will the occupants

of a space ship move about?

Dr. Gaume: Some engineers feel that it might be necessary to build in gravity in a space ship or a satellite by rotation of the vehicle in space, producing a certain amount of centrifugal force that would give an effect of a certain amount of gravity with which a man could orient himself. As far as moving about is concerned, we have not yet been able to produce "zero gravity" long enough to answer that problem.

Q. Then you have been able to produce a relatively

gravity-free state?

Dr. Gaume: Yes, we can produce a gravity-free state for a very short time in high-speed jet planes. In the F-94, which we have used in our experiments, a subgravity or gravity-free state can be attained for about forty or forty-five seconds. In rockets, a period of two and one-half to three minutes of gravity-free state can be attained. The eventual solution of the problems of the gravity-free state will have to wait until longer periods of time in the zero-gravity state can be attained.

Q. What effect, if any, will zero gravity have on digestion?

Dr. Gaume: From our studies in jet aircraft, it would appear that the person would not have too much trouble in either eating or drinking, although he would probably do better drinking through a glass tube. After he places

the food in his mouth, however, he would have no trouble in swallowing or digesting the matter.

Q. Have you conducted an experiment in relation to the psychological reaction to zero gravity?

Dr. Roth: Yes, although all of our experiences have lasted no longer than twenty or thirty seconds. Even within this period, there are sideward and upward motions of the craft which prevent a pure zero gravity, so it's difficult to say. In the sub-gravity state, at least, we have noticed very little psychological difficulty. A certain number of people do get "motion-sick," and become disoriented from the zero gravity, but these are people who tend to become ill under any motion stress. We have found that about twenty-five percent of the people do get ill, and another twenty-five percent of the people



Drs. Gaume (left) and Strughold conduct experiment in "environmental and climactic conditions" in space cabin.

don't particularly like it. Fifty percent of the people in our experiments, however, have had no trouble at all, and even like the zero-gravity state.

Q. Over such a period of time as would be required for a venture into outer space, wouldn't the individual experience problems of confinement, even though he is not

ordinarily affected by claustrophobia?

Dr. Roth: Well, that would depend largely upon how many people are in the crew and how much space they have to move around in. Submarine crews, for example, do not seem to suffer from confinement, even when exposed to cramped quarters for more than two or three months at a time. Therefore, it would really depend upon the physical condition of the actual cabin.

Q. In this cabin, what physical aids, such as padding and suits, will be used to aid the passenger in overcoming the effects of sudden acceleration upon take-off?

Dr. Roth: Actually, with present-day rocket data and



F-94s, like the one above, and T-33s have been used in experiments to produce a gravity-free state for short periods. Here F-94 pilot Maj. Herbert D. Stallings talks over problems of weightlessness with Dr. Siegfried J. Gerathewohl.

fuel capacities it looks as though the individual will have to be rotated into a reclining position; that is, perpendicular to the axis of the rocket ship. He would be in a modified beach-chair position, with his head at about heart or eye level. Then, when the gravity-free state is reached and after the motor has cut off, he can rotate back to a more conventional position, with respect to the long axis of the rocket.

Q. Will the human body, within the sealed cabin, raise the humidity and heat considerably due to respiration and perspiration?

Dr. Roth: Yes, the human body will greatly affect the atmosphere within the cabin.

Q. How will you solve this problem?

Dr. Roth: The problem can be solved with conventional air-conditioning equipment, the humidity being reduced by condensing the water on cooling coils, and the temperature being controlled either by a refrigeration device or a heating device, as required.

Q. Will the occupants be confined to this rotating chair

and fed from, say, a tube?

Dr. Roth: There is no reason to expect that the individual will not be able to move about or eat normally.

Q. How will outer space affect the digestive system? Dr. Gaume: It is doubtful if the gravity-free state of

outer space will affect the digestive system of the body.
Q. Will the occupants of the craft be fed foods in

capsule form?

Dr. Gaume: Suppose we just speak of food concentrates, rather than any specific type. Naturally, concentrates will permit a larger quantity of food to be carried on board, using up less total weight and volume. Whether they are consumed in concentrated form, or reconstituted by adding water and cooking, is not particularly important, because plenty of water can be made available, both for this purpose and for drinking.

Q. How can it be provided, without carrying a tre-

mendous supply of water?

Dr. Gaume: Probably it will be water which will be recycled through air-conditioning systems, in that all the water lost by the body can be re-utilized and re-cycled within the cabin, and purified drinking water obtained thereby.

Q. How will waste materials of the body be disposed? Dr. Gaume: We are conducting research in that right now. Waste materials contain certain essential elements and constituents that may be re-utilized in the same manner, with a different type of processing, as the water. Q. After a space ship has passed the extremities of our atmosphere, will it still travel on power, or will it coast to a predesignated point and use power only in landing and take-off?

Dr. Gaume: Power will have to be used in altering course during flight, and in slowing down to orbital velocities in reaching the moon or another planet, and in landing and taking off from another planet. The distance of the flight will determine the amount of power used on take-off from earth. In a voyage from here to the moon, for instance, power will be used only for a short time, and then the rocket will coast the rest of the way.

Q. If a rocket were to fly to the moon, would the occupants land there, or would they assume somewhat

of an orbit, go around the moon, and return?

Dr. Roth: Probably the first trips to the moon will be ones of circumnavigation, having an elliptical path; in other words, going around the moon, and returning to the earth, since it does require energy to slow down and land on the moon, and then more energy to take off. This requires fuel. If the first ships are fuel limited, it would be easier just to orbit around the moon and return to earth. But it depends upon our propulsion system.

Q. Assuming, then, that you could place a man on the

moon, what problems would he encounter?

Dr. Roth: Well, the moon is a rather barren body almost entirely devoid of an atmosphere. That is why it is seen so clearly, since there is no atmospheric distortion. Since there is no atmosphere, meteors do not burn up before landing, and so the surface is probably peppered by meteorites of all sizes and shapes. Many of the craters seen on the moon may actually be the result of some of these meteorites plunging into the surface unimpeded by an atmosphere around the moon. Gases are non-existent, so man would have to supply all the gases for respiration.

In regard to gravity, the gravity of the moon is very much less than that of earth. In order to escape from the earth into space, man will have to reach a minimum velocity of seven miles per second. However, in order to leave the moon, a velocity of only one and one-half miles per second is required. The moon's gravity, therefore, is about one-seventh of that of the earth. Temperature-wise, the moon runs from about 250 degrees Fahrenheit in the heat of the day down to almost minus 300 degrees at night, and so there is great temperature variation during the daily cycle.

(Continued on following page)

Q. What are the human limitations in regard to heat and cold?

Dr. Roth: Well, in regard to heat tolerance, a man, clothed in regular summer dress, when suddenly exposed to a dry, hot air environment of, say, 400 degrees Fahrenheit, will be able to survive only for a period of about five minutes. If you reduce this temperature to, say, 212 degrees Fahrenheit, or the boiling point of water, he will have thirty minutes of survival time, though his functioning will be poor throughout the latter part of this period. As you change the humidity factor, you change the survival time. So far as cold is concerned, anesthesia today is often accompanied by a freezing of the patient to decrease his metabolic rate and blood flow requirements. Temperatures as low as seventy-five degrees Fahrenheit have been tolerated without difficulty. Once you get below seventy-five degrees, you begin getting irregularities of heart action, and this temperature becomes rather dangerous. In this case we are speaking of the body's own temperature, of course. Suitably clothed, a person can stand almost any degree of cold in the environment around

Q. How cold does it get in outer space?

Dr. Gaume: The temperature in outer space depends, actually, on the amount of absorption of solar radiation. The side nearest the sun of a body placed in outer space would be very, very hot, while the opposite side would be exceedingly cold, and there would be a temperature gradient between the two; but the temperature differences even on a very narrow plate will be quite remarkable. This is one of the problems which the Air Force's engineers have to solve; that is, the problems of solar heating of structural materials in rockets when they enter space.

Q. What other hazards will the space voyagers en-

Dr. Roth: Within the cabin there should be no apparent difficulty which could be attributed to the effects of space. Outside the cabin one encounters problems of meteors, cosmic radiation, heating effect, temperature effect, dehydration—actually, within a pressure suit in outer space, one would have problems which are very similar to those within the cabin, except that they are exaggerated by the fact that most of the equipment is of a portable, temporary type. Therefore, his danger in relation to the hazards is increased, and the chance of his being able to repair a defect within his suit is reduced.

Q. What will be the effects of ultraviolet and cosmic radiation upon the human who ventures into outer space?

Dr. Roth: Ultraviolet radiation offers no problem, since this radiation is easily blocked out by common glass or the metallic structure of the rocket craft. Cosmic radiation is an altogether different problem, as not enough is yet known about the effects of cosmic radiation of high concentration on the body. We have been attempting to study the effects of these problems through the use of experimental animals.

Q. Then you have sent animals into outer space?

Dr. Roth: Yes, mice and monkeys have been sent as high as 100 miles in rockets from White Sands, New Mexico.

Q. Have there been any changes, genetic or otherwise, caused by the exposure of these animals to the elements of space?

Dr. Roth: These changes are usually rather long term, and the animals have only been back from their trip for less than five years. They are presently living in retirement in the National Zoo in Washington, and are being carefully watched for any genetic changes, or any struc-

tural changes in their bodies or the bodies of their offspring.

Q. What planet, within the limits of present knowledge, would be best suited to sustain life as we know it here on earth?

Dr. Roth: Mars seems to be the best planet for sustaining life.

Q. What would some of the problems be on Mars?

Dr. Roth: Man would have to be protected against temperature changes on Mars. There is a long period during the day when temperatures are similar to those on the surface of the earth, but it gets extremely cold at night on the side of Mars away from the sun, and man would have to have some well-designed heating equipment to keep warm.

There appears to be some water on Mars. There are polar areas which probably represent ice. These polar areas shrink in size during various seasons, and it is possible that these vaporize into the atmosphere in the form of water vapor. I don't believe that anyone has seen anything resembling surface water on Mars. The so-called "canals" are rather nebulous in that one does not see water flowing in them, if, indeed, they exist at all. The only indication of water is in the polar areas.

The gravitation on Mars is less than that on earth. While it would take an escape velocity of seven miles per second to leave the surface of the earth, it would take only three miles per second to leave the surface of Mars. It depends, actually, on the ratio of the mass to the diameter of the planet. This is the factor that determines the gravitational pull on the planet, and, in turn, determines the escape velocity required.

Q. As a final question, could you project anything as to possible life, plant or animal, on other planets within our solar system?

Dr. Roth: Venus is rather densely covered with clouds, so it is almost impossible to find anything that would indicate life there. The structure of the atmosphere of Venus is rather nebulous, because it is distorted by these clouds, and we cannot penetrate these cloud layers to get any accurate assays as to what is up there. There are areas on Mars, however, which change color seasonally and resemble areas of vegetation on earth.

They are brown one season and a greenish color the next season. However, the green does not appear to have the same spectral qualities as the green seen in the plants on earth. This does not negate the possibility that there are other catalysts resembling chlorophyll and other pigments that give a pattern of green as seen in these areas.

As far as the other planets go, I don't think that there is enough available information to indicate that there is life on them. The conditions seem to be best on Mars when we think in terms of life on earth. Now, there might be other metabolic systems incorporated in other planets, and so you might be able to have what we consider living things without oxygen. But, as far as we know life on earth, Mars seems to be the planet which would best support it.—End

Dr. Gaume, born in Oklahoma in 1915, was graduated from Kansas State and took his M.D. from Creighton University in 1940. He entered the AF in 1942 and served as a flight surgeon in North Africa, Italy, and Indo-China. He returned to private practice after the war and in January 1956 joined the staff of the School of Aviation Medicine. Captain Roth was born in Boston in 1929, was graduated from the University of Massachusetts, and took his M.D. from Harvard. He entered the AF in 1955, and was in air evac before going to Randolph.

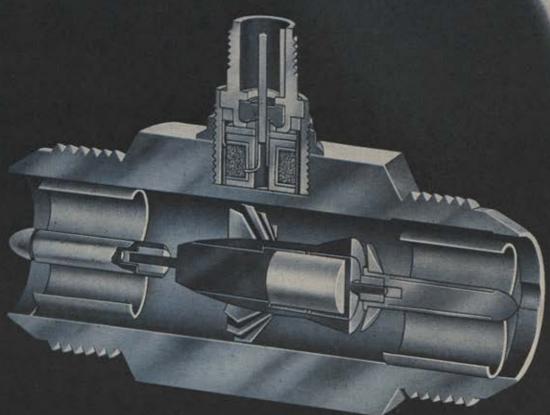
## A.D. 1959

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'SILENT' SERVICE'

THE

SPEAKS UP

By Capt. James F. Sunderman

F M/SGT. Frank Clifford proved one thing well in his article "The Silent Service" (see Air Force, October '56), it was his opening shot about the pen being a mighty sharp weapon. The advice he offers to all of us in blue suits on how to write, clear, and sell an article is the best I've seen.

But he hitched an excellent piece of journalism to a tired horse. This business about the Air Force being the silent service is an old saw. It doesn't cut much any more. Fingering the AF man as a "literary dud" is popular but about as unfair as a two-headed coin in a game of "king bee." Yet for some reason the theme seems good for a soap box anywhere, anytime.

Scanning a few issues (as Sergeant Clifford did) of AIR FORCE Magazine, one Marine Gazette, and two Army mags in search for a yardstick of AF bylined writing, then sweeping across the panorama of AF and airpower book literature by quoting a year-and-a-half-old article by my good friend Professor Bart Leach, is one way to "desk-top survey" the problem.

But it is not a very reliable way to buttress the indictment today that the Air Force is the silent service, that "Air Force men simply are not

writing."

First, a word about the AF story getting abroad in the land. A recent Department of Defense study of service-subject articles appearing in the top national periodicals over the past year puts the Air Force out in front. It's one thing for military people to write for the big mags; quite another to get published in them. Few military bylines appear in the big national publications. Editors and staffs prefer the professional writers for popular features on military subjects. Their articles sell magazines. Military writers don't, by and large. The pros are the ones who can pay the editor's butcher, his baker, his candlestick maker.

This has been a fact of life to the Air Force for many years. Major public information emphasis has been geared accordingly. The wisdom seems to have been proved.

But what about the Air Force writer? Certainly there is a large place for him in the scheme of things, especially with respect to the more serious analysis, the professional diagnosis of airpower, the USAF, and the state of the art of air science.

It is mainly in this sphere that Air Force people are writing, Sergeant Clifford and his summary inspection of a few current magazines notwithstanding. My examination of the evidence falls into a pattern.

It started, for the most part, several years ago with a pronouncement by Gen. Thomas D. White, Vice Chief of Staff, USAF, that he would like to see more AF bylines appear over airpower, Air Force, and aviation writing. Flashy headlines, popular features, widespread national publicity had given out the facts of the conquest of the air and the evolution of military airpower into the predominant force it is today. But the eye-catching treatments had not carried the meaning and the interpretation so essential to a deeper public and official understanding of the realities of the air age. And it seemed logical that the Air Force man-the professional man whose business is airpower-could contribute immeasurably toward this end by taking his story to the public in print, by exploring the science of airpower in magazine articles and books. Besides, more AF bylines would enhance the profession of the military airman, as well as supplement a growing literature of airpower which was not keeping pace with the technical and doctrinal advancements in military air science.

There was nothing mandatory or directive about General White's 1953 statement. It was a clear-cut policy guidance from topside, and was picked up by many of the major air commanders, passed on down the line in staff meetings and written memoranda.

Shortly thereafter, General White himself led the way by writing in the spring 1954 Air University Quarterly Review on "The Current Concept of American Military Strength: Its Meaning and Challenge to the US Air Force."

The word was out, And in the next Quarterly Review the editors put together the first official set of instructions to AF people on how to write, clear, and place articles. The complete text of "So You Want to Publish an Article," by Lt. Col. Kenneth F. Gantz, USAF, and Dr. Frank W. Anderson, Jr., was reproduced by the OIS, Hq., USAF, and widely disseminated throughout the Air Force. Things began to change.

Until the early fifties the AF, without a doubt, rightly bore the stigma
"The Silent Service." Many officers
and airmen had refrained from writing
for commercial publication, innocently thinking the regs prohibited
any such shady enterprise that might
buy junior an extra pair of shoes.
More held the fear that if they would
speak out they would become another
Billy Mitchell or an Orville Anderson
or, at best, be the recipient of punitive
action of one kind of another. It is

surprising how much of this feeling still exists today, despite, as Sergeant Clifford pointed out, the encouragement AFR 190-6 gives to the AF writer.

One of the first of the major commands to pick up the significance of the Vice Chief's words was the Air University. Nearly 7,000 student officers a year pass through the AU resident courses into command and staff positions in the Air Force.

To Gen. Laurence Kuter, AU Commander at the time and a brilliant AF author in his own right; to Brig. Gen. Dale O. Smith, then Director of AU Education and a wellknown writer; and to Maj. Gen. Lloyd P. Hopwood, Commandant of the AC&SS and long-time protagonist of AF writing, this was music. Students, faculty, and staff members were promptly advised of the Vice Chief's statement and were strongly petitioned to devote more of their spare time to the literary aspects of airpower. Frequent formal and informal reminders followed. Official action integrated broader creative writing phases into the school system as part of the communication techniques training. This step was designed not only to give training in writing for publication but also to benefit the AF in more readable staff papers, official reports, and correspondence.

With encouragement from Hq., USAF, an article-writing requirement was integrated into the curriculum. Beginning with the 1954-55 Air Command and Staff College class, each student produced an article for publication on some aspect of the Air Force or airpower. Screened by the AU faculty, the best of the 500 articles produced were sent to USAF. Here they were culled to eighty. Nearly half of these eventually wound up in print.

It was a start. A pioneer program, not much to crow about, but successful as a first-time effort. For about 500 AF officers this was probably the first try ever made at writing for publication. You can bet many of them will try again and again—especially those who were agreeably surprised to receive a check.

The 1955-56 class produced nearly 800 articles. It's too early for a final tally on these. But from a preliminary survey we believe much was learned the first year that reflects in better writing this time.

Faculty members at AU were not to be outdone by the students. Several score of their articles came through the Magazine and Book Branch—the clearing house for AF writing—where I have temporary lease of a desk.

Results from other commands have not been so spectacular as from Air University, which is a natural setting for literary endeavor. Even so, articles from throughout the Air Force have increased in such numbers since 1953 that attempts to place or even keep accurate records have become a problem. Last year alone, according to our tally, AF people wrote and forwarded to Hq., USAF, for clearance more than 500 articles on AF or airpower subjects. AFRs require headquarters clearance for only certain categories of writing. It can be safely estimated that several hundred additional pieces were cleared by lower command headquarters-for a grand total of well over 700 articles in one year.

Air Force people aren't writing?

Now as to surveying military magazines, there are a few Sergeant Clifford missed. Five recent successive issues of the Air University Quarterly Review, the professional journal of the Air Force, reveals thirty-eight out of forty-five articles bylined by AF people, or about eighty-four percent. Having been an editor of the Quarterly Review for a number of years, I know the rigid examination these articles undergo. I also know the ratio of those published to those submitted is about one to twelve. (I'm sure the ratio is about the same for AIR FORCE Magazine.) And what about Flying Safety, Combat Crew, the list of excellent house organs like Fairchild's Pegasus (which stands up to any professional mag)? And such commercial magazines as Gill Robb Wilson's Flying? AF bylines appear in all of these publications with regu-

One of the most interesting "desktop surveys" in this respect is an analysis of the new Air University publication, An Airpower Bibliography, by Dr. Raymond Estep, of the Documentary Research Division, Research Studies Institute. This unique document is a 200-page, double-column listing of airpower and USAF subjects, articles, and books. The articles listed were screened from commercial and official magazines. In the main they consist of the writing done between the years 1950-55. This highly revealing bibliography is organized into several dozen subjectmatter categories. I arbitrarily selected nine for my survey so that I could get a fair cross-section percentage of Air Force writers to articles being written on air subjects by all writers including (as Sergeant Clifford puts it) "historians, college professors, free-lance magazine writers, newspaper pundits, and politi-

(Continued on page 57)



Dawn-to-dark firing tests speed delivery of the mighty power plants that will thrust America's missiles into outer space.

## On the line...rocket engines for America's major missiles

Deep in the remote canyons of the Santa Susana Mountains, a bolt of flame knifes the sudden darkness of a California evening.

Obscured in the shadows — watching this man-made lightning flare and die as it has an untold number of times before — are the men of ROCKETDYNE... testing and tuning the giant propulsion systems they are building for the major missile proj-

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Type of articles by AF subject matter	Number of articles listed in Bibliography	No. by AF Authors	Per- centage by AF Authors
Airpower, Doctrine, Strategy, Tactics	250	65	26
AF Personnel	26	11	42
Education and Training	63	27	43
Defense, Civil and Air		15	19
Combat Aviation in Korea		10	26
Intelligence	. 15	5	33
Psychological War	10	3	30
Research and Development	99	20	20
USAF Organization and Related Agencies	149	49	33
Total	729	205	28

This is a survey from An Airpower Bibliography, Dr. Raymond Estep, Documentary Research Division, Research Studies Institute, Air University, Maxwell AFB, Ala. Published March 1956.

Above are the results:

Out of a total of 729 articles scanned in this survey, 205 were by Air Force people. Or, twenty-eight percent of all articles written over the past five years in these nine fields of airpower, and the USAF, were written by Air Force people.

Admittedly, some of the articlewriting now being done is "pumppriming" in nature. Much more is being written than finds its way into print. But writers are made, not born. Few hit the printed page on the first try. It's a matter of practice, trial and error, rewrite, discouragement, and rewrite. Where it's all leading to is important.

Few writers start with *The Saturday Evening Post*, even the pros. Air Force officers are not professional writers. They are professional airmen. But they are learning to write. They have the vision and the determination. In the process of trial and error, they are getting published in ever-increasing numbers.

On the book front an equally arresting, but not as well known, set of statistics can be displayed. And when it comes to books I'm on even more familiar ground.

Following General White's 1953 proclamation, the Office of Information Services, under the Office of the Secretary of the Air Force, took some giant strides. The Magazine and Book Branch was expanded from two to five people. First, in the summer of 1954 a study was made to determine the pattern of service-bylined books published within the previous two years. Here are the results: Army bylined, twenty-seven; Navy bylined, seventeen; Air Force bylined, five, of which two were not on AF or airpower subjects. The study raised alarmed evebrows in USAF circles.

Why the dearth of airpower book-writing and publication? Several weeks spent asking this of executives and editors in the major book publishing houses, of top professional writers, of retired AF people (who should have been writing), and a searching analysis of Information Service objectives, philosophy, and operations, produced a lot of answers. It also gave us the basis for organizing a new operation in Information Services, the USAF Book Program.

This program aimed at stimulating the writing and publication of book literature on airpower and the USAF. But the concept underlying it was broadened to embrace a literature of the air comparable in scope to the literature of the sea. Such a literature of the air would include writing on civilian as well as military aviation and would comprise a wide variety of subject-matter treatments; the scholarly and academic volumes on theory, doctrine, strategy, tactics, and related techniques; history (professional and popular); biography; special air studies and air monographs; technical works on air science; personal narratives; fiction; and historical air novels.

To be complete, book literature of the air must embrace all aspects of military and civilian aviation. Within this literary framework the literature of the Air Force would predominate and be in proper perspective since the story of the conquest of the air has been largely the story of the US Air Force from its earliest days to the present.

The book program was launched in September 1954. Nine months later three air books had appeared, with a dozen or so more under way or under contract. The editors of Am Force Magazine picked up this trend in May '55 issue's column "Shooting

the Breeze." Several months later, air books began appearing with such regularity that AIR FORCE reestablished an air book-review column called "The Airman's Bookshelf." This column, once a regular feature, had been discontinued five or six years earlier for lack of good new air books to review.

By mid-winter 1955-56 the renaissance in Air Force book literature was well under way. Publishers and writers were awakened to the need for literature of the air age and encouraged by the assistance and cooperation the book program extended. They took heart at the "new spirit" abroad within the Air Force. The program had opened doors to unexploited literary opportunity—doors that had been shut tight in the past.

For the Air Force it meant a long step toward the realization of a professional and popular literature. Between May 1955 and December 1956 forty-six air books appeared under the auspices or with the assistance of the program.

Now, what has it all go to do with Air Force people writing? Simply this: Out of the forty-six air books published under the program to date, seventeen, or thirty-seven percent, of all air books published in the last eighteen months were written by active or retired Air Force people (including three general officers, one of four-star rank), or civilian employees of the AF. This figure represents far more books than were written and published by AF people in the preceding five years.

And for success stories, we like the case of The Hunters, a work of fiction about the air war in Korea published by Harpers in February 1956. It was serialized in Collier's and recently picked up by Twentieth Century-Fox for movie production for \$60,000. The author? A Regular Air Force colonel. AF Lt. Col. Ward Taylor wrote Roll Back the Sky, a novel about B-29 operations in the Pacific in World War II. A successful seller, it also has a movie option attached. Two other recent AF books, one fiction, the other non-fiction, were serialized in magazines and picked up for nation-wide TV productions on the Armstrong Circle Theater and the new Playhouse 90. And the recent book, Battle Hymn, by AF Col. Dean Hess, is under movie production, and will be released next

Now let's look into the immediate future of Air Force book-writing. My records list twenty-nine Air Force (Continued on following page)



TI PRODUCTION ENGINEERING helped Lockheed trim 55 lb of dead load from the P2V-7 sub-hunting Neptune ... by transistorizing just one system - the 14-station intercom. In addition to saving weight, safety and reliability were increased while maintenance and power drain were reduced.

intercom

Well within MIL-E-5400 for general performance, MIL-T-5422C for environment and MIL-I-6181B for interference, this TI-built system has been designed for a 2000-hr maintenance cycle and an exceptionally long service life. Signal response is instantaneous without need for warmup. There is negligible power drain on standby and negligible heat dissipation while in use. The system takes power directly from a 28 Vdc line and uses less than 6 watts per station.

This is one example of Texas Instruments systems engineering now being applied to audio, radio, radar, sonar, infrared, and other systems for communications, navigation, search, fire control, and missile control. Continuing progress over a quarter century has resulted in over a third of a million sq ft of engineering and manufacturing facilities - soon to be doubled — located in an excellent dispersal area.

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#### 'SILENT SERVICE'\_CONTINUED

subject and airpower books under publisher contract to appear within the next twelve months. Out of these twenty-nine, ten are AF-authored, for an average of thirty-four percent of AF authors for AF books-to-be next

During the past fifteen months twenty air book manuscripts in addition to those published and those under contract found their way to my desk for review and clearance. They are now looking for a publisher. Of the twenty, eleven were written by Air Force people.

Further examination of the record shows seventeen air book manuscripts planned or in various stages of composition-by Air Force people! Among these are names of several high-ranking AF retired generals.

Who says Air Force people aren't

All this adds up to quite a box score, I believe. I'm well aware one can play magic with numbers, and it is the published product that counts in the long run. To date this record has not been too impressive, although in one area-book-writing and publication-it is forging ahead of the other services.

But if any one thing is indicated, the last few years have seen a break in the "Silent Curtain." The Air Force, young and dynamic, is finding its own voice, producing its own corps of writers. They are learning to speak with authority, clarity, and in the best professional style.

An old Chinese proverb reads: "The journey of a thousand miles begins with one step." General White led the Air Force into that first step several years ago. We haven't finished the journey yet, but we're quite a way down the pike.

One thing is sure. No one can call the USAF the "Silent Service" any more.-END

#### ABOUT THE AUTHOR

The author, Jim Sunderman, runs the AF's book program, in the Magazine and Book Branch, in the Pentagon. Born in Ohio, he earned his master's degree from the University of Florida, where he also completed course requirements for his doctor's degree. He taught history at the University of Miami and has written a book, Journey Into Wilderness, about the Florida Indian war. A glider pilot in World War II, he was associate editor of the Air University Quarterly Review, Maxwell AFB, Ala., before moving to his present assignment. He's married and has three boys.



Air-to-air missiles must be guided from the mother plane during that brief interval between the closing of the firing switch and the instant the missile locks on its target. This is the critical moment when a success or failure depends upon the exactness with which computers in the mother plane direct the missile's flight. This is the moment when nothing is as vital to the kill as the precision voltage reference system controlling the computers.

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# Who Are THE COMMUNISTS and Why?

W HAT makes a Communist tick?
Why is an American Communist willing to betray his country and risk his own neck to help the Soviet Union win control of our nation?

These questions were asked frequently of US District Judge Frank A. Picard after the Detroit trial of six Communist leaders for conspiring to advocate the violent overthrow of our government. "What kind of persons are these Communists?" he was asked.

"You'd be surprised," said Judge Picard. "They don't have horns. They are sincere in a way. In fact, their sincerity is the thing that ruins them because it has led them beyond the law."

Addressing the six before sentencing them on February

19, 1954, Judge Picard had this to say:

"You are not ignorant people at all. You are far from stupid. . . . I think that you are sincere in that you really believe in communism and that you want to better the lot of the so-called proletariat. . . . You have been attacked by a virus known as 'Russianitis' and you really are gullible enough to think that if you could get control—with the help of Russia—of this country, you would be able to shrug off Russia and then enjoy the millennium or paradise that you envision. Either that or you believe you would be big shots in this country as part of a world organization independent to some extent of Russia.

"Your admiration for Russia is so great," continued Judge Picard, "that there isn't any doubt in my mind, and there wasn't any doubt in the jury's mind, that there is nothing you wouldn't do—lie, cheat, or even worse—in order to attain your objectives."

Judge Picard had no hope that his remarks would win the six Communists away from communism. He made this

plain. In effect, he was speaking for the record.

"There were times during the trial," he told the six, "when I felt you just despised capitalists and brass hats because you weren't one of them. I have discarded that thought. This morning I'm giving you the benefit of saying you believe in your cause, but whether you do or not is immaterial, for that cause has so engulfed your thinking, so dominated your every move to the extent that five of you took the stand and lied about what you believe because you thought the end justified the means. . . . You really think you are martyrs. But you're not going to jail for your belief. . . . You're going to jail because you want to force those beliefs on others. . . . As I said to you in the charge, you can believe anything-even that we ought to have a monarch in this country-but you can't force those beliefs on others by force and violence. So you're not martyrs-you're goats-and Russian goats at that.'

In this article we shall take a look at the Communists in

(Continued on page 65)

## Cessna T-37 designed for Jet Training

To meet jet age demands, the U. S. Air Force requires a jet trainer that makes it easy for cadet-pilots to master first-line combat airplanes.

The Cessna-developed T-37 introduces the cadet to all combat jet airplane characteristics while training on this safe, easy-to-fly jet trainer.

It is designed to provide the Air Force with a jet trainer that can be operated at substantial savings and cover the most important and longest phase of the cadet-pilot's jet training.

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### **COOL ENOUGH FOR YOU?**

## Fenwal's new Cooling Effect Detector rides high in North American F-100F Super Sabre . . . Answers question: Is cooling air cool enough?

The Aircraft Industry, the most weight-conscious industry of all, has good news from Fenwal Incorporated good news in a half-pound package. Fenwal engineers have packed a complete, accurate Cooling Effect Detector into a package that light.

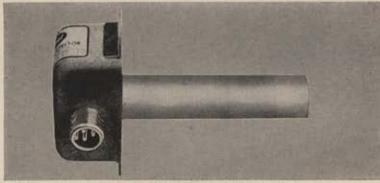
North American has sent the feather-weight detector aloft in the F-100F, where it warns the pilot the instant cooling air for vital electronic equipment fails to cool

The detector, known as the #18801, is not only light but versatile. It can be used wherever cooling air protects vital equipment.

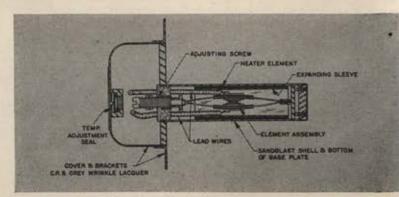
Though simple, it takes into account every variable in air-cooling effect — ambient temperature, air flow, air density, humidity, and others. When the total cooling effect is inadequate, the detector closes a circuit. Depending on the circuitry, an alarm is sounded, an indicator is actuated, or automatic remedial action is taken.

If you are looking for a compact, light detector of inadequate air cooling, the 18801 could easily be your answer. Write for complete data — or, better still, tell us your problem and let us suggest the right answer. Fenwal Incorporated, Aviation Products Division, 3412 Pleasant St., Ashland, Mass.





ALL IN A HALF-POUND STAINLESS STEEL PACKAGE — here is Fenwal's #18801 Cooling Effect Detector. Inside is a hermetically-sealed THERMOSWITCH® unit with a heater element. Characteristics of a 22 ohm heater element rated at 32 volts D.C. — optimum adjustment range, 500—10,000 lbs./hr./ft² of air flow; exposure limits—65°F to 160°F under "no-flow" conditions. Characteristics vary with other heater element ratings.



INSIDE STORY — Exposed probe shell is the sensing element. Changes in the rate of heat dissipation cause shell to expand almost at once, actuating internal switch. Switch is surrounded by a heating element. Thus, detector signals its own overheat and, simultaneously, overheat of the protected equipment.

non-Communist countries, because it is both more important and more difficult to understand why people become Communists in free countries than in those already under the Communist yoke.

In considering what kinds of people become Communists and why they do, we must make a distinction between the "hard core" of fanatic, dedicated Communists and the rank-and-file Party members, many of whom leave the

Party after a few years.

The hard core is much the same the world over. In this group are the leaders of the national Communist Parties, whose names you often see in the newspapers. They are the key men of the Party. Here also are the underground Communists, whose names you never see and who are unknown even to most members, unless they are exposed or leave the Party and reveal their former membership. The underground includes espionage agents and those who keep their Party membership secret in order to join non-Communist organizations for the purpose of maneuvering the Communist Party into control of them.

The typical, professional Communist joined the Party as a young man because he was deeply dissatisfied with the world around him. He had either lost or never had a religious faith. He saw, and may have experienced, some of the injustices that exist in any imperfect human society. He read Karl Marx and Lenin and discovered a "science" that told him capitalism was the cause of all injustice. For him, it was a satisfactory "science"; he accepted its explanations of everything that had ever happened and would happen in the future. The Communist scriptures declared to him that the evils of capitalism are a basic part of the system and cannot be corrected by reforms. A revolution of the working class was necessary, according to Red doctrine, to sweep away the whole social and economic system, bring about a Communist state, and create a world of justice and peace.

The young recruit learned that to bring about this society required complete dedication to the cause, and he was thrilled by the thought of joining in a movement that involved danger and self-sacrifice, but would result

in a new "heaven on earth." . . .

The individual who completely surrenders himself to communism, as if to a religion, soon learns to accept all of its dogmas without question. Those he doesn't understand he takes on faith. For him, the Soviet leaders are the only true interpreters of the faith. From the moment a person joins the Party, he is plunged into so much activity that he has no time to think for himself. New members who show promise through energetic carrying out of assigned tasks and acceptance of discipline rise higher in the organization.

Soon the Communist Party becomes their whole life. All their friends are Communists, and they are cut off from the outside world in spirit, if not in flesh. For they are the chosen few who are destined to lead the revolution.

Since the dedicated Communist has surrendered his power of independent judgment to his leaders, he accepts the Party dogma that the Soviet Union, as the motherland of communism, must be defended and all of its policies approved. He learns to view and judge the USSR in a different way from other countries, He knows that all is not perfect there; but he believes that is because the USSR is faced by hostile capitalist countries that seek to destroy it. For that reason, every good Communist must help to strengthen the Soviet Union and do all in his power to weaken the forces opposed to it.

The wholly indoctrinated Communist has learned that there is no place in the Communist Party for pity or for outside loyalties. He accepts the twists and turns of the Party line and justifies them as clever tactics planned by the all-wise leaders in the Kremlin. He judges every action coldly in the light of whether it serves the Party.

He learns skill in deception, skill in manipulating unsuspecting people for Party purposes. It becomes easy for him to say one thing and mean another, to lie, and to commit treason against his country, and to become a

spy for the Soviet Union.

The habit of obedience becomes second nature to him. He accepts any task, no matter how distasteful to his private feelings. He will go anywhere he is ordered to go at a moment's notice, to another city or another country. He will accept any sacrifice—persecution, imprisonment, exile, even death. Worst of all, he has accepted the corruption of his own character, of which he may or may not become aware.

This hard-core Communist has almost ceased to be a human being. Ex-Communists have told how members who moved into the inner Party became hard, ruthless, cold, and remote. Whatever idealism they had when they joined the Party became warped and twisted into something very close to cynicism. For at the top, the ideal of social justice long ago disappeared into complete subservience to the will of the Communist masters in the Kremlin.

But the deep-dyed Communist who has given his life to the Party may not admit this to himself. He lives in a closed world in which all good is within the Party, and the world outside is all evil. What promotes communism is good and is not to be judged by the moral standards of the outside world. He is in a war against that world, and in that war all means are fair that will help to defeat the enemy. If his conscience ever troubles him for the lies he tells and the deceptions he practices, he stifles it under the hard shell of faith in the leadership of the Soviet Union. This faith has become his second skin. His nakedness without it is too painful to contemplate.

It is possible that there may be some hard-core Communists who have lost their illusions about the Party but remain loyal to it because they have become completely corrupted and enjoy the sense of power it gives them.

Do any of these hard-core Communists ever leave the Party except by expulsion from it? The answer is, yes, some do. Of course, according to Party rules, a top member never resigns from the Party—he is kicked out, and in Communist-ruled countries he may be executed as well. But there have been a number of important Party members who, after a long period of doubt about the aims and practices of the Party, were finally disillusioned enough to get out.

Whittaker Chambers, who was converted to communism while at college, was a loyal, trusted Party member for twelve years. Half of those years he spent in working to obtain secret US government documents for the Soviet agents. Commenting about his moment of change, Chambers said:

"I can no longer retrace with certainty the stages of my inner earthquake or distinguish its successive shocks. I did not know what had happened to me. I denied the very existence of a soul. But I said: 'This is evil, absolute evil. Of this evil I am a part,' " And from that moment he was no longer a Communist.

Other similar "changes of heart" could be cited from countries on both sides of the Iron Curtain. However, as

(Continued on following page)

we would expect, there is far less defection from the Communist Party by Party leaders and underground agents than by rank-and-file members. The leaders are more thoroughly indoctrinated, and their commitment to the Party is deeper. Threats of persecution and blackmail by the Party against those who might be tempted to break away, and the difficulties of starting a new life outside, keep some in who would leave if they dared.

Since most of us have probably never seen or known a Communist, here are a few findings that apply to Communists in general. These should help us to get a perspective on the movement in relation to its rank-and-file members.

First, most members join the Party when they are young—usually in their late teens and early twenties. The Party's greatest appeal everywhere is to those young people whose have not yet found meaning and direction for their lives.

Second, there is a very big turnover in Party membership, many staying in only two or three years. In the United States, for example, it has been estimated that 700,000 persons have joined and left the Communist Party since it was founded in 1919. Peak membership was 100,000; today there are fewer than 25,000 members. In countries like France and Italy, which have large Parties, there is constant movement into and out of the Party.

Third, most members are not indoctrinated in Marxism or in the real aims of the Communist Party before they join it. Immediately after joining, the recruit is drawn into activities. Thus he is made to feel part of the Party, even though he does not understand its inner workings or its real aims and purposes. Later he is given all kinds of slogans that are supposed to explain communism and his role in the movement. He learns to repeat these slogans. If he uses the right one, he is "on the beam." If he uses the wrong one, he is off. Thus most Party members are kept busy with activities and slogans.

Some members gradually become aware of the real purpose of the Party and accept it. They are then ready to move into the inner Party circle and join the hard core of conspirators. Or, as in the case of many rank-and-file members, they may smell a rat, be repelled by the smell of it, and start on the path of disillusionment that takes them out of the Party. Others may simply become bored and drift away from the Party, as was the case with many US Party members.

Although the "fellow traveler" is not actually a member of the Communist Party, he deserves mention in passing. He is in sympathy with some, if not all, of the aims of the Communist Party. He flits around the Party as a moth does around a candle flame, and sometimes he gets burned. He may be a leader in some Communist "front" organization, or he may be active in other fields in which the Communists are interested. Regardless of his motives or intentions, he performs many acts that help the Communists.

How can a movement that demands the complete surrender of one's individuality appeal to the many people who have accepted it?

The noted British historian, Arnold J. Toynbee, gives three answers to this question. He says that the Communist movement "is formidable because it makes a powerful appeal to at least three different publics. It appeals (a) to weaklings who long for clear-cut and authoritative answers to all questions, both on matters of fact and on issues of conduct; (b) to idealists who long to devote themselves to some great supra-personal public cause which will take them out of themselves; (c) to 'natives' who long to find a short cut to catching up with the West in material effi-

ciency and power. Of these three publics, (b) is influential out of all proportion to its members; (a) and (c), which overlap, include, between them, the great majority of the human race."

To these three categories of people may be added a fourth: poverty-stricken people in Western countries who have lost hope that social and economic conditions under their governments will improve. For many such people, the Communist Party offers an outlet for protest against something rather than a positive program for something. This explains much of the appeal of communism in France and Italy.

In analyzing the appeals of communism under these classifications, we must remember: motives that impel a person to act in a certain way are seldom simple and clear cut, but are usually mixed. For example, some of the maladjusted individuals, whom Toynbee calls weaklings, may also be idealists, and their purpose in joining the Communist Party may combine a desire to escape from their personal problems with a desire to right the world's ills. However, for our purpose, these four classifications are a useful guide in sorting out the kinds of people who become Communists.

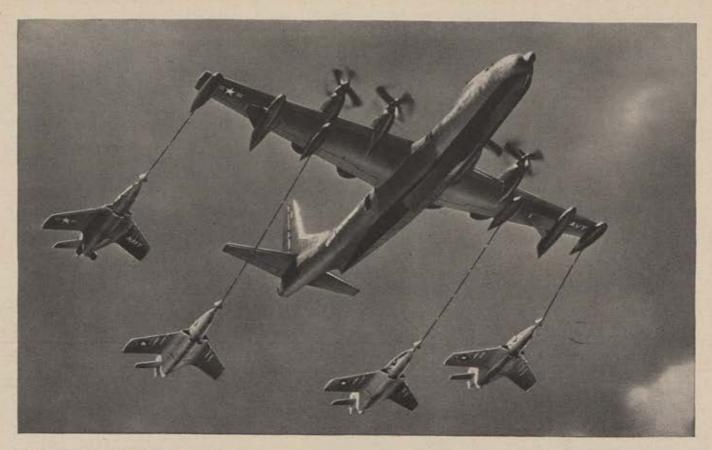
The Communist Party in the United States offers the best example of communism's appeal to what one writer on the subject calls "damaged souls."

This is in part because the US Party never became the working-class party it tried to become in its early years. Some of its leaders came from the ranks of labor, and the Communists did gain control of some labor unions, but in so doing they never won the allegiance of rank-and-file union members to communism. In some unions, there were thorough housecleanings when the members finally realized what had happened. In others, where Communist control was stronger, loyal members dropped out. Any way you look at it, communism made comparatively few converts among the workers of the US. The Communist appeal to class hatred has little meaning in the US. An energetic worker can, and often does, become a capitalist himself. A capitalist may lose everything he has and begin again as a worker. The great majority of workers in this country have believed-and proved-that they could achieve their goals of improved economic and social status within our democratic, capitalistic system.

During the 1930s the Party did attract a number of members from the white-collar and professional occupations. Probably most of them joined for idealistic reasons, which will be discussed below. But a number were socially maladjusted persons, failures of one sort or another, for whom the Party seemed to be the answer to their personal problems.

Some US Party members have been first-generation Americans who found it difficult to become assimilated into American life. Often they were in conflict with the traditions and culture of their foreign-born parents. Some belonged to minority groups who felt discriminated against. Their feelings of insecurity and rejection might be expressed in a hostile, resentful attitude toward society. So they joined the Communist Party, which also had a hostile, destructive attitude toward society. The Party, which was an outcast in American life, was a natural haven for some individuals who felt themselves to be outcasts.

The Communist Party has attracted lonely, frustrated young people who have difficulty making friends. Usually unattractive, unpopular, and lacking humor, they have found comradeship in the Party. It helps to raise their self-esteem, and they enjoy feeling superior to the outside



## **NAVY FLIGHT SETS NEW RECORD**

Allison Turbo-Prop-powered "Tradewind" opens new era in vital Pacific Fleet service

A few weeks ago the U.S. Navy opened a new chapter in aviation history when its giant aerial tanker - the Convair R3Y-1 Tradewind - set a new transpacific speed record for water-based aircraft. On its maiden round-trip flight from Alameda, California, to Keehi Lagoon, Honolulu, Air Transport Squadron Two [VR-2] firmly established the Navy's long-standing belief in turbo-prop power as the jet age's most flexible and efficient power source. On its return flight the Tradewind covered the nearly 2,500 miles over water span in 634 hours, far surpassing the record on this route for this type aircraft.

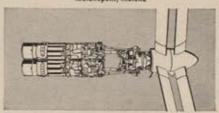
Powered by four Allison twin power section turbo-prop engines driving contrarotating Aeroproducts Propellers, the Tradewind boasts nearly 24,000 horsepower—can lift its 80-ton weight from the water in 30 seconds, climb quickly to cruising altitude and cover more than 2,000 miles nonstop at speeds in excess of 350 miles per hour.

What makes this astounding aerial feat possible is the development of a whole new concept of powered flight—the culmination of 10 years of research by the Navy, Convair and Allison. It required the solving of one of the most complex engineering challenges in aviation history—perfecting a gas turbine engine of advanced design and mating it with a six-bladed contrarotating propeller.

The R3Y-1 Tradewind will refuel in flight eight jet fighters-four at a time -at speeds of more than 350 miles per

hour. This new addition to the vast Pacific Fleet, the R3Y-1 will provide a vital service to our fast carrier task forces, further extending the range and striking power of the Navy's mighty air arm.

ALLISON DIVISION OF GENERAL MOTORS CORPORATION



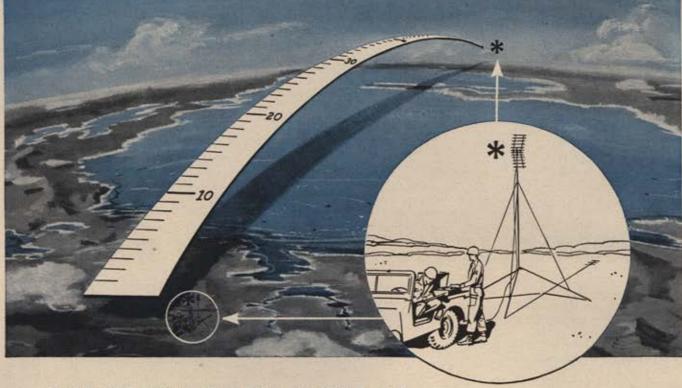
R3Y-1 demonstrates versatility of Turbo-Prop power in jet-age transportation

Record-breaking Navy R3Y-1 is powered by four T40 Allison Turbo-Prop engines like this—each having twin power sections driving contrarotating Aeroproducts Propellers. Both power sections in each engine give the R3Y-1 full power for rapid takeoff and climb to cruising altitude. To gain best fuel economy for cruising, one power unit may be shut off entirely, allowing the other to operate at its most efficient setting. Either power section operates all six blades contrarotatively.



#### "RADAR RULER

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#### PORTABLE RADAR STATIONS MEASURE AND DOUBLE CHECK 50 MILE READINGS IN SECONDS

For the first time, surveyors are freed from short-sighted optical equipment. Unlike old-fashioned surveying tools, the "radar ruler" pierces through fog, darkness or dense foliage, electronically pacing off distances of 1 to 50 miles, precise to within a few meters!

This new general-purpose surveying instrument was developed by Motorola's Military Electronics Laboratory for the Signal Corps Engineering Laboratories, Fort Monmouth, N. J. The entire operation can be handled easily and quickly by unskilled personnel.

This self-calibrating system uses two identical portable radar stations which bounce a signal back and forth thousands of times each second. High-speed computers automatically provide the data necessary to measure off the

Here is just one more example of the equipment now being developed by Motorola for many varied military applications.



3 suitcases and a 25 ft. collapsible antenna comprise the entire equipment

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non-Communist world where they were so unhappy. The Party welcomes them and makes them feel needed.

Studies of the family backgrounds of nearly 300 American ex-Communists have revealed a larger than average number of suicides, desertions, and divorces. In some of these cases the Communist Party seemed to offer stability and roots that were lacking in the family.

Studies have also revealed that many Communists are weak, submissive, dependent persons, who want to be told what to do and what to think. The dictatorial character of the Communist Party appeals to them. It relieves them of personal responsibility for their thoughts and actions. The party has all the answers, it gives orders, and they are happy to obey, asking no questions, but feeling useful and important in doing humble tasks.

What does the Communist Party give to these maladjusted souls that they could not find in another organization? Although many of them came from religious homes, they have become indifferent to religion. Yet they need to believe in something. For these, the Communist Party has replaced the church. It gives them a faith, a doctrine, and a discipline.

Finally, many of the emotionally maladjusted persons who have joined the Communist Party are running away from facing the problem of what is wrong in themselves by attacking what they think wrong in society. The Party gives them a fine opportunity to attack society. The Party is always belligerent, always attacking something, always defying established authority. Hatred is a dominant emotion in communism. And in the eyes of Party members it has moral reasons for hate. Through the Party, the maladjusted individual who is inwardly rebellious and antagonistic toward society can vent his pent-up resentments without feeling guilty.

In his book, Where We Came Out, Granville Hicks, author and former teacher, has explained why a number of American intellectuals became Communists in the 1930s. The group for which he speaks was not composed of the social misfits and failures. By and large, he says, "they were men and women who were doing well in their professions and seemed to be as stable and as happy in their personal lives as the average non-Communist."

Most of this group joined the Party after 1935 when the Communists promoted the Popular Front against fascism, and the Party reached its highest membership—100,000. Before this, however, there were some factors in American life and in the world situation that inclined some young, educated Americans to take a sympathetic view of the Soviet experiment with communism.

First, some were disillusioned with events that followed World War I, which the US had entered "to make the world safe for democracy." Many Americans viewed the Versailles Peace Treaty and the failure of the US to join the League of Nations as a betrayal of that ideal. Some of our young men and women became ardent pacifists. Some were highly critical of a political and economic system that they thought produced wars.

Second, during the prosperous 1920s, a few young idealists were alienated from what, to them, seemed primarily a "big business" civilization. They felt that there were more

important things in life than making money.

Then came the financial crash of 1929, followed by a severe depression, with millions thrown out of work. These young critics became convinced that capitalism had broken down, and, like Humpty Dumpty, couldn't be put together again. They had been attracted to socialism in the twenties because its advocacy of state ownership of the means of production, to be achieved by democratic methods, seemed

reasonable to them. But the Socialist program no longer seemed adequate. To quote Hicks: "A socialism of deeds, not of words, was what we were looking for, and it was true the Communists were active in every strike and every unemployment demonstration and that they were beaten and jailed and sometimes killed. By comparison the Socialists seemed tame and ineffectual."

At this time, about all that these sympathizers with communism knew about the Soviet Union was that the Communists had taken over the government and socialized the means of production. They knew that the USSR was not a paradise, but thought it was doing very well. What impressed them most was the Soviet claim that there was no unemployment in the USSR. What impressed them about American Communists was "their absolute devotion to the cause." Even though, as Hicks says, "we didn't like them very well . . . they did get results." So the young radicals read Marx and Engels and Lenin, and were convinced that they had the key to history.

It was the big switch in the Party line in 1935 that brought many Communist sympathizers, including Mr. Hicks, into the Party. Hitler's rise to power and growing threat produced a change in Soviet tactics, which was embodied in the concept of the Popular Front. Communists were told to cooperate with any group that was fighting fascism. The US Party took in anyone who wanted to join. It dropped its revolutionary propaganda for nationalist propaganda. One of its slogans was "Communism Is Twentieth-Century Americanism." Communist leaders quoted the Declaration of Independence and said communism was in the tradition of the American Revolution.

Hicks says, "It never occurred to me at the time that the new line was really a trick, a device for strengthening Soviet foreign policy. When I joined the Party, it was not because I wanted to help Russia, though I had friendly feelings toward the Soviet Union both as an example of working socialism and as the chief enemy of fascism. Nor was it because I desired the overthrow of the government of the US. . . . I joined the party because, as a convinced Marxist, I was in agreement with what I believed to be its ultimate aim-the socialization of the means of production -and especially because it seemed to be leading the struggle against fascism." He had no knowledge, he says, of Communist espionage while he was in the Party, though, as he and all of us learned later, some American Communists were at that time spying for the Soviet Union in our government.

It was the Nazi-Soviet non-aggression pact of 1939 that opened the eyes of thousands of Party members (including Hicks), here and abroad. The Party leaders in every country waited to get the new line from Moscow, then immediately made a right-about-face and called a halt to the anti-Fascist crusade. This was an awful shock to the idealists who had accepted the mask of the Party for its real face. It was now clear, even to them, that the national Communist Parties were completely under the domination of Moscow and that it was their primary duty to serve the interests of the Soviet Union. The idealists had been played for suckers, and most of them knew it.

"The great evil of communism," says Hicks now, "is not that it uses vicious persons, as it sometime does, but that it corrupts good ones. . . . Most of them, fortunately, got out of the Party before they were wholly corrupted, but not all."

Communism never again had much of an appeal to American intellectuals, even during the period of the Soviet-American alliance in World War II, Postwar Soviet (Continued on following page) policy has reduced its appeal practically to the vanishing point. This story, with individual variations, is the story of many former Communists in many countries. But there remain in the Party everywhere some sincere but perverted idealists who are unable, or refuse, to face the truth about communism. The longer they stay in the Party, the stronger their faith grows because it has become their only reason for living.

In Asia, where millions of people live in great poverty and illiteracy, communism has made some headway among those who are looking for a short cut to more food, better living conditions, and industrial development. Asians are anxious to catch up with the West, and some of them are impatient. These don't want to wait for results from the slow ways of democracy. They are fooled by the Communist promise of results tomorrow—not a week from to-

These "people in a hurry" see in the Soviet Union the example of a once-backward country that became a strong industrial country in a comparatively short time. They are impressed, too, with Communist China's vigorous efforts in that direction. The totally planned economy of these two countries appeals to some Asians as the only efficient

way to achieve rapid material progress.

Most Asians know little or nothing of actual conditions in the USSR—its low standard of living after thirty-eight years of communism, and the brutal exploitation of the people by which industrialization was accomplished. They don't know about the forced labor camps. Nor do they know how little freedom the ordinary Soviet worker has who is told where he must work, how many hours, and how much pay he will receive. He has been forced to give most of his labor to building up heavy industry and producing a huge array of armaments. There has been very little production of the things needed to make life better for the ordinary citizen. And he can't afford them anyway. The masses of Asians are unaware of these facts. Nor do they realize that Red China is industrializing in the same way.

The appeal of communism in Asia is strengthened by feelings of resentment and distrust toward the West on the part of many Asians. These feelings have grown out of the years when most of the countries of Asia were colonies in empires ruled by Western capitalist powers. Most of these former Asian colonies became independent nations after World War II. But the old suspicions linger, and today some Asians express fear that the world's strongest capitalist nation—the United States—would like to dominate the Far East economically. As they see it, colonialism and capitalism are two names for the same thing: exploitation.

Asians who hold such fears do not understand that the interest of the US in aiding underdeveloped countries is based, not on a desire to exploit them, but on a desire to help them "catch up with the West" as truly free and independent nations. By strengthening freedom in the rest of the world, we help maintain our own freedom.

Along with distrust of the West goes an intense nationalism, which is natural for people who have so recently become independent. The Communist movement in Indo-China gained momentum by taking up the cause of national independence. France refused to grant complete independence to the three Indo-Chinese states immediately after World War II. The Communists of Vietnam, led by Ho Chi Minh, seized the opportunity to whip up a war against the French and non-Communist Vietnamese.

He won a following among the Vietnamese "in a hurry," not because they wanted communism—most of them didn't know what communism was—but because he seemed to be the only effective fighter for independence. He concealed from them the knowledge that, if he won, they would be under a cruel dictatorship that took orders from Peiping and Moscow. Now that he has taken over the northern half of the country, more than a half-million Vietnamese have fled to the south to escape the harsh rule of the Communists.

It is important to remember that the Asian Communist Parties are all "national" Parties in the sense that the leaders and members are Asians. There is no outward sign of

foreign control.

But there, as in the West, the hard core of Communist leadership consists of persons trained in Moscow. They are indoctrinated Marxists, trained in the techniques of revolution by military action and by infiltration and subversion. Many of them were educated in Western universities. While admiring and envying the superior technology of the West, these Communists are filled with blind hatred for the West. They play on the popular theme of "Asia for the Asians," and pour out endless propaganda against "US imperialism" and their own governments.

At the same time, the Communists make rosy promises to give the people all that they yearn for—land to the landless, more food, more schools, lower prices, higher wages, lower salaries for officials, complete equality—all this through drastic reforms by nationalizing the land and in-

dustries. . .

With local variations, the situation just described is the usual story of communism's appearance in other underdeveloped areas of the world. The new power and prestige of Red China in Asia is attracting, as well as alarming, some of the fence-sitters—particularly among the ten to twelve million overseas Chinese who live in Southeast Asia.

There are only two countries in the Free World where the Communists have been able to build effective mass

political parties. They are France and Italy.

In national elections, the French Communist Party polls more votes than any other single political party. It is kept out of power only by a coalition of several other parties and by the unwillingness of still other parties to join it in forming a government.

The Italian Communist Party is the largest Communist Party in the Free World, with a membership estimated at 1,700,000. In voting strength, it is second only to the

Christian Democratic Party.

In both countries the Communists control the largest trade-union federations and hold many positions of power in local, particularly city, governments. Their strength comes largely from the ranks of labor. To understand this, one must know something about the political and economic situation in those countries.

Capitalism has not developed in France and Italy as it has in the US where our economy is freer, and—as it has expanded and prospered—the workers have received an increasing share of the nation's wealth. The American working man has a big stake in our economic system, which he helped to create and which has done well by him.

Workers in France and Italy have not done so well. The economies of these war-ravaged countries were on the verge of collapse after World War II. With a transfusion of US economic aid, their industries were helped back on their feet and today are producing more than ever. But wages have remained very low, while the cost of living has soared. In Paris in 1954, there were workers who still received as little as thirty to thirty-five cents an hour, or about \$60 a month. In Italy, poverty is even greater, and unemployment is a serious problem. . . .

(Continued on page 73)

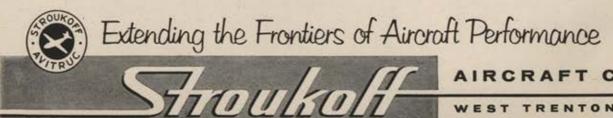




### "Mayday" Mission for Pantobase

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The labor movement in France before World War II, and in Italy before the Fascists come to power, was predominantly Socialist and, to a much less degree, Communist. The Communist Party in both countries emerged from the war with considerable popularity and prestige because of its militant activity in underground resistance movements against the Germans in France and against the Fascists and Germans in Italy. The Party was well organized and had a program of action. In the confusion, misery, and despair of the first postwar years, the Communist Party won its largest membership. Although membership has been declining every year since then, the unsolved problem of poverty has kept the Communist vote high.

In France and Italy the Communist Party is a mass organization, with a large number of unindoctrinated, unassimilated members. Most of them are Communists out of protest against the way things are rather than out of a positive belief in communism. This is the reason why many non-Communists vote for Communist candidates. They are not concerned with the long-range goals of communism, which they would disapprove if they understood them, but with their own long-standing grievances. They have lost hope, and some of them are ready to give communism a chance to prove its boasts that it can do better.

Unfortunately, wide disagreement among the various non-Communist Parties of France and Italy about what should be done has hindered the development of strong, effective democratic governments. Coalitions of several parties govern both countries, and government by coalition always means constant compromise to keep the coalition

from flying apart.

From the time of the French Revolution and the First Republic, the idea of a strong central government has not appealed to the majority of the French people. In the new constitution, written after World War II, they saw to it that the executive power of the premier was kept weak so that he could easily be turned out of office by the National Assembly. The result has been a rapid turnover of governments, none of which could count on staying in power long enough to carry out vigorous reforms.

In Italy, government of the Center parties, led by the Christian Democrats, is hampered by strong opposition from the left-wing Socialists and Communists on the extreme left, and from the ultra-conservative Monarchist

and Fascist-type parties on the extreme right.

As a consequence, the Communist Party in both countries has had considerable success in convincing the workers that it is the only Party capable of solving their problems.

In addition, the Communist Party backs the popular cause of "peaceful coexistence" with the Soviet Union. It expresses and fosters the anti-US sentiments of those French and Italians who oppose the costly rearmament program and fear that American leadership in foreign affairs may take them into a war against the Soviet Union.

The French Communist Party has the largest core of dedicated, fully indoctrinated Communists who are members of long standing. Although membership has dropped from a peak of about 800,000 in 1946 to about 450,000 today, the party's influence is greater than its numbers

indicate, as the voting record shows.

Even so, much of the Communist vote remains a vote of protest rather than a belief in communism. The great majority of French people are ardent lovers of freedom. The basic reason for the instability of their government is their fear of giving too much power to one man. There is no doubt that a continuing campaign of objective truth about Communist tyranny and, above all, vigorous action

to put an end to poverty and slums, would win support for the party that took such action, and greatly reduce Communist strength in France.

In Italy, where there is even greater poverty, the Communist Party has a broader base of mass support than in France. This support comes chiefly from the workers of the industrial cities in the north and from the impoverished peasants in the agricultural areas of the south.

Italy is plagued by two chronic ills: over-population and lack of natural resources. Approximately two million, or ten percent of the working population, are unemployed. Another two million, most of them in southern Italy, are

only partially employed.

The Italian Communist Party is well organized and has plenty of money (some of it obtained by "liberating" Italian banks in the final days of World War II). It is led by educated, capable, and dangerous men. Control of the General Confederation of Labor puts them in a position from which they can exercise great influence.

Probably no more than 100,000 of the estimated 1,700,-000 Party members are genuine Communists in the sense that: (1) they are fully committed to the Communist cause; (2) they understand it; or (3) could be counted on to support it in a showdown for the control of Italy.

But the Party shrewdly exploits the conditions in which millions of Italians live and has convinced a great many of them that it is the only Party that really cares about bet-

tering their lot.

In searching for answers to the questions of who are Communists and why they are Communists, we have learned that communism attracts most of its followers when they are young. Among the kinds of young people it attracts are: (1) maladjusted individuals and weaklings who cannot stand on their own feet; to these the Communist Party offers an escape from personal problems and direction for their lives; (2) idealists who want a great cause to devote their lives to and who are ignorant of the real nature of communism; (3) impatient folk in underdeveloped countries who are in a hurry to catch up with the West in material progress and who believe that communism is the shortest path; (4) workers in advanced countries, such as France and Italy, who vote Communist largely as a protest against their lot.

People who are attracted to communism in non-Communist countries are all, for one reason or another, deeply dissatisfied with life as they know it. Communism is pictured to them as the great cure-all, and they accept the picture for the real article. At the time of joining the Party, most members are ignorant of the true nature of the Communist conspiracy, of its ultimate goals, and of the means

by which those goals are to be achieved.

Sooner or later, most of the rank-and-file members discover the truth, or enough of the truth to become disillusioned with communism and get out of the Party. Some merely become bored. In the US and Western Europe the Party has been steadily losing members in recent years.

Those who remain in the Party are the real Communists -the hard core. Whether they have kept their original faith in communism as an ideal or whether they have become cynical seekers after power makes no difference. They are all corrupt. They have sold out their own countries and their own souls to help spread the tyranny of Soviet communism over the whole world.-END

This material, here slightly abridged, was originally published as a pamphlet entitled "Who Are Communists and Why?" as part of the Office of Armed Forces Information and Education's series, "Know Your Communist Enemy."





LET'S HAVE YOUR JET BLAST

In "Jet Blasts" you can sound off on any subject you want. We'll pay a minimum of \$10 for each "Jet Blast" used. All letters must be signed but we'll withhold names on request. Keep letters under 500 words. "Jet Blasts" from service personnel do not necessarily report official policy.

### Can We Make Disarmament Work?

What kind of disarmament? In its eagerness to dispel the fear of atomic devastation, end the cold war, cut taxes, and reduce the defense budget, the American people are unwittingly apt to force the President and Congress to accept from Russia a disarmament program that will prove futile and could result in outright catastrophe. To prevent such a disaster, an intensive informatory and educational campaign will have to be launched by outstanding persons in whom the public has confidence,

Bernard Baruch, in the most significant section of the speech that he delivered upon the one hundredth anniversary of Woodrow Wilson's birth, issued this warning: No disarmament program "can be adopted which fails to provide direct, effective, and certain guarantees for enforcement of its terms. International disarmanent of both conventional and atomic weapons requires an international authority with power to inspect, control, and impose punishment, swift, sure, and condign against any transgressor. Any agreement which does not establish the authority to enforce it would be incalculably dangerous. To permit any nation the right to veto the decisions of the control agency, or actions taken against violators would be to make the plan meaningless."

Because of his prominence, Mr. Baruch's message appeared upon the front page of many important newspapers. However, the purpose of his warning against disarmament without sufficient safeguards has for many vears been the battle cry of a stalwart minority. Men, women, and organizations, despite adverse criticism and even charges of subversiveness, have already advanced the principle that the road to permanent peace is through universal disarmanent under inspection and enforceable law. Our greatest historian, Arnold Toynbee, has been an advocate of this procedure.

In October 1954, the National Council of the Churches of Christ in the USA, in their "Fourth National Study Conference on the Churches and World Order," declared: "We support such charter revision as is necessary to give the UN the authority to carry out an effective plan of universal and enforceable disarmament."

In its summary to the press in August 1954, the American Assembly called upon the US government to "persist, despite all obstacles, in its efforts toward a system of universal disarmament guaranteed and safeguarded by practical procedures of inspection and control."

When President Eisenhower came to office, his first foreign policy speech contained a strong reaffirmation of the principles of enforced disarmament, and in recent months the advocacy of enforceable disarmament has been proclaimed in the press or through public addresses by such individuals as Henry Luce and David Sarnoff. These men have not spelled out disarmament under enforceable law but very soon our electorate will have to come to the realization that any just, enforceable law implies a legislative body to make the law, a judicial body to adjudicate it, and a police force to enforce it.

Former Secretary of the Air Force Thomas K. Finletter summed up this situation in a speech he made before the Foreign Policy Association in Philadelphia with the admonition that "it will take a fine quality of mind and character if this renewal of the drive for enforced disarmament is to succeed. And it will have to be carried on with courage. For there is one disagreeable point about any plan for enforced disarmament, and that is, that it has to be enforced against us as well as against the other nations."

J. A. MIGEL

### Maybe That 'Ol' Devil' Isn't So Bad After All

Since everyone else in the Air Force (or so it seems, picking up Air Force or any of the service journals), has some suggestion or plan about what to do with that "ol' devil," the Effectiveness Report, permit me to express a couple of my own.

In all the comments the various gripes contain, the monkey seems to be placed on the back of almost everything and everybody—the form, the system, the reporting officer, the job, the commander's wife — in short, almost every place except on the number one man in the whole picture, the officer reported upon. Let's put that

monkey where he belongs, in the majority of cases, on the "broad" shoulders of the guys who get those sour reports which just seem to be the cause of the various complaints, suggestions, and assorted comments.

The Air Force has spent a good deal of time, money, and effort in the development and end use of this report in its various forms. The Effectiveness Report is a tool—and a tool, admittedly, is only valued in direct relationship to the skill of the user.

As a personnel officer in a reasonably large command, I am responsible, among a variety of other chores, for reviewing several thousand of these reports each year. We have a few problems in our program, so various studies are in order, with the result that a few significant observations have come to light on officer evaluation, among them:

1. Given objective rating conditions, a reporting officer will probably rate a subordinate just about at the same value other raters have applied.

2. Over a period of only a few years' accumulation, a definite pattern of reporting will usually emerge.

(Continued on page 77)

another RCA first

New Concept in Transistor Design for High-Frequency Applications in Military and Commercial Equipment



Designed to provide a "built-in" accelerating field in the base region that propels charge carriers from emitter to collector, RCA-2N247—a germanium p-n-p type transistor—begins a new era in transistor operation at radio frequencies extending from the lower frequencies well up into the short-wave bands.

Here is a design that makes possible a significant reduction in base resistance and collector capacitance—substantially increases voltage- and current-handling capability, provides shielding between base and collector leads to minimize interlead capacitance and coupling to adjacent components. The resultant benefits to designers are: (1) high input circuit efficiency, (2) excellent operating stability, (3) good automatic-gain-control capabilities over wide input-signal variations, and (4) good signal-to-noise ratio.

Adaptable to mass-production techniques, RCA-2N247 can provide for the expanding needs of high-frequency commercial and military applications. It is one more example of RCA's intensive development program in semiconductor techniques to provide high-quality transistors—in quantity. For more data on the 2N247 Drift Transistor, write RCA, Commercial Engineering. Or call your RCA Field Representative.



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	1.5 Mc	10.7 Mc
DC Collector-to-Emitter Volts	-9	-9 volts
DC Base-to-Emitter Volts	-0.2	-0.2 volt
DC Collector Current	-1	-1 ma
Collector-to-Base Feedback		The same of the same of
Capacitance	1.7	1.7 µµf
Input Resistance	1350	170 ohms
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A Measured in a single-tuned unilateralized circuit matched to the generator and load impedance for maximum transfer of power (transformer insertion losses not included).

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### MASTER INDICATOR Approx. weight 414 lbs.

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Approx. weight 1 lb Height 241/4 inches Length 544 inches Clearance behind panel 311/4 inches



#### DIRECTIONAL GYRO

Approx. weight 8¾ lbs. Width 7½ inches Height 7½ inches Length 8½ inches



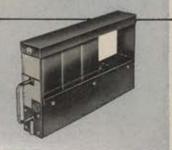
#### FLUX VALVE

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Approx. weight 5 lbs. ¼ ATR 12¾ inches long



For more than a decade, Gyrosyn compasses by Sperry have set the standards of the aviation industry for commercial and military aircraft alike. Every day, hundreds of thousands of precision, on-course miles are flown with the aid of these accurate and dependable instruments. Yet in the Sperry laboratories the search for even greater accuracy and precision never ends—as evidenced by Sperry's most recent development, the C-10 Gyrosyn.

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At latitudes under 65° where the C-10 Gyrosyn is "slaved" to magnetic headings, accuracy is assured within ¾ of a degree. At latitudes above 65°, where magnetic headings are unreliable and the C-10 Gyrosyn is unslaved, random drift is less than 3° per hour. This compares with an average random drift of 8° to 16° per hour with many slaved compasses in use today.

#### THIS IS EFFICIENCY

A separate latitude corrector also automatically compensates for earth rate drift of the gyro, whether slaved or unslaved. Reliability of the system is further assured through the direct-drive nature of the master indicator which precludes transmission errors common to repeater-type instruments.

#### THIS IS THE ANSWER

. . . for today's faster-flying conventional aircraft and for tomorrow's turbo-prop and jet airliners. The C-10 Gyrosyn is recommended as the directional component of the SP-30 Flight Control System and the Integrated Instrument System, both of which are standard in the Douglas DC-8. It can be applied readily to modernize flight instrument equipment in existing aircraft. For complete information on the Sperry C-10 Gyrosyn, as well as other developments in the field of precision instrumentation, write our . . .



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In substance, who else but the officer reported on establishes the quality of service, and thus the comments and rating? Certainly not the reporting officer-if (and I will admit this to be a pretty big IF) he is doing any reasonable kind of a job, in this chore, all he does is observe and report, but not determine, what he sees. Sure, there are exceptions to a pattern-but where an isolated report is subjective, there are several recourses in obliteration or withdrawal of the report, and in many cases in the reliance on the maturity of judgment of board members who use these reports (while the latter calls for a good deal of faith, I have reviewed files of officers classified as Exceptionally Well Qualified and which contained a relatively recent low report—an obvious indication that undue weight was not given to a subjective deviation from pattern).

My own record? Nothing in the way of outstanding reports, but good enough to get me to my present grade in less total time than some of my contemporaries have in grade. Oh, yes, I have one of "those" reports in my file, too-something about minimal mission consideration, among other things, the man said. I have not bothered to argue the report, and elected to leave it in the file, to be smothered (and, again, I hope) by the sheer weight of prior and subsequent reports. But then, if almost all officers didn't, at one time or another, get an ego-bruising report, there wouldn't be any dissatisfaction and I might have spent this evening watching the fights.

And thus we come to my second proposal-astounding, and one sure to arouse the dander of those who, before me, also took pen in hand-LEAVE THE EFFECTIVENESS REPORT ALONE. It is not perfect, and, like the promotion system, is sure not to please every officer; it contains artificial barriers, and does not exclude the emotional factor; the administrative requirements are often a nuisance and preparation time is always the wrong moment; but, by and large, over the long haul it does what is expected of it with reasonable recognition of human failings. If there seems to be a drop in objectivity, then let's emphasize and re-emphasize objectivity; put a premium on it if we have to; but let the Report do the job it is intended to do, without agitating every hour on the hour for changes to take care of the "I wuz robbed" boys.

LIEUTENANT COLONEL

### Let's Hold on to That 'Out-At-Twenty' Man

Would you work ten of your most productive years for half pay? Of course you wouldn't, and neither will most of the estimated 60,000 to 70,000 highly skilled USAF NCOs who will hit the twenty-year service mark in the next five to seven years.

Thanks to the vast build-up of our air arm during the early days of World War II, some 28,000 non-coms will celebrate their twentieth year of service during the next five years. And in the following two years that figure will rise to 40,000 or more.

With a choice of half pay for staying home to enjoy the sunshine of California or Florida or fishing in streams from Arkansas to Maine, or remaining in the service for that twenty- to thirty-year period for what amounts to little better than half pay (when you deduct retirement money), it does not require much heavy thinking to figure out that most of this trained manpower force will be lost to the USAF within seven years.

A study of recent retirements shows that an "out-at-twenty" attitude prevails among the NCOs, and unless AF planners come up with something to make these NCOs change their "out-at-twenty" views to "go-for-thirty," the finest Air Force in the world might have personnel problems reduce its capability as a deterrent against aggression.

The average tech or master retiring at twenty years, during the next five to seven years, will be somewhere in the forty- to forty-five-year-old age bracket. His productivity and capability should be at their peak. Normally the loss of a certain percentage of personnel of this caliber could be expected and the situation handled with ease, but the hump period of these retirements—especially say 1962-63, when such a large number will be eligible to retire—could have us lose so many technical, supervisory, and administrative non-coms that our air-power potential could be injured.

In recent years the USAF, the Air Reserve Association, and Department of Defense officials all joined forces to help sponsor and pass legislative actions that increased re-enlistment bonuses, offered choice assignments to re-uppers, boosted pay rates, and offered additional tech school training. This was as it should be, a successful bait to lure first-hitch airmen, especially tech school graduates, into making the AF a career.

Career NCOs, it is true, received the same advantages in most instances, but no realistic approach appears to have been taken to cope with the "out-at-twenty" attitude

the "out-at-twenty" attitude.

It is obvious that the USAF cannot afford to lose thousands of its trained top enlisted technicians and supervisors in a short period of time, and on the other hand the majority of the NCOs cannot afford to and probably would not pass up worthwhile inducements to change their "out-at-twenty" aim to a "go-for-thirty" plan.

It's difficult to arrive at just what a suitable inducement might be, but perhaps the AF might offer twentyyear vets an opportunity to waive their retirement rights until, say, the twenty-fifth year, when they could retire and collect the same retirement pay they would have collected for thirty years. Another plan might have them sign over for two-year hitches at twenty, waiving their retirement rights during the hitch for a cash bonus of \$1,000 for the two-year pcriod. Of course, if he wanted to retire at twenty-two or sign up for another two years, he could do so providing he was recommended as a top NCO.

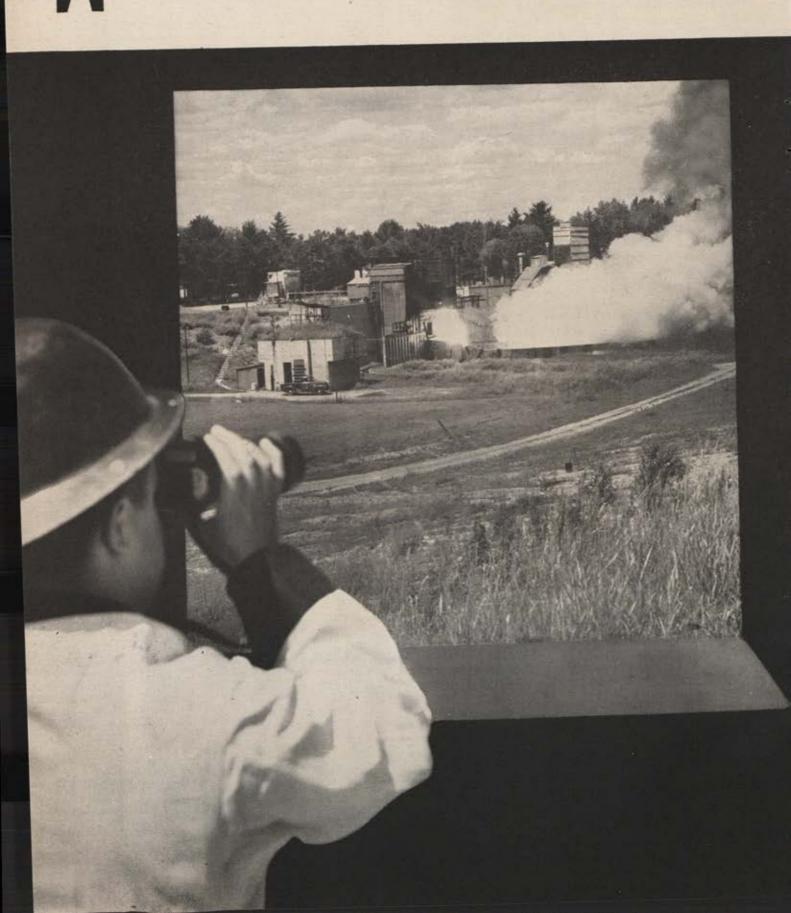
If this cash bonus appears to be high, just weigh it against the figure of \$14,000 used in recruiting publicity as the loss in dollars for each first-termer who does not re-up. If the youngster is considered worth \$14,000, what value must be placed on say a B-52 crew chief, forty-one years of age and a master sergeant with almost all his twenty years spent around aircraft? Or a communications NCO with seventeen to eighteen years of experience in communications and electronics work.

The inducements offered, whatever their cost, would be a bargain indeed if they helped us retain the type of men who can keep our Air Force from dropping from the best to second best. In today's world we can't be second best in the air and exist.

M/SGT. BILL O'KEEFFE

PROGRESS REPORT ON PROJECT VANGUARD

# General Electric X405 Being



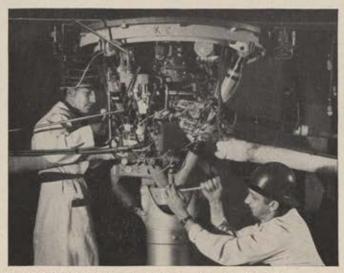
# Readied For Flight Testing

# "Flyable" model of G-E rocket engine on schedule at fully instrumented Malta, N. Y. rocket test station

General Electric's new X405 rocket engine has already completed many successful static test runs—only a year after General Electric was awarded a contract to build the first-stage powerplant for the VANGUARD rocket. Now being qualified for flight test, the G-E X405 is scheduled for early delivery to Martin-Baltimore, builder of the VANGUARD airframe and prime contractor for the earth satellite launch vehicle.

When the bi-liquid X405 launches the finless, threestage VANGUARD rocket during the International Geophysical Year, it will produce more than 27,000 pounds of thrust and have a burning time of about 150 seconds. At burnout 36 miles above the earth, the X405 rocket engine will have accelerated the VANGUARD rocket to a speed of 4000 mph—more than a mile a second! The advanced G-E powerplant is currently undergoing detailed qualification testing at the Malta, N. Y. rocket test station, operated by General Electric for the U. S. government. Fully instrumented, Malta's advanced engine and component testing facilities have enabled G-E rocket engineers to make rapid progress in the development of the X405.

Superior performance of G.E.'s X405 is the result of more than a decade of General Electric rocket engine experience. The new powerplant marks another milestone in G-E rocket engine progress, is another example of how General Electric today can provide the U. S. rocket and missile industry with highly reliable, high performance rocket engines . . . of unmatched quality. General Electric Company, Cincinnati 15, Ohio.



FULL ENGINE SYSTEMS TESTS simulate X405 flight requirements, duration of actual VANGUARD first-stage run. Above, G-E technicians install X405 engine in rocket test pit in Malta.



X405 ENGINE RUNS ARE CONTROLLED from blockhouse, adjacent to firing pit. Completely instrumented test cells record continuous performance data during close-to 150-second run.

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This is how Hickam Field, Hawaii, looked after the sneak Japanese attack fifteen years ago. The planes are B-17s.

# **Caught With Our Planes Down**

Fifteen years after Pearl Harbor, an eyewitness looks back

#### By Lt. Col. Franklin Hibel

HE DAY began in Honolulu as a typically beautiful, peaceful Sunday morning. A moderate trade wind-northeast to southwestblew over the island, carrying clouds moving gently from 2,000 to 3,000 feet, occasionally higher, over a sleeping and unsuspecting city. It was 6:00 a.m. and dawn on that December 7, fifteen years ago. At that exact hour, about 200 miles north of Oahu, orders for take-off were being given to crew members of 360 aircraft of the Japanese First Air Fleet.

An early riser, even on Sunday, I had shaved and put on civilian slacks in the large, new 600-man consolidated barracks at Wheeler Field, the Hawaiian Air Force's fighter base, twelve miles inland from Pearl Harbor, I was a corporal in the Army Air Corps, assigned to the 14th Pursuit Wing's public relations office.

It was the first Sunday after payday and Honolulu would be crowded with fun-seeking GIs and gobs. But all thoughts of fun-making were forgotten when the first wave of enemy aircraft-190 fighters and bombers with the Rising Sun on their wingsroared over the island.

Two young fighter pilots, Lts. George Welch and Kenneth Taylor, had been playing poker all night following a dance at the Wheeler Officers' Club. Temporarily assigned to Haleiwa Field, an emergency landing base eight miles away on the north shore, they yawned sleepily as the game broke up.

It was almost eight o'clock in the morning, and they were undecided about hitting the sack or driving to Haleiwa for a swim. It was a decision they never had to make for just then some twenty-five planes, in follow-theleader fashion, dived on the Wheeler hangar line, strafing seventy-five new P-40B aircraft. It was a simple assignment-the Curtiss Kittyhawks were wing-tip to wing-tip.

Startled and stunned at the sight and sound of so many planes early Sunday, when training activities were at a standstill, Welch and Taylor dashed outside. One of the planes, less than 200 feet off the ground, roared at them. With machine-gun bullets blasting around them, and realizing what the orange-red circles on the wings stood for, they darted back into the club.

M/Sgt. Fred Brown, one of the married non-coms at Wheeler, lived with his wife in a brick duplex two short streets from the hangar line.

At 7:30 a.m. Sergeant Brown flicked on the radio to listen to a KGMB disc jockey. He was back in bed when the first bomb crashed.

Rushing to the window, the sergeant saw flames shooting up from the gas storage dump on the southwest corner of the field. The radio was blaring a popular song of the day, "I Don't Want to Set the World on Fire.'

A formation of thirteen B-17s, led by Maj. Truman H. Landon, neared the first leg of a long flight from San Francisco to Manila.

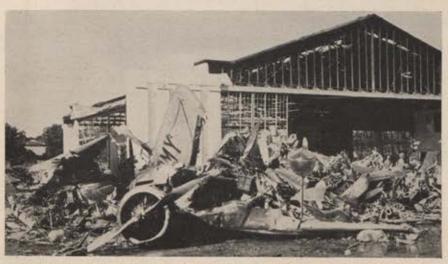
On December 1, Gen. H. H. "Hap" Arnold had written to Lt, Gen, Walter G. Short, Hawaiian Department commander: "We must get every B-17 available to the Philippines as soon as possible."

Arnold's plan was to reinforce the vulnerable island chain so close to Japan. The Army Air Corps Chief of Staff had personally inspected preparations at Hamilton Field for the 2,392-mile flight of the 38th and 88th Reconnaissance Squadrons to Oahu on the initial lap to Mindanao.

Skimming through an overcast forty miles from the coast of Oahu, Major Landon brought his Flying Fortress into the clear-and smack into the middle of nine dive bombers.

Landon thought they were friendly until they started to make passes at him. "Hell, they're Japs!" screamed the bombardier.

(Continued on following page)



A heap of demolished planes and wrecked hangar at Wheeler Field, T. H., show thoroughness of Japanese bombings. In foreground is an Air Corps amphibian.

I had just reached for my aloha shirt when the planes dived at Wheeler. All hell broke loose within the next moment.

As I stared at the window, a Japanese plane with a fixed undercarriage flew by! Looking at the goggled head of the pilot, I thought dazedly that here was a creature from another world. Machine-gun bullets slashing through shattered windows brought me back to reality.

The slugs whined and smashed into wall and foot lockers, ricocheted off concrete pillars and tore into bunks upon which now wide-awake airmen were scrambling.

All was bedlam and bombs and bullets after that. So shocking and sudden was the Japanese attack that it was difficult to think straight. I ran out of the barracks and up the main street to Wheeler's back gate, miraculously escaping the bullets strafing everyone in view. Military families piled out of dependents' quarters in stunned surprise and stumbled into machine-gun fire.

Black, billowing smoke rose from the hangar line. Men of the 78th Pursuit Squadron had been domiciled into a tent area there, across from the post exchange. As the Japanese pilots swept low over the hangar line, they raked the tents with deadly gunfire. Tents and tenants were slashed, and those airmen who were hit never knew what had happened.

The attacks on Wheeler and the other airfields—Hickam and Bellows—were carefully planned and exceptionally well executed.

Twenty-five enemy aircraft bombed Wheeler in the initial pass. They approached the fighter base from the east, circled counter-clockwise, and then came in from the north for the attack. The planes descended from 3,000 feet and roared over the hangar area in V formations.

After this pass, leaving death and destruction in their wake, the Japanese broke formation and seemed to disregard each other in the strafing attacks that followed. The pilots maneuvered recklessly, maintaining little air discipline as they narrowly averted mid-air collisions. They dived to as low as fifty feet, concentrating on the tent area and vicinity of the consolidated barracks.

Almost an hour later, seven aircraft flying at 500 feet came in from the south and machine-gunned men moving our planes onto the airdrome. Many of us saw the faces of the pilots, since during these final passes they came down to dangerously low altitudes of thirty feet as they fired their .50-caliber, 7.7-, and 20-mm machine guns at us.

As they scrambled into the officers' club, Welch reached for a phone and frantically called Haleiwa. After what seemed ages, Haleiwa replied and reported planes had been seen coming in but had presumed they were Navy.

"They're Japs!" Welch screamed. "They're pasting the hell out of Wheeler. Load two P-40s-mine and Taylor's."

They raced to Haleiwa in Taylor's car, bombs and bullets making it risky going. But Taylor held the wheel grimly and made the eight miles in less than ten minutes, tires shrieking as he jammed on the brakes near the waiting P-40s.

When I interviewed him in the Pentagon recently where he is now a full colonel, Taylor said, "I flew against the Japs in a pair of tux trousers . . . never got a chance to change 'em."

Welch knocked down four enemy aircraft, while Taylor blasted two from the skies along with two probables. "Those two probables were confirmed," he told me, "and my score was an official four, also."

Welch and Taylor roared into Wheeler for more ammunition. Their P-40s were being loaded when some fifteen Japanese bombers flying low were spotted. The crewmen ducked for cover, leaving two bewildered lieutenants sitting in their cockpits like clay pigeons.

They made snap decisions. Welch gunned his plane and took off, and Taylor followed. It was like tackling an obstacle course as they wheeled over dollies and smashed into boxes of ammunition. As they roared into the air, ammunition on the wings scattered in every direction—but they made it.

I asked Taylor if he had seen Landon's flight of B-17s. "Hell, yes!" he said. "Matter of fact, we were prepared to fire away when we suddenly realized they were our own bombers."

"One of the Japs got the gas storage dump," Fred Brown wrote to me, in reply to my request for his personal observations and experiences at Wheeler on December 7. Now a civilian living in Chicago, he received a commission after the war started.

The storage dump was next to Air Corps supply, where Brown was a sergeant. All inflammables were stored there—gas, turpentine, dope, lacquer, and the like. When he looked out of his bedroom window, the flames were tearing high.

Rushing his wife and mother-in-law across the road to the cover of a metal-roofed garage in a clump of trees, he high-tailed it to Air Corps supply where he was chief clerk. Before he could arrive there, the Wheeler intelligence officer recruited him.

Base intelligence had built up a large file on known undesirables in the neighboring towns of Wahiawa, Haleiwa, Aiea, and Pearl City. Brown helped round up "several characters" suspected of acts of sabotage, and placed them in the stockade at the adjacent Army post, Schofield Barracks

One of those caught red-handed was a Japanese by the name of Haesbe. He ran "Haesbe Town," just outside of the upper part of Schofield. It consisted of a number of shops, including several beer gardens, novelty and barber shops.

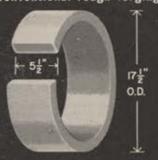
A one-time commander in the Japanese Navy, Haesbe had been sitting (Continued on page 85)

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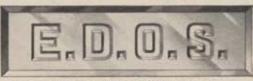
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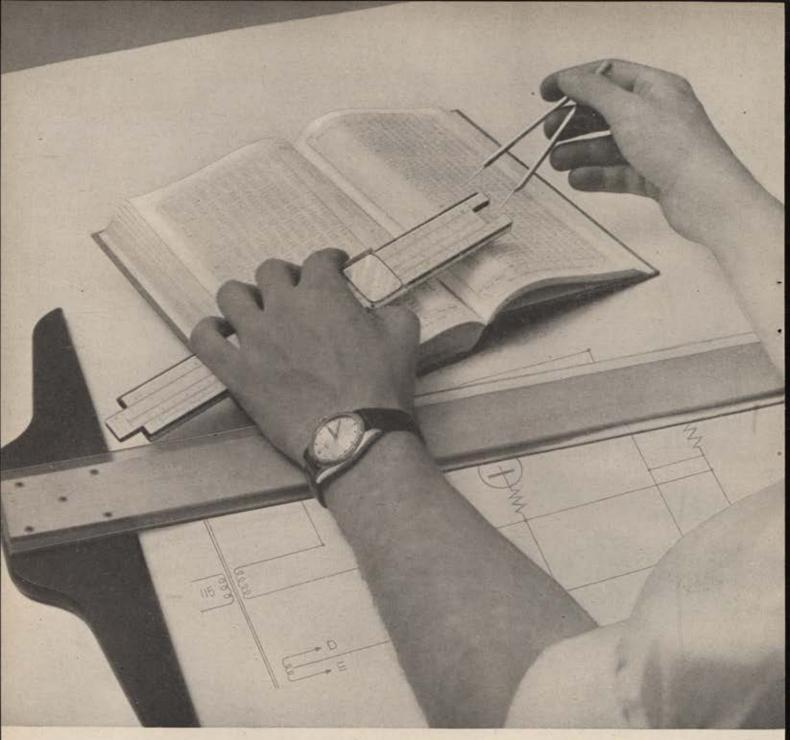


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### What's most important in this picture?

Not the slide rule, though it's helpful. Nor the divider. Nor the logarithm table. It's the human hand, of course, because it is motivated by the long, strong arm of human intelligence. It belongs to the career engineer dedicated in his

service to the Department of Defense.

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next to the largest US military installation, Schofield, for seventeen years. And he operated a short wave set during the attack!

"Best I've ever seen," Brown recalled.

Little known is the fact that the Japanese planes contained American parts. Brown examined several of the enemy aircraft shot down during the island blitz and noted Delco-Remy generators with "Made in USA' stamped on them, as it was on a good many of the other instruments. Name plates in English were superimposed with Japanese symbols.

"Those two-seater jobs came in crawling, pulling out almost in slowmotion from their shallow dives," Brown wrote. "They came so close that you could see the expressions on the faces of the gunners riding backwards in the rear seats of those open jobs. I felt I could have hit them

with rocks.

"Our only defense," Brown said, "were tin helmets, circa 1918."

As a supply sergeant, he had helped store ammunition into a hangar just one week before the attack. That particular hangar had been vacant for months.

The stored ammo was to have accompanied a squadron to the Philippines," he related. "That hangar was the first hit. The Japs' info was pretty

Brown admitted, like so many of us, that it was exceedingly fortunate the Japanese did not move in with some 30,000 troops. Had they known how little prepared we were, they could have taken the Hawaiian Islands with little resistance during that crucial day.

Landon pulled back on his wheel and climbed out of range, easily outdistancing the much slower Japanese

When I interviewed him in the Pentagon not long ago, he wore three stars and was Inspector General of the US Air Force. Anxious for a major command in the field, he asked AF Chief of Staff Gen. Nathan Twining for the Caribbean Air Command, where he now is stationed.

However, he voluntarily took a bust to major general, since the Caribbean command calls for only two stars.

What was his reaction when the Japanese planes suddenly appeared and made passes at him?

'Stupidity," he told me frankly.

"Sheer stupidity."

The general was being unkind to himself. His deft maneuver in climb-



This photo, taken shortly after the bombings, shows damage to a barracks at Wheeler Field. Japanese planes strafed the survivors as they stumbled out.

ing quickly out of range proved that. A minor miscalculation in navigation had General Landon's flight coming in from the north instead of the east. It was from the latter direction that the hostile aircraft were first spotted on an oscilloscope.

Two Signal Corps privates, Joe Lockard and George Elliott, operated a mobile air warning set on an otherwise untenanted hill called Opana, near Haleiwa. They had tracked the Japanese planes in from 130 miles, only to lose them as they neared the

Their excited alert failed to disturb the Air Corps officer on duty in the information center. This officer thought the blips belonged to the flight of General Landon's Flying Forts.

This tragic error gave the Japanese the supreme military advantage-surprise. Had the targets been interpreted correctly, some of those killed might have been saved and the damage to our planes, ships, and installations reduced. But the Japanese had called the play.

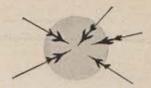
On the following day, December 8,

the United States and Great Britain declared war on the Japanese and on December 11, Germany and Italy declared war on the US and Congress declared war on those countries.

We paid a staggering price for our victory almost four years later. Besides the billions of dollars we spent waging the war, almost 400,000 of our men lost their lives and, including those wounded, our total casualties were more than one million.-END

Lt. Col. Franklin Hibel is editor of The Air Reservist in Washington, D. C. He was born in Boston, Mass., on August 20, 1910, and was raised in New York City. He enlisted in the Army Air Corps in November 1940, and in one year-1942-Colonel Hibel was, successively, a corporal, sergeant, staff sergeant, second lieutenant, and first lieutenant. During World War II he was public relations officer of the Seventh Fighter Command and later officer in charge of the Armed Forces Press Service. He is the author of two books on military humor, I'll Clue You and Take It From Me.





### RENDEZVOUS

Where the Gang gets together

HISTORY OF OUTFIT: The 83d Fighter Day Wing was recently activated at Seymour Johnson AFB, N. C. Records indicate that the 83d Fighter Group existed from September 1943 through April 1944 at Richmond Army Air Base, Va., and Dover Army Air Field, Del. It consisted then, as now, of the 532d, 533d, and 534th Fighter Squadrons.

A Lt. Col. Woodrow W. Korges and a Lt. Col. Ernest H. Beverly were listed as Group Commanders. Capt. John T. Gilbertson, Maj. Berry Chandler, Maj. Richard E. Ryan, a Capt. Taylor, Maj. Peter B. Provenzano and Maj. Jacob W. Dixon were listed as commanders of the three squadrons at various times. That's about the extent of our information.

We're interested in determining if anyone who was a member of these units might have information on any group and/or squadron insignia and distinctive aircraft markings that were used during that time. We have already established that no approved insignia or markings exist but if unofficial ones used in 1943 and 1944 exist and are suitable, action might be taken to secure official approval and thereby carry on the tradition of the units. Maj. A. H. Bomberger II, 83d Ftr. Day Ops. Officer, Hq., 83d Fighter-Day Group (TAC), Seymour Johnson AFB, N. C.

452D BOMB GRP. (H): Some former members of the 452d have asked about a reunion. In order to get started we need to know how many and where. Any former members of this fine combat group interested in a reunion or get-together in the summer of 1957 drop a line to: W/O Ernest F. Carner, 410 Second St., E., Barksdale AFB, La., or to Maj. Ed Landis, Test and Tactics, 376th Bomb Wing (M), Barksdale AFB, La.

KOKE ANYONE?: In the book, "One Damned Island After Another" there is mention of a Lt. Henry L. Koke in the South Pacific being a dead ringer for Capt. Snake Tumblin of the comic strip "Terry and the Pirates." We'd like to hear from anyone who can give us a lead on Lt. Koke. Air Force Association, Attn.: Mr. Loosbrock, Mills Bldg., Washington 6, D. C.

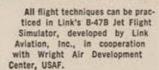
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Maj. Gen. Robert E. L. Eaton (left), Tenth AF Commander, presents Con-AC trophy to representatives of 302d Troop Carrier Wing, of Wilmington, Ohio, winners of the Reserve Troop Carrier Rodeo held in October at Bakalar AFB, Ind. From left are Lts. Paul Heironimus, pilot; Arthur, co-pilot; Holloway, navigator; and S/Sgt. Cox, cargo-kicker. The Rodeo was the first competition held among Reserve troop carrier wings in dropping men and supplies on targets.

Air Force Association President John P. Henebry has reappointed T. B. Herndon of Baton Rouge, La., chairman of the Association's Air Reserve Council, and Alfred C. Schwab, Jr., of St. Paul, Minn., chairman of AFA's Air National Guard Council, Mr. Herndon, a brigadier general in the Air Force Reserve, is director of aeronautics in Louisiana, Mr. Schwab, who commands the 133d Fighter Group of Minnesota's Air Guard, is sales manager for the Dietene Company in civilian life.

In addition to Chairman Herndon, the Reserve Council members are: Alex B. Andrews of Raleigh, N. C.; John O. Bradshaw, West Lafayette, Ind.; Richard E. Carter, Arlington, Mass.; Newton H. Crumley, Elko, Nev.; Daniel De-Brier, Atlantic City, N. J.; Andrew J. Downey, Rego Park, N. Y.; Lowell E. Geffinger, Winnetka, Ill.; Dr. John E. Gilmore, Santa Monica, Calif.; Hardin Masters, Oklahoma City, Okla.; John R. Poutnay, Coral Gables, Fla.; Lloyd Ruppenthal, McPherson, Kan.; and Doyle A. Webb, 1956 outstanding Air Reserve airman, Marshall, Tex.

Mr. Schwab will head an Air Guard Council composed of: Frank A. Bailey, Little Rock, Ark.; Robert D. Campbell, Los Angeles, Calif.; David L. Cochran, Boise, Idaho; Duane L. Corning, Sioux Falls, S. D.; Bernard M. Davey, Atlanta, Ga.; Dale J. Hendry, Nampa, Idaho; George D. McMorries, Dallas, Tex.; Ed Mack Miller, Denver, Colo.; William W. Spruance, Wilmington, Del.; Donald J. Strait, Vienna, Va.; Philip E. Tukey, Bangor, Me.; and Walter B. Larson, Chicago, Ill.

The two councils advise the Association on matters pertaining to Air Guard and Air Reserve programs.

The 23d meeting of the Air Staff Committee on National Guard and Reserve Policy, commonly known as the Section V Committee, last month recommended that staff members of Reserve units be reimbursed for mileage or travel expenses incurred in official duties.

The committee also proposed that forms used to credit a Reservist with points when training with a unit other than his own be simplified to avoid possibility of loss of

training assembly credits.

On the controversial issue of eliminating airline employees from the Guard and Reserve, the committee suggested that those who agree in writing to accept active duty in the Air Force be retained. This policy (Am Force, October '56) is currently under review.

The Civil Service Commission has turned down an Air Force request for approval of a plan which would permit members of Reserve units to be employed as civilian technicians in their organizations.

Known as the Air Reserve Technician plan, it would require that jobs in the Reserve flying units be filled by unit members. The Air National Guard has had such a system for several years and, in fact, employs some 10,000 such technicians.

The Air Force approved the system for its Reserve more than a year ago but had a difficult time obtaining approval from Carter L. Burgess, Assistant Secretary of Defense. Mr. Burgess finally okayed the plan last summer and sent it to the Civil Service Commission for endorsement.

The Commission's refusal to accept the plan means that it can be achieved only through legislative action. A bill to authorize the program for the Reserve is being prepared in the Pentagon and will be introduced in the next session of Congress.

For the second straight year New York's 9215th Air Reserve Squadron, whose members are experts in the field of public information, has conducted a two-day seminar for Air Force information officers.

Approximately 200 representatives of all Air Force commands heard experts in the fields of radio, television, magazines, newspapers, wire services, and newsreels discuss the kind of information they can use and the manner in which it should be submitted.

The program, under the over-all supervision of the squadron commander, Col. M. M. Frost, was put together by a seventy-man committee headed by Robert P. Keim, Reserve lieutenant colonel and member of the Advertising Council.

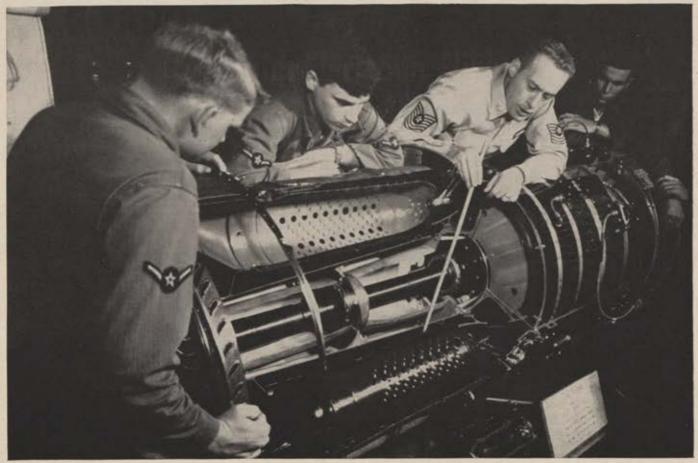
Notes on the back of a Form 175. . . . A recent interpretation of the Reserve Officers Personnel Act provides that credit toward promotion may be given for temporary promotions awarded between June 26, 1950, and July 1, 1955. The interpretation will prove a boon to officers who received spot promotions in Korea only to lose them upon return to the States. . . . National Guard Bureau is authorizing fourteen days of active duty for pilots transitioning into new aircraft, Authority is limited to newly assigned pilots who have never been current in unit mission aircraft. . . . Telephones at federal expense are being authorized for Assistant US Property and Fiscal Officers in the ANG as a means of improving base supply activities. . . . ANG tactical bombardment units are scheduled to be reorganized and redesignated as fighter-interceptor units early next year. The forthcoming change is another step in the longterm plan to give the ANG almost exclusively an air defense mission.

-EDMUND F. HOGAN

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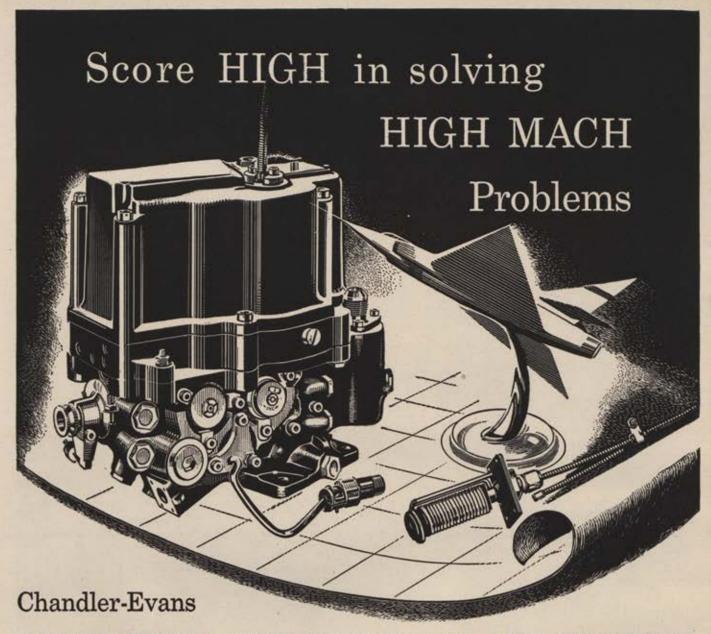
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#### AFA COMMITTEES NAMED

The following people have been named by AFA President John P. Henebry to serve on AFA Committees during 1956-1957:

Airpower Policy Committee: John P. Henebry, Park Ridge, Ill., Chairman; Gill Robb Wilson, New York, N. Y.; John R. Alison, Hawthorne, Calif.; Edward P. Curtis, Rochester, N. Y.; James H. Doolittle, San Franciso, Calif.; Robert S. Johnson, Garden City, L. I., N. Y.; Arthur F. Kelly, Los Angeles, Calif.; George C. Kenney, New York, N. Y.; Thomas G. Lanphier, Jr., La Jolla, Calif.; W. Barton Leach, Cambridge, Mass.; C. R. Smith, New York, N. Y.; Carl A. Spaatz, Chevy Chase, Md.; Thomas F. Stack, San Francisco, Calif.; James M. Stewart, Beverly Hills, Calif.; Harold C. Stuart, Tulsa, Okla.; T. F. Walkowicz, New York, N. Y.; Ennis C. Whitehead, Newton, Kans.

Executive Committee: John P. Henebry, Park Ridge, Ill., Chairman; Gill Robb Wilson, New York, N. Y., Vice Chairman; Samuel M. Hecht, Baltimore, Md.; Julian B. Rosenthal, Lake Success, N. Y.; J. Alan Cross, Miami, Fla.; Joseph J. Foss, Sioux Falls, S. Dak.; Charles J. Russhon, New York, N. Y.; Peter J. Schenk, Santa Barbara, Calif.; William W. Spruance, Wilmington, Del.; Harold C. Stuart, Tulsa, Okla.; James M. Trail, Boise, Idaho; W. Thayer Tutt, Colorado Springs, Colo.; S. Ernest Vandiver, Atlanta, Ga.

National Wing Advisory Council: George D. Hardy, Hyattsville, Md., Chairman; Leonard Dereszynski, Milwaukee, Wis.; Frank T. McCoy, Jr., Nashville, Tenn.; Fred O. Rudesill, Metairie, La.; Leonard A. Work, State College, Penna.

Constitution Committee: Julian B. Rosenthal, Lake Success, N. Y., Chairman; N. Michael Kavanaugh, San Francisco, Calif.; Randall Leopold, Lewistown, Penna

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Convention Site Committee: John P. Henebry, Park Ridge, Ill., Chairman; Walter T. Bonney, Silver Spring, Md.; James H. Straubel, Washington, D. C.; Ralph V. Whitener, Springfield, Va.—End



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The TARCAL's component parts are identical with those used in the J-Model JETCAL Analyzer. They are here assembled as a separate unit tester and for use with all earlier models of the JETCAL Tester.

The TAKCAL operates accurately in all ambient temperatures from -40°F. to 140°F. Low in cost for an instrument of such extreme accuracy, it is adaptable to application in many other fields.

Explosion-proof TAKCAL for special applications. Measures 200 to 7500 RPM, direct reading, with ±0.1% accuracy.

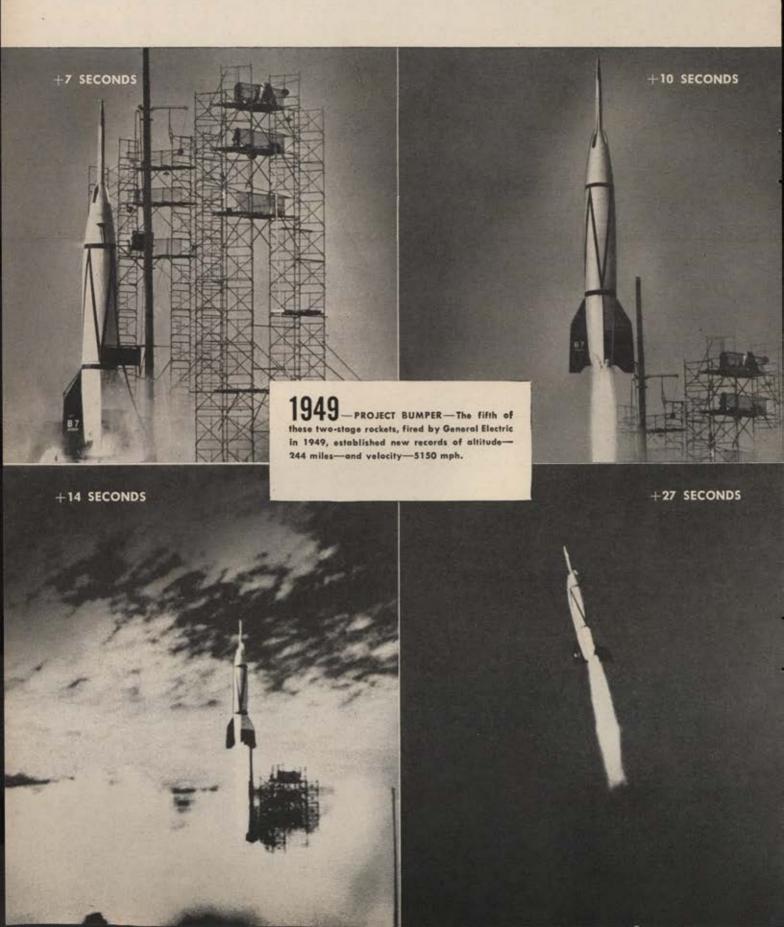




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# How General Electric Experience



# Advances Missile Technology

General Electric's Project Bumper established new records of altitude and velocity. But far more important is the valuable research data compiled in the successful completion of the Bumper project. Many problems were overcome with Bumper—problems in temperature, telemetry, separation, and aerodynamics. Bumper helped solve the problems of communicating with missiles at extreme altitudes, and was a major preliminary step in the development of a satellite. In solving these and other problems, General Electric has contributed a wealth of research data to the missile industry—information that is being utilized on the nation's top priority ballistic missile project.

General Electric's Missile & Ordnance Systems Department presently is working on an Air Force prime contract to develop the ICBM nose cone. Programs are being carried out in such varied fields as communications, hypersonics, metallurgy, mathematics, and thermodynamics to support this nose cone contact. General Electric has formed the Missile & Ordnance Systems Department to act as a Company focal point for large, highly complex missile projects. Scientists in the new department, backed up by the vast resources of many General Electric operating departments and laboratories, are currently working to solve the perplexing problems associated with the ICBM nose cone and other missile projects.

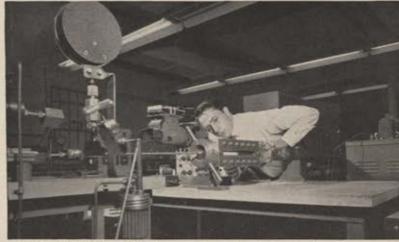
By focusing this wide range of specialized talents of General Electric personnel on highly complex defense system problems, the Missile & Ordnance Systems Department is making significant contributions to America's defense program. Section 224-5, General Electric Co., Schenectady 5, New York.

ENGINEERS: G.E.'s Missile & Ordnance Systems Department is currently expanding its staff of highly skilled engineers and scientists. If you have a background of successful creative engineering, send your qualifications to: Mr. George Metcalf, General Manager, Missile & Ordnance Systems Department, General Electric Co., 3198 Chestnut St., Philadelphia, Pa.

TODAY—CONTINUED RESEARCH AND EXPERIMENTATION in advanced missiles and missile systems is helping solve such advanced problems as development of the ICBM nose cone. Headquarters for General Electric's participation in these programs is the Missile & Ordnance Systems Department in Philadelphia, Pa.



MR. ROBERT P. HAVILAND, Flight Test Engineer at MOSD, directed Project Bumper and other advanced programs, gaining valuable experience which he is currently applying to present missile programs.



DR. YUSUF A. YOLER—widely known for research in hypersonics—is currently engaged in the design and development of wind tunnels, shock tunnels, mass accelerators, and other facilities for continued progress in missile systems.

Progress Is Our Most Important Product





# Fire control radar tells... WHERE TO AIM WHEN TO FIRE!

All-seeing radar pinpoints the target for these Air Force planes. Whatever armament they carry—guns, rockets or missiles—fire control radar tells them where and when. It provides the far-sighted vision, necessary for modern long-range combat operations.

Today's modern fighter plane is an electronic wonder, with fire control radarcomputer systems supplying a continuous flow of information about target position in terms of range and rate of closing.

RCA is a major supplier of airborne fire control equipment to the Armed Forces. Its activity in developing and producing these systems requires a close working relationship with the airframe industry and the Department of Defense, a "partnership" vital to the success of any weapons system.



Defense Electronic Products

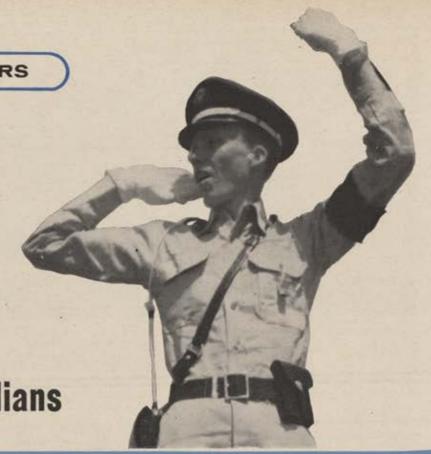
RADIO CORPORATION of AMERICA Camden, N.J.

#### AIR FORCE CAREERS

NO. 3 OF A SERIES

# AIR POLICE

The Men Who Guard Our Guardians





The combat commands now use sentry-dog teams. These handlers give their dogs about eight hours of training every week, in addition to their guard duties.



Lance, a SAC dog, isn't kidding when he attacks heavily padded "intruder."



An air policeman guards a SAC Boeing B-47 Stratojet at March AFB, Calif.

HE air policeman who was most likely to give an offender a bop over the head with his billy club first, and ask questions afterward, has gone out of style with the reciprocating engine.

Nowadays this important airman has become as global in his responsibility as the Air Force itself. For example, at Lajes Field in the Azores, air police duties require very close coordination with local law enforcement officials. An AP who is deficient in basic fundamentals of AP work is in danger of jeopardizing international relationships. He's a diplomat in black combat boots and Sam Browne belt.

The same can be said for Morocco, Japan, Okinawa, and the forty-odd countries where Air Force personnel are on duty.

The increasing importance of the Strategic Air Command, the Air Defense Command, the Tactical Air Command, and the supporting commands, has magnified security problems and elevated the AP to a vital position. The AP has learned some new security methods to protect the Air Force's valuable jet-age equipment, including nuclear weapons and guided missiles.

One of these is the assignment of German shepherd dogs to field air police units to give sentries greater range at Air Force bases and installations. The combat commands, led by SAC, now employ sentry-dog teams at many bases. So do some of the over-

(Continued on following page)



To combat traffic accidents, motorized air policemen stay alert for speeders.

seas commands. Far East Air Forces alone has more than 375 teams in Japan, Korea, Okinawa, Guam, and the Philippines.

These men are only a small part of the approximately 38,000 airmen and officers on AP duty in the United States and overseas. They are assigned to the seventy-seven career field, with Hq., US Air Force, supervision exercised by the Inspector General and his Provost Marshal.

To understand the AP and his duties in today's fast-moving Air Force, take a typical squadron—the 366th Air Police Squadron at TAC's England AFB, La, A captain and a first lieutenant head up the squadron, but the routine and often frustrating duties fall to dozens of airmen, many in the upper three grades.

These airmen are carefully handpicked. Size and physique used to be a major criteria, but are not so important now. More important is an individual who can exercise leadership in a variety of assignments, and who can meet, handle, and solve unexpected situations on the basis of his



Persons wanting to enter any SAC base must positively identify themselves.

own judgment. He also must have personal integrity beyond reproach.

To select and retain this type of individual, this squadron—as do all others in the Air Force—constantly conducts its own training program on the job, in addition to the training that the men receive at the Air Force Air Base Defense School at Lackland AFB, Tex.

The squadron has a three-fold mission: (a) retraining, (b) law enforcement, and (c) security.

At England AFB a master sergeant heads up the retraining phase, which consists chiefly of operating the stockade. Here the prisoner is retrained so that he can return to his squadron a better airman.

A high-ranking NCO is in charge of law enforcement. He supervises the guard mounts, held three times daily, and sees that the APs are briefed, given special instructions, and posted. The APs are encouraged to be friendly and helpful, but firm. They must keep traffic moving, patrol the nearby civilian community, and handle all necessary identification and registration procedures required on the base—including registration of vehicles, fire-arms, and cameras. They also provide identification cards for military and civilian personnel and dependents.

A master sergeant, usually assisting the Provost Marshal, is responsible for the security phase at England AFB. His duties include manning of restricted areas by the use of security post and motorized patrols. He is also in charge of central security control communications and is responsible for making the decision that throws the base sabotage alert plan into effect if and when such a move may become necessary.

The main security posts at England

AFB are the flight lines, entrance and operations gates, special weapons post, and ammunition dump. An AP must be able to detect saboteurs and to prevent any damage by them.

One of the AP's biggest headaches—and of the Air Force as well—would be reduced if Air Force members quit speeding both on and off base. Accidents in privately owned vehicles continue to take a heavier toll of life, property damage, and time lost from duty due to injury than any other single accident cause. To combat this destruction, motorized APs, some in new sedans and station wagons, are continuously on the alert for speeders in an attempt to reduce deaths, injuries, and property damage estimated in the millions of dollars.

For example, the AP squadron at ARDC's Edwards AFB, Calif., has just received newly conditioned patrol cars which have been painted blue and white and labeled "Edwards AFB Highway Patrol." They have two-way radios and are manned by NCOs with a basic knowledge of first aid. These airmen say this comes in handy, because accidents still happen regularly despite their patrollings.

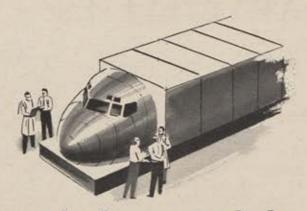
The air policeman today must have outstanding personal attributes and a healthy appetite for a variety of assignments. He must know military law and be in superb physical condition. He must be adept, if not expert, at judo. He must know patrol and investigation techniques, search and seizure, as well as the handling and treatment of prisoners. He must be able to control traffic and investigate accidents. He must be steeped in security indoctrination and sabotage alert procedures. He must know ground defense training, and be well versed on weapons and tactics.

As his duties have increased, so has prestige for the air policeman. He is smartly attired in his neat uniform—topped by a white cap and garnished with black combat boots and a black Sam Browne belt—and puts on white gloves for special occasions.

The Air Force now has a study under way to determine whether the AP's familiar arm brassard should be replaced with a distinctive AP insigne. Major commands currently are reviewing the study and are submitting suggestions for an insigne that will provide both easy identification and boost the morale and pride of the air police.

The Air Force feels the air policeman deserves this attention. And many airmen on the Air Force team are inclined to agree.—End





# SIMULATORS built by Curtiss-Wright

Crews for tomorrow's jetliners will have thousands of hours of jet experience before the first Boeing 707 or Douglas DC-8 enters service. They will "fly" the jets right off the drawing board, in electronic Flight Simulators built by Curtiss-Wright.

The Simulator behaves exactly like the prototype aircraft — even uses an identical crew compartment. All controls and instruments function as they do in actual flight. Crews rehearse world air routes under varied weather and navigational conditions. A "trouble console" conditions the pilot's reflexes against all possible emergencies. Simulators built by Curtiss-Wright have resulted in savings of millions of dollars, thousands of manhours yearly for the world's leading airlines.

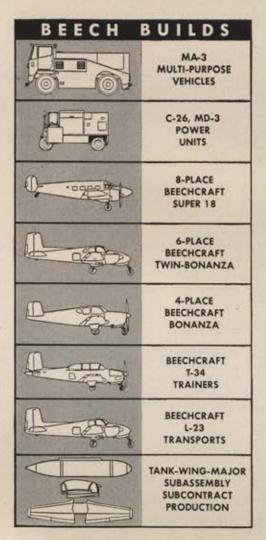
Curtiss-Wright has developed and produced more types of Simulators than all other manufacturers combined — with types now in production or service for aircraft powered by piston engines . . . piston engines plus jet engines . . . multi-jet engines . . . and turboprop engines. This proven experience is reflected in performance, dependability and fidelity of Simulators built by Curtiss-Wright — and by documented cost reductions and increased crew efficiencies in all types of military and commercial aircraft flight training programs.

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## CAPABILITIES . . . Manpower, Tools and Experience

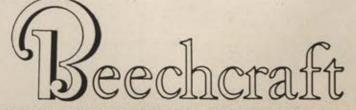
The amazing photograph at right was taken by Tom Ashley, managing editor of Flight Magazine, at the National Aircraft Show in Oklahoma City over the Labor Day weekend. It shows a U. S. Army L-23 Beechcraft making a successful takeoff and climb over a simulated obstacle, represented by the two poles. A previous takeoff by another make airplane had cut the upper ribbon, which the photo shows as broken. The number at the base of the pole represents the distance in yards from the beginning of the takeoff run of the L-23.





The U. S. Army L-23B transport, rugged military version of the famous Beechcraft Twin-Bonanza, has a proud and distinguished record of service. First ordered into military production in 1952, the L-23 was the first twin-engine airplane used by the Army Field Forces. From the battle fields of Korea to the training fields at home, and back again to foreign stations, the L-23 has met the exacting demands of military service with distinction. Today, the Army's confidence in the L-23B's dependability and superior performance has resulted in new orders to fill the Army Aviation Division's expanding needs.

We're happy to welcome the United States Army to the long list of enthusiastic "re-order customers" . . . evidence again that Beechcraft has the manpower, tools and experience capabilities to design and produce quality aviation products.



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# Tech Talk

USAF and Convair officials announced that America's first supersonic bomber, the delta-wing B-58 Hustler, made its first taxi tests at Convair's Fort Worth, Tex., plant. Taxi runs are the final phase in the bomber's ground-test program before it takes to the air on its maiden flight. The Hustler, designed for supersonic speeds and altitudes above 50,000 feet, calls for a crew of three: a pilot, navigator-bombardier, and defensive systems operator. Wing span is approximately fifty-five feet and length is about ninety-five feet. The triangular wings have elevons in the trailing edge which combine the control functions of conventional ailerons and elevators. Sixteen complex major subsystems in the B-58, including the bomber's own defense system, are virtually automatic and work with a minimum of supervision from the

An aerial fire engine to combat airplane-crash fires and accomplish quick rescue of the occupants is being developed by Kaman Aircraft Corp. in cooperation with the Ansul Chemical Co., manufacturers of fire-fighting devices. The aerial fire engine, a Kaman HOK-1 helicopter (see cut), carries a pilot, a three-man, fire-fighting team, and Ansul dry chemical fire extinguishers. The helicopter, in addition to transporting the crew and equipment to the scene of the crash, aids in the fire fighting and rescue by beating down the flames with its powerful rotor downwash. The firefighting equipment consists of two Ansul 300-pound-capacity dry chemical tanks, each with one hundred feet of hose, slung below a cargo hook under the helicopter.

The Radioplane Co., Van Nuys, Calif., has developed a new rocketpowered target drone, the RP-70, which is designed for weapon system evaluation and training at Mach 0.9 speeds at 50,000 feet. It is powered by a solid-propellant rocket with a flight endurance of eight to ten minutes. The airframe, weighing 300 pounds, is specifically designed for volume production, and it is slightly over nine feet long, with a wing span of five feet. With the exception of the steel rocket motor case, which makes up the mid-section of the fuselage, all other primary structures are made of glass fiber and reinforced plastic. The

(Continued on following page)



General Electric's test device simulates banking, pitching, and complete turns of aircraft, and it also duplicates the magnetic field of any point on earth. Dark object (center) is part of a highly sensitive compass system under test.



Fire-fighting helicopter, Kaman HOK-1, hovers over burning airplane, beating flames back with rotor downwash as two firemen approach to rescue the pilot.



Radioplane's rocket-powered drone, designed for weapon systems evaluation and training at speeds of Mach 0.9 at 50,000 feet, has ten-minute flight endurance.

plastic wings and horizontal and vertical stabilizers are fixed surfaces, and the drone is controlled by small vanes located just forward of the wing (see cut), linked to the flight-control system. It can carry the special tracking and scoring equipment required for military training and evaluation and development of tactics for defense missile systems. Now ready for flight test, the RP-70 is part of a self-sponsored rocket drone program which Radioplane has conducted over the past two years.

The first guidance reference system for the dozen or more proposed earthsatellite-carrying rockets has come off a pilot production line at Minneapolis-Honeywell Regulator Co., Minneapolis, Minn. This company is building the inertial guidance-type systems for the rocket's prime contractor, the Glenn L. Martin Co. of Baltimore. Md. Unlike systems that require radio or radar tracking so that command signals can be issued to a vehicle's flight-control system, the Vanguard guidance reference system is carried entirely in the rocket. Its job will be to keep the finless rocket from swerving off course and to gradually "tip" the rocket's flight so that it enters a globe-circling course some 300 miles above the earth.

Heart of the control system is three highly accurate gyroscopes that will be calibrated to a "memorized" heading in the three axis or directions of flight—roll, pitch, and yaw. Known as HIG (hermetic integrating gyros), they have nearly 300 parts and require tiny bearings which are alike to within ten millionths of an inch. (If you took a hair and split it into 400 parts, one of them would be ten millionths of an inch wide.) Since a speck of dust or







Stainless steel model starts to glow (center) and then melts (bottom) in less than six seconds under 4,500 mph exhaust blast from rocket nozzle. It is part of NACA's research program on the problems of aerodynamic heating.

lint would have about the same effect on the gyro as a handful of gravel in an auto transmission, they are assembled in hospital-clean areas. Many of the special sensitivity features of the HIG (it can measure motion 3,000 times slower than the hour hand on a watch) are due to its virtually frictionless operation, created by mounting the gyro rotor assembly and gimbal in a special fluid. The gyro wheels look like four or five quarters glued together, and they're polished smooth to a tolerance of a millionth of an inch.

National Advisory Committee for Aeronautic's efforts to solve aerodynamic heating problems have led scientists at the Langley Aeronautical Laboratory to develop a special research rocket for use in the denser air near the surface of the earth where aerodynamic heating is the most serious. A special four-stage rocket, equipped with research models and telemetering, is fired upward with the first two stages and allowed to coast "over-the-top" of its trajectory and start its descent into denser atmosphere. At this point the second two stages boost the speed of the vehicle to supersonic speeds for the test run. In this manner, large-scale information can be obtained about heating rates during the re-entry period of a missile's journey.

NACA also uses small stainless steel models (see cut) mounted in a rocketexhaust jet for laboratory tests of aerodynamic heating. This method allows a simulated flight test at about 4,500 mph at an altitude of 50,000 feet. In the tests, an acid-ammonia rocket shoots hot gases through a two and one-half inch supersonic nozzle against the stationary model facing the jet. Heat damage is intensified because of the small size of the model (span, two and one-half inches; wing thickness, one-eighth inch), which starts to disintegrate within eight seconds, melting the nose and wings.

Scientists at Northrop Aircraft, Hawthorne, Calif., have duplicated the balance mechanism of the inner ear in perfecting a highly effective "brain" unit for use in its advanced guided missile programs. The small instrument, weighing a little more than an ounce, is made of glass tubing and even resembles the convolutions of the inner ear in shape. Northrop describes the instrument as a manometer accelerometer, or, in lay terms, the "flying plumb bob" because it can continuously report to the complex automatic guidance "brain" of a missile, signaling the slightest course deviation.

The instrument is made of twin tubes of glass joined together at the bottom by two smaller glass tubes. Within the device an electrolytic solution covers tungsten electrodes which are fused into the glass material. The slightest deviation in the position or speed of a missile or a manned aircraft can be detected in a fraction of a second. The signal voltages are transmitted to the guidance system, which in turn activates corrective controls.—End

### Featherweight Champ!

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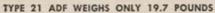
Why carry dead weight? Why excess bulk?

This Automatic Direction Finder offers accuracy and reliability proved in more than two years of testing — yet the entire 5-unit system weighs only 19.7 pounds. Now you can have a DUAL installation where required — at a weight saving of 80 pounds or more.

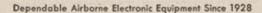
The ADF still is the world's Number One navigational aid, usable on an estimated 60,000 radio stations. Now you can have ADF featuring ARC standards of performance and reliability. This system incorporates hermetic sealing of critical components such as the entire loop assembly. It also has other mechanical features designed and tested for dependability under today's higher speeds and more exacting operational and environmental conditions.

The Type 21 ADF covers all frequencies from 190 kc to 1750 kc. It requires less power — only 2.8 amps at 27.5 volts dc input. Extremely low drag of the loop is an outstanding feature. Housing extends only 2 inches from the skin of the aircraft.

Now make room for more payload and other equipment. Fly with ARC-reliability, less weight, less space, less drag. Ask your dealer for complete details.



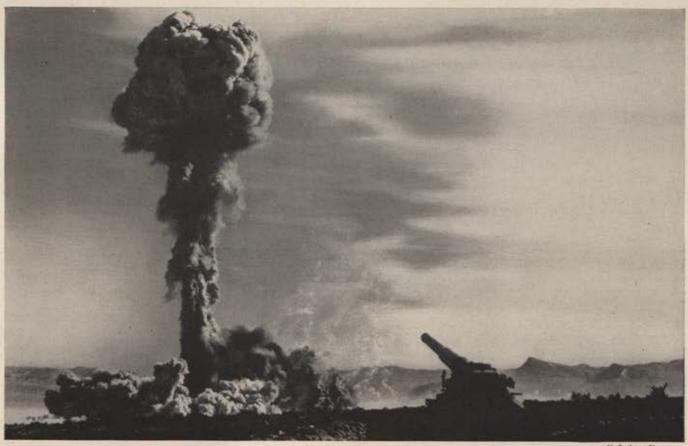
Component Units Weights: Receiver, 6.8 lbs.; Loop, 4.3 lbs.; Loop Housing, 0.5 lbs.; Control Unit, 1.6 lbs.; Indicator, 1.3 lbs.; Power Unit, 5.2 lbs.; CAA Type Certificated





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Firing of 280 mm Atomic Shell at Las Vegas Proving Ground in May, 1953. This shell was designed jointly by Picatinny Arsenal and Los Alamos engineers and scientists.

U. S. Army Photo

### ARMY ATOMIC MUNITIONS ARE BORN AT PICATINNY ARSENAL

Picatinny Arsenal at Dover, N. J., is composed of a group of Ammunition Development Laboratories responsible for Army ammunition technical development. Its responsibilities include research and development of ammunition for artillery, mortars, and recoilless rifles, mines, grenades, warheads for bombs and guided missiles, and rocket propellants.

One of Picatinny's principal laboratories is the Atomic Applications Laboratory, which is responsible for Army research and development of atomic munitions. This Atomic Applications group operates as the nerve center for all activities in atomic development for the Department of the Army.

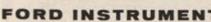
To execute its mission responsibility, the Atomic Applications Laboratory draws not only on its "in-house" capabilities, but on the facilities of other Army arsenals, proving grounds, and on industry. Its "in-house" capabilities include an engineering technical organization that uses the full facilities and capabilities of the arsenal.

As well equipped as it is to solve the multitude of complex technical problems which confront it, Picatinny Arsenal has no greater asset than the long years of accumulated experience and unfailing loyalty of its career government employees. A recent example of its effectiveness is the crash program which resulted in the 280 mm Atomic Shell.

Picatinny's technical capabilities are utilized basically in expanding the frontier of mechanical, electrical and explosive development.

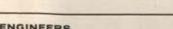
The scientific personnel in organizations such as the Atomic Applications Laboratory will determine America's ability to meet potential aggressors with the most effective Atomic Weapons possible.

This is one of a series of ads on the technical activities of the Department of Defense.

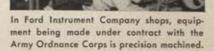


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### **New Jersey Wing Holds Convention**

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At the New Jersey Wing convention banquet, Edward P. Schinman, second from left, winner of the Wing's top 1955 award, presents the 1956 aviation awards to Brig. Gen. Peter C. Sandretto (USAF-Ret.), left, Henri G. Busignies, far right, and Joseph A. Abbott who accepted award for Raymond Perry (see text).



Curtiss-Wright's Roy T. Hurley, left, gets a special manpower trophy from Maj. Gen. Robert Copsey (see text).

Roy T. Hurley, President of Curtiss-Wright, and the winner of the New Jersey Wing's Airpower Award in 1952, has been awarded a special New Jersey Wing Trophy recognizing his outstanding contributions to the procurement of skilled technicians for the Air Force. The award was presented at the annual Wing convention at the Hotel Albion, Asbury Park, on October 13.

In making the presentation (see cut), Maj. Gen. Robert Copsey called Mr. Hurley "a man who gets things done." Curtiss-Wright, under Mr. Hurley's leadership, has been active in promoting advertising campaigns urging



Guests at the Spokane Squadron dinner meeting at Geiger AFB (see text), included, left to right: Donald J. Strait, USAF Deputy Assistant Secretary; Col. Jack B. Blanchard, Chief of the Operations and Training Branch, AF Division, National Guard Bureau; William W. Spruance; and David F. McCallister.

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its outstanding contributions to a better community understanding of the impact of airpower, with its diversified programs, ranging from dinner meetings to symposiums.

high school students to stay in school and to follow technical careers.

The Wing's Airpower Award went to Raymond S. Perry, President of Federal Telecommunication Laboratories, for his contributions to civilian and military navigational development. Joseph A. Abbot accepted it for him.

The 1956 Research and Development Award went to Federal Telephone and Radio Company, and was accepted by Henri Busignies, President, and Peter C. Sandretto, Vice President and Technical Director. Mr. Sandretto also appeared on the Industrial Symposium that was a part of the convention program.

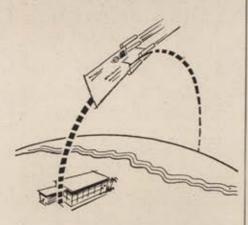
The Kearfott Company and James E. Ashman, President of Ultrasonic Company, Boston, also received major Wing awards for 1956.

R. Kenneth Hamler, Millington, was elected new Wing Commander. Other officers are Lloyd G. Nelson, Vice Commander; Mary C. Herr, Secretary; and Enrico Carnicelli, Treasurer.

The October 11 meeting of the Spokane Squadron was held in the Officers' Club at Geiger AFB. Roy Hanney, Commander of the Squadron, and the members were guests of Brig. Gen. Sam Agee, Commander, Ninth Air Division, WADF, Col. Harrison Thyng, Deputy Division Commander, and Col. Grover Wilcox, 84th Fighter Group Commander.

The guests at the banquet preceding the meeting included Mr. Donald J. Strait, Deputy Assistant Secretary of the AF and a member of AFA's Air National Guard Council, William W. Spruance, AFA Vice President from Wilmington, Del., David F. McCallister, Folsom, Penna., winner of the 1956 Ricks Jet Proficiency Flight, and Ed Hogan, of AFA's Headquarters staff.

The California Wing held the second of its mid-year Conferences, devoted to developing stronger statewide programming, on October 27-28, (Continued on following page)



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at the Hacienda Motel in Fresno, site of the 1955 Wing Convention. Curtis E. Christensen, Wing Commander, was in charge of the arrangements for the affair.

Some seventy-five Squadron members attended the sessions, which were limited to a discussion of outstanding programs within the wing, and problems encountered by various Squadrons

Twelve Squadrons and several Wing Auxiliary units were represented. A feature of the weekend was the reorganization of the California Wing Auxiliary as a Wing unit, following the decision at New Orleans by the 1956 National Convention delegates to limit Auxiliary activities to state level.

The 436th Troop Carrier Wing, based at Floyd Bennett Field, N. Y., has been awarded the 1956 New York Wing Trophy for Outstanding Achievement by a First Air Force Reserve unit. The presentation was made by Maj. Gen. Roger J. Browne, First AF Commander, to Col. Peyton Gibson, 436th Commander.

The trophy, a C-119 model mounted on an engraved base, is donated by Fairchild Airplane and Engine Corp., builder of the plane. The winner is determined by First AF Headquarters, based on achievements of the unit, including recruiting of personnel.

William H. Stein, a major in USAFR, represented the Wing as Commander during the presentation of the trophy.

The Rainier Squadron, Seattle, has come up with a program to utilize election-year interest to increase the airpower education of its members and the public.

The two opponents in the race for the Senate have been invited to give their views on airpower at a regular meeting of the Squadron. Gov. Arthur Langlie spoke at a meeting at the Sandpoint Naval Air Station, before a large crowd on October 15. Incumbent Sen. Warren G. Magnuson accepted the invitation to speak to the same group, including personnel of the Air Reserve Center, on October 27. Robert Kimbrough is the Rainier Squadron Commander.

AFA's Skokie Valley, Ill., Squadron sponsors an annual model plane contest for area youngsters, and this year has embarked on a plan to attract more kids, and arouse more interest in building and flying models.

Nick Schwall, Skokie Commander, contacted one of the larger model kit suppliers, and obtained a list of all retailers. These stores will be supplied with AFA posters giving information on the contests, and urging shoppers to buy model kits as Christmas presents.

Several AFA units, including the Maryland Wing, and the Philadelphia and Olmsted Squadrons, have participated in local premiere showings of the film, "Toward The Unknown," starring William Holden, and released through Warner Brothers. This movie depicts the life of a test pilot at Ed-



Philadelphia Squadron Commander Joe Dougherty, Sally Downing, and Bill Holden. The actor received an honorary Squadron membership (see text).

wards AFB, and is receiving good notices.

Holden appeared in Philadelphia with the film, and was presented an honorary membership in the Metropolitan Philadelphia Squadron, by Joe Dougherty, Squadron Commander.

Dougherty, Squadron Commander.

Beirne Lay, Jr., long-time AFA
member and winner of two National
AFA awards—a 1953 Citation of
Honor and the 1956 Arts and Letters
Trophy—wrote the story for the film,
which was produced by Holden's
Toluca Productions Company.

The Illinois Wing has announced plans for its 1957 Wing Convention to be held at the Sheraton Hotel in Chicago, on April 27. Bob Vaughan, Commander, says that the principal speaker will be Dr. Chalmers Sherwin, of the University of Illinois Physics Department. Dr. Sherwin was awarded AFA's Science Trophy for 1956 in New Orleans.

At its last Executive Council meeting, the Wing discussed the possibility of awarding aviation education work-(Continued on page 107)

### project VANGUARD

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#### ... and REEVES comes up with the solution

Placing the earth's satellite in its pre-determined orbit requires precision to the nth degree. The second-stage of the three-stage rocket which will carry the satellite up to its orbit must be separated shortly before its trajectory bends back towards the earth.

Separation of the second stage is controlled by a coasting time computer designed and built for the Martin Company of Baltimore by Air Associates, Incorporated.

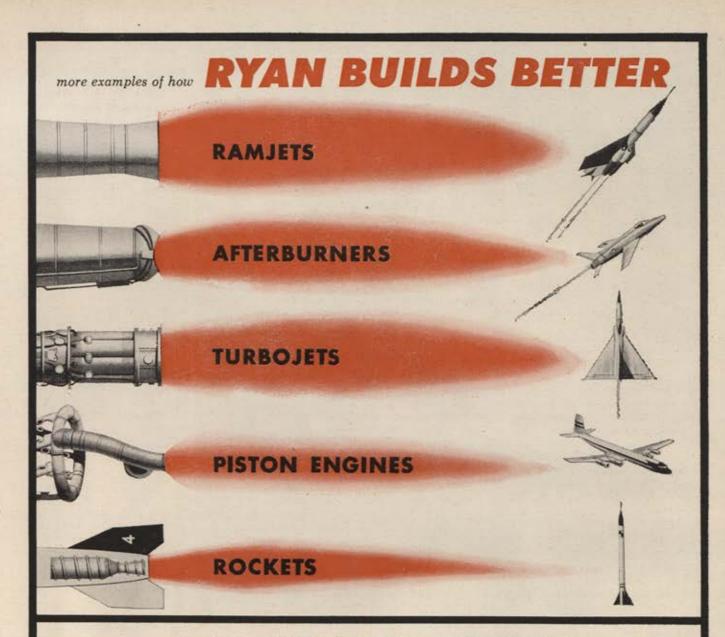
The Reeves Instrument Corporation has designed and is building for Air Associates the "speedometer" needed for computing the second-stage coasting time as a function of the burn-out speed. Essentially an integrating accelerometer, it provides a continuous record of velocity as the rocket speed builds up and feeds this information into the control unit's computer.

The control unit, after the computed coasting time has elapsed, triggers the system. Stage two is separated and stage three gives the satellite the final acceleration required for insuring that the satellite circles around the earth.

Because of its vast experience in design of precision gyros and accelerometers, Reeves has been assigned the task of developing an important instrument for use in one of man's great ventures, Project VANGUARD.







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Ute Squadron officers at a recent meeting at Hill AFB, Utah. Left to right, front row: Keith Nichols, Commander; Selby Tanner, Vice Commander; Fred Hannah, Secretary; and Glenn Overstake, Treasurer. Rear row, left to right: Louis Bononio, Jacob Yeagley, and Wayne Hartley. Meeting was held to plan the Squadron's part in the Airpower Symposium, January 31-February 2, 1957.

shop scholarships to area teachers. The idea met with favorable response, and at least two Squadrons plan to make the awards next summer.

AFA's Silver Medal program, which recognizes the top Advanced Cadet in each AFROTC Unit in the nation every year, has indicated that these Cadets usually continue to receive honors.

Lt. Hugh M. Milton III, a Silver Medal winner who was graduated from Duke University in 1955, recently completed basic pilot training at Laughlin AFB, Tex., and was top man in his graduating class.

Miss Joanne Alford, an engineer with the Glenn L. Martin Co., is a graduate of Purdue, a pilot with more than 200 hours, and has flown the



Darlene McInnis, right, Washington AFA Wing's Miss Airpower, was feted by Warner Brothers' Studio. Here she has lunch with actress Natalie Wood.

T-33 and the B-57 jets. This remarkable young lady is also, as most AFA members know, AFA's Miss Airpower for 1956. The five-foot, 100-pound brunette won that title out of a field of fifty-seven entrants from all over the country.

Since she reigned at the convention in New Orleans, Miss Alford has received so much public notice that the Martin Company has relieved her of her official duties so she can start a six-month tour of the country. On the tour-sponsored by Martin and AFA-Miss Alford will speak to high school students to encourage them to enroll in scientific courses in college. The idea is to help relieve the shortage of scientific and technical skills facing industry and the military services.

Joanne started her first tour on November 2, with a two-day appearance in Boise, Idaho. In the following two weeks she visited Denver and Colorado Springs, Colo., and Omaha and Lincoln, Nebr. In these cities she lectured to high school students, Chamber of Commerce groups, AFA meetings, and was given briefings on the Strategic Air Command, the Air Defense Command, and the USAF Academy to give her background for future appearances. She also met with officials of the University of Nebraska Air Age Education Department, and with AFA's Board of Directors in Colorado Springs.

As this went to press, Joanne was getting ready to visit several Pennsylvania cities. Just before starting her tour, she was an honor guest at a banquet of the "Ninety-Nines" in Washington, and was made a member of this group of women pilots.—End

Every flier will get a tremendous kick out of reading LOU REICHERS' adventure-packed book about his flying career—from single-engine planes to multi-engine jets!



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APT. Tom Blythe shivered as he stepped into the cool air. His gray eyes followed the lacy contrails high above the San Gabriel Mountains.

He looked back to the bare ramp where oil spots marked the parking places of the B-47s. They would wing home tomorrow, from England to Southern California in twelve hours. Non-stop.

He pushed open the door into squadron operations. The round-faced clerk looked up. "Captain Nelson said he'd be waiting for you in the parking lot, sir."

"Thanks, Carmody, Anything new?"
"You got the word about being stand-by crew tomorrow?"

Tom nodded. Foreman's crew had the assignment, but his would be the alternate. It meant waiting by the loaded KC-97 tanker until the bombers were down. If any came in low on fuel, the tankers would take off and refuel them.

"Congratulations, sir."

Tom turned back, "On being standby?"

"On going to jets. Your request was approved, didn't you know?"

It had come. Finally. "Great. Simply great. It's what I wanted, you know."

"We'll miss you around here. Your crew doesn't know it yet, and I'll bet they won't like it."

"That's the way the ball bounces, Carmody," he said. His grin faded as he thought of Bud Nelson, the former science teacher who had been his navigator during the Korean tour. And of Nancy and how she would take the news.

Tom hurried toward the parking lot. He hated to keep Bud waiting, but the plane had to be checked. Maybe he was over-cautious, but Bud would understand because he had been with him that time, Ralph Elsin had been there, too,

He glanced up again at the contrails. Tails to invisible kites. The exhilaration made his step lighter. His moment of regret on leaving the tankers passed quickly. Now he'd fly the thirsty bombers. Nancy would understand.

"Wishing?" the voice asked, and he recognized Bud's slow drawl.

Tom grinned sheepishly and fitted his lanky frame into Bud's sedan. They'd been a team for four years. Now it's like a divorce, breaking up a crew. You just couldn't calmly say, "I'm going to jets. See you around." Tom had looked forward to this day, but now, somehow, he couldn't tell Bud. He wanted to tell Nancy first.

Bud wheeled into the traffic leaving

Rivers Air Force Base. Lights were coming on. The smoke from the cement plant was rising vertically. "Looks like fog," Bud said.

Tom shook his head. "Weather

doesn't predict any."

"They've made mistakes before." "With the wing coming in, it'd be a poor time to be wrong," Tom said, thinking suddenly of the time he had been wrong. Or had he? Ralph Elsin thought so. Tom let his mind slip back to 1951 and the cold sky over North Korea. The left inboard engine of his B-29 had caught fire. He had feathered it. They couldn't stay in formation without putting full power on the other three engines. Ralph, his co-pilot, had argued that it made more sense to go back and fly another day. Tom had refused. He was there to fight a war, and he intended to do just that. Then another engine had gone sour and suddenly MIGs were all around them. They had fought their way back to a crash landing on a friendly beach.

"Big hero," Elsin had said bitterly. "You lose the airplane and the Com-

mies have a big laugh!"

Without thinking, Tom had struck out and regretted it instantly. Bud had stepped between them and shortly thereafter Ralph had been transferred to another crew. That was the last they had seen of each other until Tom came to Rivers. He and Bud were all that was left of the old crew. Ralph had gone through jet transition and had been spot-promoted to major. Bomber crews got all the gravy.

Nancy and Maude Elsin had become fast friends years ago at Topeka. Maude had helped Nancy when Lucy was born, while he and the crew were still on Okinawa. Nancy had listened quietly when he told her about it. "Now don't worry, darling," she had said. "You were just doing your job, trying to get it over sooner because it meant saving lives."

"I didn't think of it that way—it was just that it was the last mission and I was tired and I wanted to finish so I

could come home to you."

She had moved to his side. "You're very human and honest, darling. What's right for one man sometimes is wrong for another. Whatever you do will be right with me."

He would rather not have talked of it again. Nancy and Maude kept trying to get them together. But it just wasn't there any more. "You notice how he rubs it in?" Tom had exploded to Nancy after a bridge game. "Always yakking about jets. You'd think tanker pilots were nothing but second-class citizens."

"He's just enthusiastic about his job," she had said.

"Well, I'm not about mine," Tom

had snapped.

Bud pulled up in front of the white stucco house with the ivy wild around the front door. The well-kept yard held two tricycles, a football, and one skate. Tom shook his head. He put the tricycles in the garage and looked again at the smog hanging heavy against the mountains. Dropping his hat in the hall, he weathered the customary assault by the children. Mike and Lucy both looked like their mother, with serious brown eyes and upturned noses.

"Hi, darling," Nancy said. He kissed

her. "Hard day?"

"Usual. Getting the bird ready for possible use tomorrow. We're stand-by crew in case some of them need a squirt." When am I going to tell her, he wondered. Why don't I just shout

(Continued on page 111)





the DEW LINE



WHITE ALICE

Two of the greatest Arctic construction jobs ever attempted are drawing to a dramatic climax.

One, the Distant Early Warning (DEW) Line, will flash the *first* warning of an enemy approaching from the north. It is America's latest answer to the challenge of maintaining world peace.

The other, Alaska Integrated Communications Exchange (White Alice), is a vital network including "over-the-horizon" and "line-of-sight" microwave links connecting isolated communities and defense installations across Alaska, as well as existing telephone and telegraph services.

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Federal Electric Corporation's experience on military assignments in the Arctic . . . in the maintenance of specialized navigational equipment for the Air Force . . . as a field service and maintenance organization for IT&T's laboratories and factories . . . coupled with the world-wide experience of IT&T, make this an ideal partnership for so broad and technical an undertaking.







A real-life SAC B-47 prepares to take on fuel from a KC-97 tanker. The man who "lowers the boom" is known in AF circles as "Clancy." After the connection is made, fuel is pumped under great pressure through the boom.



Boeing KC-97F, tanker version of the Stratofreighter. The boom, used for aerial refueling, is shown in retracted position. Boeing is now producing an all-jet tanker version of its 707 jetliner to make aerial refueling easier.

the news? It's what I want. Sure, it means breaking up the crew, but that would happen sooner or later.

"Any change on Ralph coming in?"
"Not that I know of," he answered.
"But I don't like the looks of the weather. If it turns bad, they'll just have them land some place else."

have them land some place else."

"I'm glad they have a plan," she said, handing him the plates. "Sometimes I'm glad they haven't put you in jets. I'm a little afraid of them."

"Jets are safe," he said.

"What made you say that," she said from the stove.

"Well . . . you said something about it once."

"You must have a lot on your mind," she said and he shook his head. After coffee, she said, "The weather doesn't look good, does it?"

"It wouldn't take much to have fog in the morning, but weather says cold air is moving in. Anyway, I'm going to call later."

Several times during the evening he started to tell her about the new assignment, but it wouldn't come out. At eleven he called the base and was frowning when he came into the bedroom. She was reading. "How is the weather?" she asked.

"Stinks. All the jets are somewhere over the Atlantic. Looks like the cold air has stopped around Bakersfield and we'll have fog."

"Shouldn't you call Maude?"

"She'd only worry. I'll check again when I get up."

"Poor kid. I know how she must feel . . . you're worried about Ralph, aren't you?"

"I'm not worrying," he said, taking off his shoes.

"You'll worry until he lands. You're like that."

"That's the way you'd like me to be," he said, turning off the light. Long after Nancy was asleep he stared into the blackness. She was right. He was worrying about Ralph, about all of them. Fog is nasty, and in a jet it is worse because they never had fuel to play around with.

The jets became his own personal problem, and he wanted to be out on the line standing by his tanker. Sleep came slowly and he remembered that he hadn't told Nancy he was going to jets. He would tell her in the morning.

The alarm exploded. He turned it off and grumbled his way to the telephone. The operations officer gave him the story. They were all down except Ralph. The last contact was around Detroit, where he was bucking strong headwinds, and since then he hadn't called in. Colonel Ferguson, the wing commander, was frantic.

Maude's voice was thick with sleep. Tom tried to make his voice light and nonchalant. "... and tell the other wives."

"Tom . . . is there anything wrong?"

"Just a little sloppy weather. Nothing to worry about. He'll probably land at Tucson," he said. There was a tightness in the pit of his stomach. Nancy was still asleep when he went out.

The fog hung like wet wash, impervious to the windshield wipers. Bud stumbled out of the front door and groped for the car. Tom filled him in on his call to the base and to Maude. Bud peered out of the window and said, "I guess that's what I would have told her, too. This is a tough racket on the wives."

The operations officer shook his head when they entered the frantic bustle of base operations. Tom reached for the telephone. Nancy said she'd go right over to Maude's but there was a note of uncertainty, of desperation, when she said, "Tom . . . I hope I can go through with this. I hate to frighten her."

"You can, Nancy. If anybody can, you can."

He drummed his fingers on the counter as he looked again at the status board, at the empty spot by Ralph's name. He pivoted slowly and saw Bud deep in conversation with Colonel Ferguson. The wing commander turned to Tom. "You have the stand-by crew, Blythe?"

"Yes, sir. The alternate crew. Captain Foreman has the primary crew."

"In about an hour Elsin may be circling the field," the colonel said. "With his radios out he can't make a GCA here, and he won't have enough fuel to go on to Tucson. If we have a tanker upstairs there might be a chance of transferring fuel."

Tom looked out at the airplanes on the ramp. "Visibility is zero now."

"The weather can improve . . . or a pilot with a lot of determination could take off in this. There's some risk—a lot of risk—but still it's possible."

Tom searched for cigarettes, avoiding the colonel's eyes. The teletypes in the weather section began clattering the hourly sequences. On the ramp a power unit coughed. So the colonel has a problem. So he wants to save the airplane, but why me? Has he heard about my last mission in Korea? Is that the kind of determination he's

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CONTINUED

talking about? Well, he's got the wrong pilot this time. I'm going to jets and I'm not interested.

Tom wanted to say: "Get another boy, colonel. I'm not for long shots," but he couldn't.

'Captain Foreman has the primary crew, sir," he said.

"You and Nelson are Elsin's friends. As of now you're the primary crew. When you're ready for take-off, this field will have a weather change. I'll see to it." He watched Tom's face and then added, "Think it over." He walked swiftly into the weather section,

Tom glanced at the window. Bud was whistling off tune. I'm going to jets, Tom thought doggedly. The old man knows that. Will I have to live with that last mission the rest of my career? In four years a man gets cautious. He starts to consider odds when he's older and not so determined. He even begins to be afraid of the possible. Right now Tom was feeling that fear of the unknown. "What do you think?" he asked his navigator.

"Since when are we paid to think?" Bud laughed.

Tom threw his cigarette in the sandfilled bomb casing. The colonel was coming back.

Tom sucked his breath in. Then he sighed and said, "My wife is with Mrs. Elsin, sir. If she calls, give her the straight story. We're going to the plane.'

On the ramp he told the crew he'd take only volunteers. He started up the ladder. They were all right behind him, and he felt both pride and anger. This was one time he wanted to go alone, but the tanker wasn't a one-man

The fog hadn't thinned when he lined the airplane up for take-off. The voice from the tower was calm. Green light. After a quick look at Connors, the co-pilot, he felt Bud's reassuring hand on his shoulder and he grimly called for full power. The tanker responded to the thrust, and he glued his eyes to the gyros and prayed. His ears strained for any slackness of the steady throb, heard the tires slap dully before leaving the runway, and they were suspended in a world of white.

The undercast had its top at three thousand feet but stretched from the coast through the valleys to the pass and the desert. Only there was it open, but there was no place to land a jet.

The morning sun was a molten ball, and the only sound was the steady beat of the four engines. At fifteen thousand feet he felt his muscles relax. The engineer pulled the throttle back on number four engine, muttering that it had been running hot. Tom nodded and wiped his face. At twenty thousand feet he leveled the tanker and began circling. Bud was glued to his radar scope. The circling became monotonous, but the strain was holding him alert for any speck in the light blue sky.

The wheel in his hands was welcome. Flying calmed him. His mind raced over the refueling procedure. When they made radar contact, the jet would make a let-down from altitude. Elsin would need the thousands of gallons of IP-4 fuel held in the green tanks lined parallel on the top deck of the tanker. The refueling would call for precision flying, both on his part and also Elsin's. Elsin would drop down below the KC-97, and then tilt the sharp nose of the bomber upwards, and the jet would look like a hummingbird drinking from a wild rose.

Once Elsin was ready for fuel, Tom would be solely relying on the boom operator-"Clancy," because he low-ered the boom, a telescopic gas line from the underside of the tanker, and probed for the small refueling aperture in the nose of the jet.

Clancy would "fly" the boom into position using controls that manipulated two small wings. Tom and Elsin would only maintain position, and the delicate touch of the boom operator would spell success or failure. When he hit the thirsty mouth of the jet, they could transfer the fuel at an astonishing rate.

The crisp chatter of the crew brought Tom back to normal. Ralph was up here somewhere, but where? Or was he already down? It wasn't a pleasant thought.

"By rights, he's about on dry tanks," Bud said.

A rapid staccato of backfires shook the ship, and the engineer worked with his controls, his face gray. "I can't control it!"

"Feather number four!" Tom directed. The prop rotated to a stop. The final mission. Only then it had been number two, but an engine is an engine and it takes power to keep them in the air at altitude. He watched the throttles inch forward in their green guideways as the engineer added power to compensate for the

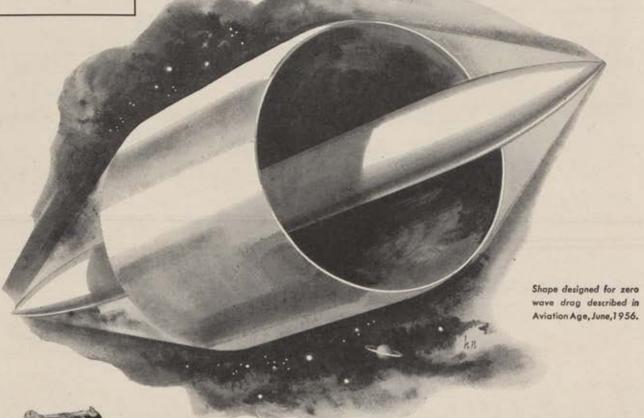
"Got something!" Bud shouted, his eyes glued to the radarscope. ' miles out and to the right. . .

"I see the contrail," the co-pilot said. "Turning," Tom said, and the tense-(Continued on page 115)

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# Continental Motors Corporation

AIRCRAFT ENGINE DIVISION

MUSKEGON · MICHIGAN

ness was back. They had found them. He switched his radio and tried calling the B-47, but there was no answer.

It meant a chase. It would take all the power they could muster. Sweat began rolling down his neck. The bomber was a tiny speck, now circling back to the left. "Full power!" he shouted to the engineer.

'She's on rated power now, Cap-

tain."

"Give me everything!" he snapped.

"But, Skipper. . . ."
"I don't think the engines can take

it," Connors said urgently.

There it was. Like Ralph Elsin four years ago. Was it worth the risk? He glanced over his shoulder at Bud. The navigator's face was tight, but he was grinning. "What we waiting for?"

Tom grinned and new energy flooded over him. He was tired of trying to weigh everything. He knew he was right, just like the last time. "Firewall her, engineer!" he commanded. "We're going in, men. Be ready to leave this bird if we have to, but we're going to give it a try!"

The answering shouts were music. The bomber was distinct now and steadily dropping. A power-off glide, Tom realized grimly. Their jets were dead, starved out, cold metal. Heading for the desert. It was their best chance. At least Ralph was thinking of that. "Stay with her a little longer," Tom muttered.

The seconds were minutes and the minutes were hours and the engines throbbed, straining to rip away from the wings. Now he could make out the men in the jet's cockpit. Ponderously the tanker pulled ahead.

'He sees us." Bud said, "but he's

waving us off.

"Going in," Tom sang out. "We'll gamble and fly the tanker back to him." Slowly he walked the rudder pedals. "Fly me, Clancy. You've gotta

The big tanker swung to the right and slid over the sweptwing bomber. The faces in the bubble canopy of the jet were toys in white helmets.

"Hold it straight," the boom operator's voice edged toward a higher octave. "We're in good position, but I don't see how we can do it."

Tom throttled back, a grin on his lips, and the tanker slowed. Its loss in speed closed the gap. The figures in the helmets stolidly watched the approach of the thick tubular boom. The pilot raked his hand across his mouth and shook his head, but the door over the refueling socket opened.

"Okay," the boom operator called out. "He's ready. A few more feet."

The boom stretched like an anteater's tongue and probed for the jet. "Just a few more feet, Skipper."

"Coming back," Tom said crisply. "Yell when you slap it into him and

I'll give her more power."

'Nearly there," the boom operator interrupted. "Trying to get him . . . trying . . . he's dropping away!"

The jet slipped downward and a hand raised from the cockpit and waved slowly. The B-47 was a crippled bird.

'Altitude ten thousand," Bud said, "Going down," Tom shouted. "I'll give 'em gas if we have to fly piggy

"Now or never," Bud said. "They'll be ready to blow that crate any

Suddenly a hatch blew from the bottom of the bomber's nose, and an ejection seat tumbled downward, the observer in the seat a green-clad doll

with a shiny white helmet, falling.
"Pull up!" the boom operator shouted. "The observer's ejected!"

'Are we with 'em again?" Tom

'Roger. . . . He's waving us off."

The pilot of the jet waved frantically and then the bubble over his head flew upward.

"They've ditched their canopy!" the boom operator screamed, his voice now a high shout. "They're ready to bail out, Skipper!"

"Power coming back," Tom said stubbornly. "Try again, Clanev."

"When they leave that bird, it can go anywhere. Let's get out of here!" Connors pleaded.

Tom shook his head.

(Continued on following page)

## About the Author

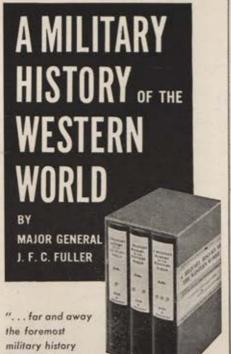
Major Heiman's first byline in AIR FORCE was with "Black Area" in our August issue. Assigned to the Information Office at



SAC's 15th AF Headquarters, Major Heiman has also been a combat crewman and operations staff officer. He was a newsman after the war before accepting a Regular commission in 1947. He's now rated as a senior navigator for SAC. He's a free-lance fiction writer in his spare time and in 1953 won the AF-wide short-story contest. From Texas, he's married and has four children.



## CONTRAILS



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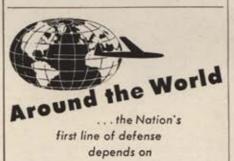
City Zone State

"Easy does it," the boom operator said, his voice now back to normal.

Again the boom probed for the open refueling slot. The boom operator began to sob with anger, his hands trving to get the few inches more he needed. Then the two met, and the impact sent a muffled thud through the tanker.

"We got him!" the boom operator shouted. "We got him!"

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Bud spun and looked at the refueling panel. The seconds limped before he shouted, "He's taking fuel!"

"More power!" the boom operator called. "They're going under us."

Tom quickly shoved the throttles forward. "Must be getting his jets started," he sang out happily. "You did it, Clancy! You did it, boy!'

On the way back, Connors gave Tom a snappy salute and said to Bud, "I understand now why you turned down jets."

Bud turned down jets? Tom turned. gave his navigator a quick, searching look. The good-humored face was bland. "Must have forgot to tell you," he said lamely. "Glad to hear that observer landed all right."

Tom was still thinking about it when they had landed and were driving to base ops. "You had a chance at jets and turned it down?" he asked

"Sure . . . my wife doesn't like jets." "That the reason?"

"Sure."

Colonel Ferguson was waiting. So was hot coffee. Ralph had landed in Tucson, and Tom grinned as he reached for the phone to call Nancy. "You can tell Maude that her everloving's in Tucson. Might get in later in the day.'

"Oh," she sighed, "Wonderful, Anything exciting?"

"Routine. I'll tell you about it to-

Bud handed him a cup of coffee and a lighted cigarette.

"I was just telling Nelson about your new assignment," the colonel

"Great news, Tom," Bud said swift-

ly. "I'm real happy for you."

"It's nothing to be so happy about," Tom said gruffly. "Just means that the best refueling crew in the Air Force will be broken up."

"I can't deny that," the colonel said. "I can still withdraw that request for jets, can't I?'

'If you want," the colonel said.
"Why would you do that?" Bud asked. "You've been dying to get into jets!"

"My wife doesn't like 'em," Tom said, smiling.

"That the reason?" Bud asked.

"Sure," he said and grinned right back at Bud, thinking of what Nancy had said.

He understood it now when she said that some things were right for some people that were wrong for others. It felt good to have found himself after four years.-End



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