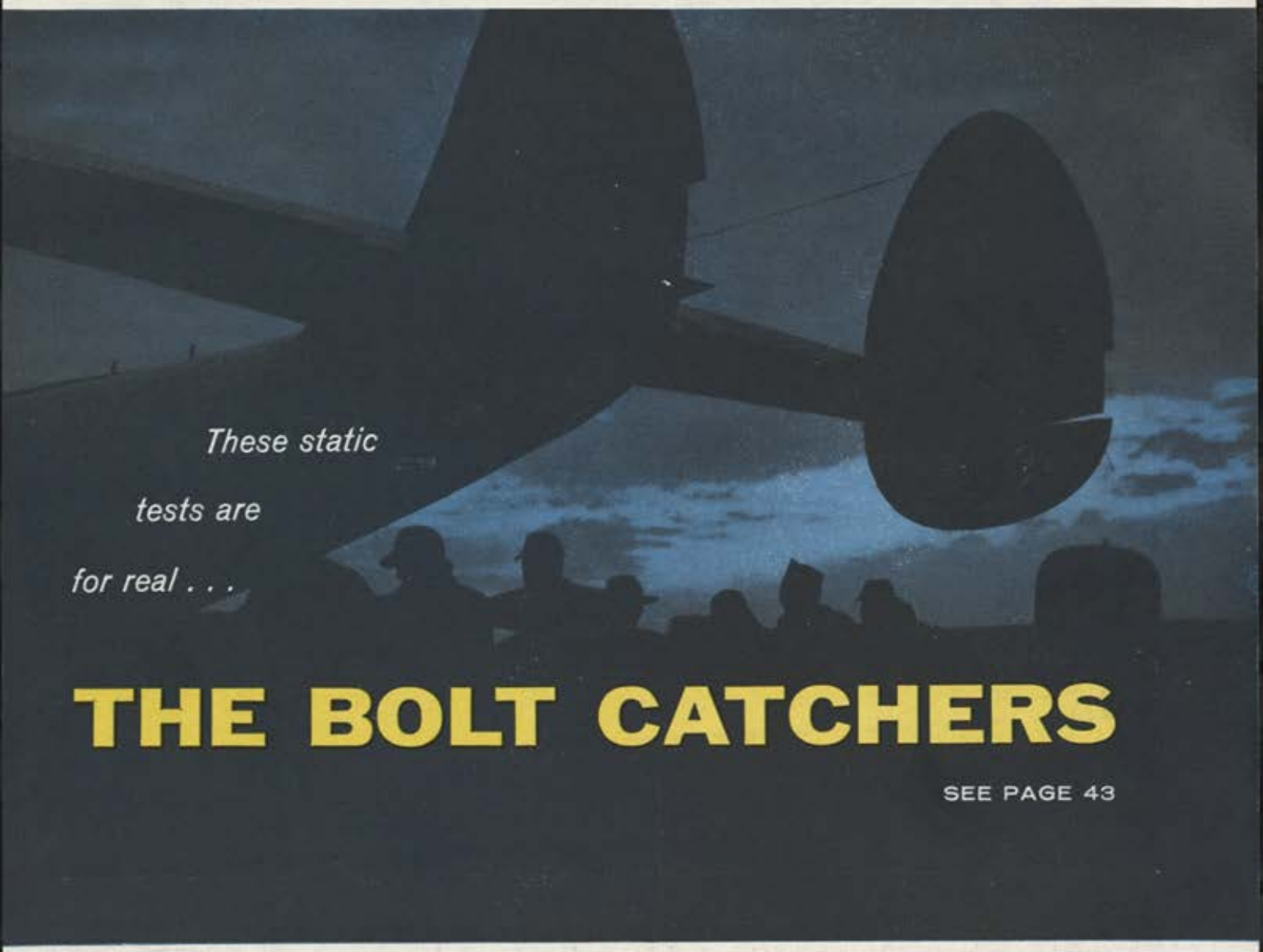
JUNE 1958 / 50c

AIR FORCE

• The Magazine of AMERICAN AIRPOWER / Published by the Air Force Association



These static tests are for real . . .

THE BOLT CATCHERS

SEE PAGE 43

ALSO IN THIS ISSUE:

Exploring the Universe — AF's Office of Scientific Research

de Seversky on Strategy • Realities of Disarmament

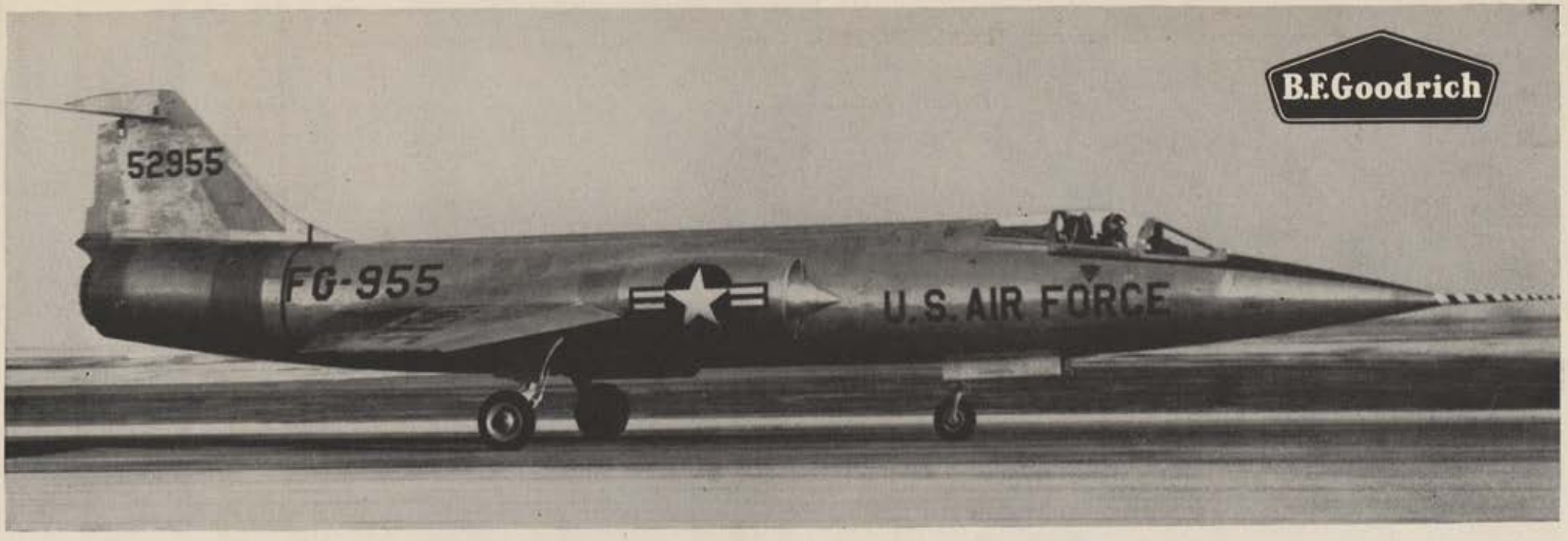
CHANCE VOUGHT's *Regulus II* supersonic missile for the U. S. Navy uses essential Hamilton Standard equipment. This installation is another example of Hamilton Standard's leadership in the design and production of equipment, propellers, or electronic components for more than 50 modern types of turbine or rocket powered aircraft and missiles.

WHEREVER MAN FLIES

HAMILTON STANDARD

Propellers * Starters * Air Conditioning Systems * Fuel Controls * Valves * Pumps * Electronics

HAMILTON STANDARD, WINDSOR LOCKS, CONNECTICUT



New B. F. Goodrich Fabric Tread Tire outlasts other jet tires 5 to 1

This new, cooler running tire survives up to five times as many high-speed takeoffs and landings as tires previously used on the F-104, Lockheed's "missile with a man". Developed and built by B. F. Goodrich, the Fabric Laminated Tread Tire is today's most important improvement in the field of high-speed tires.

Multiple plies of nylon cord inside the rubber tread stock of this B.F.Goodrich Tire produce a stiffening effect that reduces rubber distortion under load. These plies tend to equalize the modulus between tread and carcass, thus cut down the heat normally generated by flexing between the carcass and tread of conventional tires. The laminates also help resist tread cutting and punctures—check the formation of disastrous high-speed "shock waves".

In addition to the Fabric Laminated Tread, the B. F. Goodrich Tire used on the F-104 has the unique Sinewave Tread pattern. This pattern not only eliminates stress points found in ordinary treads—it reduces the mass in which heat can build up.

Operational F-104's have made as many as 25 takeoffs and landings on B.F.Goodrich Fabric Tread Tires—*with no sign of tire failure.* This performance is amazing, compared with only four or five takeoffs obtained from other high-speed tires. Find out how these new tires can give your supersonic aircraft safer takeoffs—more landings. Write B. F. Goodrich Aviation Products, a division of The B. F. Goodrich Company, Akron, Ohio.

Cross-section of B. F. Goodrich Fabric Tread Tire shows how fabric laminates are built into rubber tread stock to provide extra resistance to tread separation. New Sinewave Tread pattern permits, for the first time, equal distribution of tread rubber in high-speed jet tires.

B.F.Goodrich aviation products

RADIOPLANE DRONES

ARMY

NAVY

AIR FORCE

WHAT IS RADIOPLANE?

Radioplane, a division of Northrop Aircraft, Inc., has been producing drones since 1938. And since 1938 Radioplane has concentrated its efforts almost entirely in the drone field, having produced and delivered tens of thousands of drones to all of the United States Armed Forces for defense training.

WHAT IS A RADIOPLANE DRONE?

A Radioplane drone is an unmanned aircraft designed to be flown by remote or self-contained control to perform a specific military mission at the lowest cost and with the highest efficiency. Every drone produced by Radioplane is developed to meet particular defense requirements which cannot be fulfilled by man-carrying aircraft.

WHY A DRONE FAMILY?

Drones are required to serve as targets for the *evaluation* of modern weapons, in the *training* of weapon crews, and for aerial *surveillance*. Each of these vital areas requires a special drone application. For this reason, Radioplane has developed this family of drones (left to right):

XQ-4A ... Evolving from the supersonic XQ-4, the Air Force XQ-4A is a highly sophisticated target drone designed to cope with the exacting and comprehensive requirements of evaluating the kill-ability of modern weapon systems.

OQ-19 TYPE ... Standard radio controlled aerial target for all the military services, the tough, reliable and versatile OQ-19 drone is used all over the world as an economical training target.

SD-1 ... Without endangering a pilot's life, the U.S. Army Signal Corps' SD-1 can be flown by remote control on photo

...the world's first drone family

reconnaissance missions, returning within minutes with a photographic report of enemy activities.

RP-77D ... Powered by Boeing's rugged 502-10 turboprop engine, the RP-77D provides high speed, and both high and low altitude performance at low cost for the training of gun and missile crews.

RP-77DL ... The RP-77DL will carry the RP-76 target aloft for launch at altitude over the Army's Nike ranges, thus eliminating the need for diverting a manned plane and crew into a workhorse job.

RP-76 ... (Shown attached to the RP-77DL) The rocket powered RP-76 has very high altitude capabilities for training the Army's ground-to-air missile crews against fast, realistic targets.

XKD4R-1 ... Designed for U.S. Navy fleet target air-to-air and surface-to-air weapon training, the XKD4R-1 rocket drone flies a pre-set course by programmed flight control.

* * *

Radioplane has been selected by the U.S. Army to provide complete *contractor operated flight services* at White Sands Proving Grounds, New Mexico. This service includes furnishing aerial targets, ground support equipment, and operational, training, and maintenance personnel.

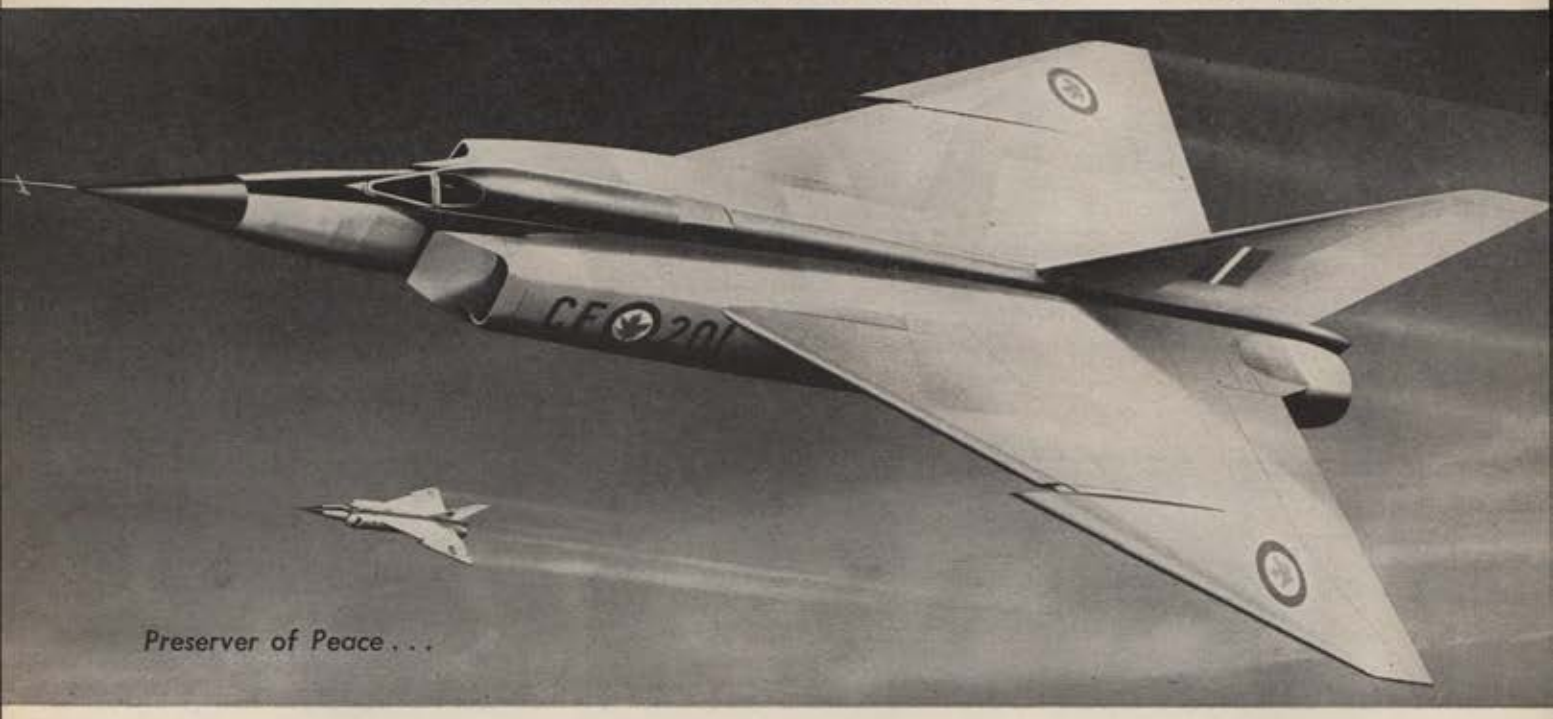
For detailed information write Customer Relations,
Radioplane, 8000 Woodley Avenue, Van Nuys, California

RADIOPLANE

A DIVISION OF NORTHROP AIRCRAFT, INC.

VAN NUYS, CALIFORNIA AND EL PASO, TEXAS

AVRO ARROW



Preserver of Peace . . .

CANADA'S SWIFT, FAR-RANGING ANSWER TO ANY SECURITY THREAT

Every advance in aircraft engineering is exemplified in the Avro Arrow, capable of traveling at well over twice the speed of sound to intercept and destroy enemy aircraft at extremely high altitudes. RCA has been assigned full responsibility for the development of a complete electronic system for fire control, navigation and communication, and an integrated automatic flight control system. While an enemy plane is still beyond the range of human eye, this radar system will detect it, and provide the intercepting pilot with a continuous flow of information, electronically computed in terms of position, range and rate of closing. Associated with RCA in the project are the Minneapolis-Honeywell Regulator Company and several Canadian firms.

RADIO CORPORATION of AMERICA

Tmk(s) ®

DEFENSE ELECTRONIC PRODUCTS

CAMDEN, N. J.

AIR FORCE

THE MAGAZINE OF AMERICAN AIRPOWER

Volume 41, Number 6 • June 1958

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FEATURES

DEPARTMENTS

Official U.S. Navy photograph

Air-to-air intercept far at sea...

For today's defense by fleet aircraft and tomorrow's by space ship or missile carrier, positive interception systems are being designed and built at Westinghouse Air Arm.

With over 20 years experience in airborne electronics, including the highly efficient Aero 13 and related systems, Westinghouse is developing advanced concepts and systems in:

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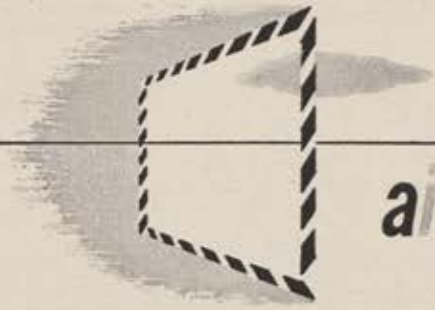


air mail

Good News for Us

Gentlemen: Your coverage of the Jet Age Conference is an excellent example of objective reporting. The April issue of AIR FORCE Magazine could very well serve as "The History" of an effective Conference. I thoroughly enjoyed reviewing the presentations and discussions.

Your special issue devoted to Space Weapons is excellent also. It provides us with an unusually timely handbook for use in acquainting our large AMC family with space age developments.

We have sent 1,000 copies of the Handbook to all organizations in AMC as a part of our information program. It is being used, along with other basic materials, as a reference piece for our base newspapers for feature stories, and as a reference for all of our people who need to be kept fully informed on this vital subject.

Members of the magazine staff have our heartiest congratulations and thanks for these very worthwhile contributions.

Gen. E. W. Rawlings
Commander, AMC
Wright-Patterson AFB, Ohio

No Demotion Here!

Gentlemen: Thank you for printing my letter in your Air Mail column of the April edition of AIR FORCE. There is just one little error—you demoted me from lieutenant colonel to first lieutenant!

This may cause some speculation among my service friends—so I would appreciate a correction.

Lt. Col. Thomas F. Teorey
APO, New York, N. Y.

● *We hasten to apologize and assure reader Teorey's colleagues that he is very much a lieutenant colonel.*—THE EDITORS

A Good Question

Gentlemen: I have been reading with interest your excellent coverage of "Men, Missiles, and Moons" in the April issue of AIR FORCE Magazine and would like to add my name to the long list of more-than-satisfied subscribers. Congratulations to your very capable staff for a wonderful job well done.

I enjoyed particularly "Air Force Problems in a Changing Age," by the Honorable James H. Douglas. I would like to direct a question to our good Secretary and possibly receive an answer also from the staff of AIR FORCE Magazine. "Mr. Douglas, is there *in fact* a shortage, or a sharp decline, in trained or experienced technicians in the Air Force today?"

I am a veteran pilot of the B-47 and the B-52, America's first line of defense, and consider myself something of a trained technician. But in my efforts to regain entry onto active duty, I have been confronted with a *complete* "closed-door policy."

This appears to me to be a very shortsighted way of solving a manpower problem—if there is one. Just exactly *how* is the Air Force planning to fly *more* and *faster* aircraft with fewer pilots?

Lt. R. D. Eagleson
Sacramento, Calif.

● *When the AF was directed to reduce its force, the first step was to reduce its initial officer procurement as much as possible in order to cut down the number of career-minded individuals who would be released involuntarily. The recall program was one of the first to be curtailed since the lead time involved is relatively short. The AF plans to reopen the recall program on a selective basis as soon as its over-all procurement programs can be realigned on the basis of the new officer ceilings. So there is still hope.* —THE EDITORS

Unintentional Change

Gentlemen: It has been called to my attention that your condensation of my presentation before the Third Annual AFA Jet Age Conference, published in your April issue, contains some omissions from the original speech that have unfortunately had the accidental effect of substantially altering the intended meaning.

I had sought to show how extreme and possibly injurious to the national interest can be the super-enthusiast's prediction for space warfare in the future. To do this I listed an argument often heard that our nation should plan to launch a more sophisticated "space follower" to seek out and destroy any entry into outer space by a potential enemy. I noted the technical challenge that this ambition represents, but concluded that the security gain compared with the expenditures of resources would be quite disproportionate, and therefore expressed the hope that preparations for such warfare would not ever become necessary. By seeing only the description of this kind of military space project without the analysis and the conclusions, a reader could gain the impression that I was expressing support for such projects, whereas exactly the contrary was intended.

Dr. Simon Ramo
Los Angeles, Calif.

● *Editorial space was, of course, at a serious premium in compiling condensations of the presentations at the Jet Age Conference. We regret any change in meaning that may have resulted from our condensation.*—THE EDITORS

Demotion Program

Gentlemen: The purpose of this letter is to acquaint the Air Force Association with the present Air Force demotion program. This is considered advisable at the present time in view of the fact that some Reserve officers will be released from active duty as a result of their selection for demotion.

In late 1956 the Air Force conducted a careful study of its officer demotion program as part of a general review of all actions designed to improve the quality of its officer corps and to maintain that quality at a high level.

The study disclosed that the officer demotion program then in effect was extremely ineffectual. Specifically, only five demotions had occurred as a result of the program since January 1, 1951. During the same period the Air Force officer strength averaged in excess of 130,000, and some 69,000 tem-

(Continued on following page)

porary promotions were effected in grades of captain and above.

It has been established that we have a number of officers serving in temporary grades who are unable to effectively cope with the duties and responsibilities required of those grades. Furthermore, as long as we make temporary promotions it is possible that there will be other officers who, subsequent to their promotion, will be unable to assume the added responsibilities of a higher grade.

A new officer demotion regulation was therefore published on July 23, 1957. This regulation which applies to all officers, both Regular and Reserve, sets forth the policy that only officers who clearly demonstrate ability to assume and discharge duties and responsibilities commensurate with their grade will be permitted to continue to serve in that grade. It further provides that officers who do not measure up to required standards, or whose capabilities have been exceeded but whose elimination is not warranted, will be considered for demotion by boards of officers.

Upon demotion, Regular and Reserve officers are reappointed in a lower temporary grade if serving more than one grade above their permanent grade, or are reduced to their permanent grade. However, the Reserve Officer Personnel Act of 1954 precludes demotion of Reserve officers serving in a grade equal to or lower than their permanent Reserve grade. Accordingly, when a Reserve officer in this category has been selected for demotion it is Air Force policy that he be released from active duty under authority contained in Section 681, Title 10, United States Code.

The release from active duty of Reserve officers selected for demotion has no relationship to a reduction in force. Officers are selected for demotion on the basis of substandard performance in the grades in which they are serving, and only after a thorough review of their records by a formally convened board composed of senior officers. Only a small percentage of those considered for demotion are selected, and these are officers with extremely poor records of performance.

Brig. Gen. William B. Keese
Deputy Director of Military Personnel
Hq. USAF
Washington, D. C.

So Do We

Gentlemen: The following clipping is from the April 4, 1958, issue of *U. S. News and World Report* (page 29):

"President Eisenhower has taken to reading books on outer space in his spare time. Government scientists have been asked for book lists on space exploration."

I believe the President could use a copy of the March issue of AIR FORCE. I certainly wouldn't part with mine.

Lt. Col. Charles D. O'Brien
AF Reserve
Houston, Tex.

● *The White House receives a copy of* AIR FORCE *Magazine each month.* —THE EDITORS.

Fall Out and Fall In Again?

Gentlemen: Our press and public seem confused as to the merits or demerits of the several current proposals for "Pentagon reorganization." Our military leaders and our unofficial service publications, such as AIR FORCE Magazine, could do a better job, it seems to me, in publicly and objectively setting forth the pertinent factors to aid our editors and columnists in analyzing the issue such as:

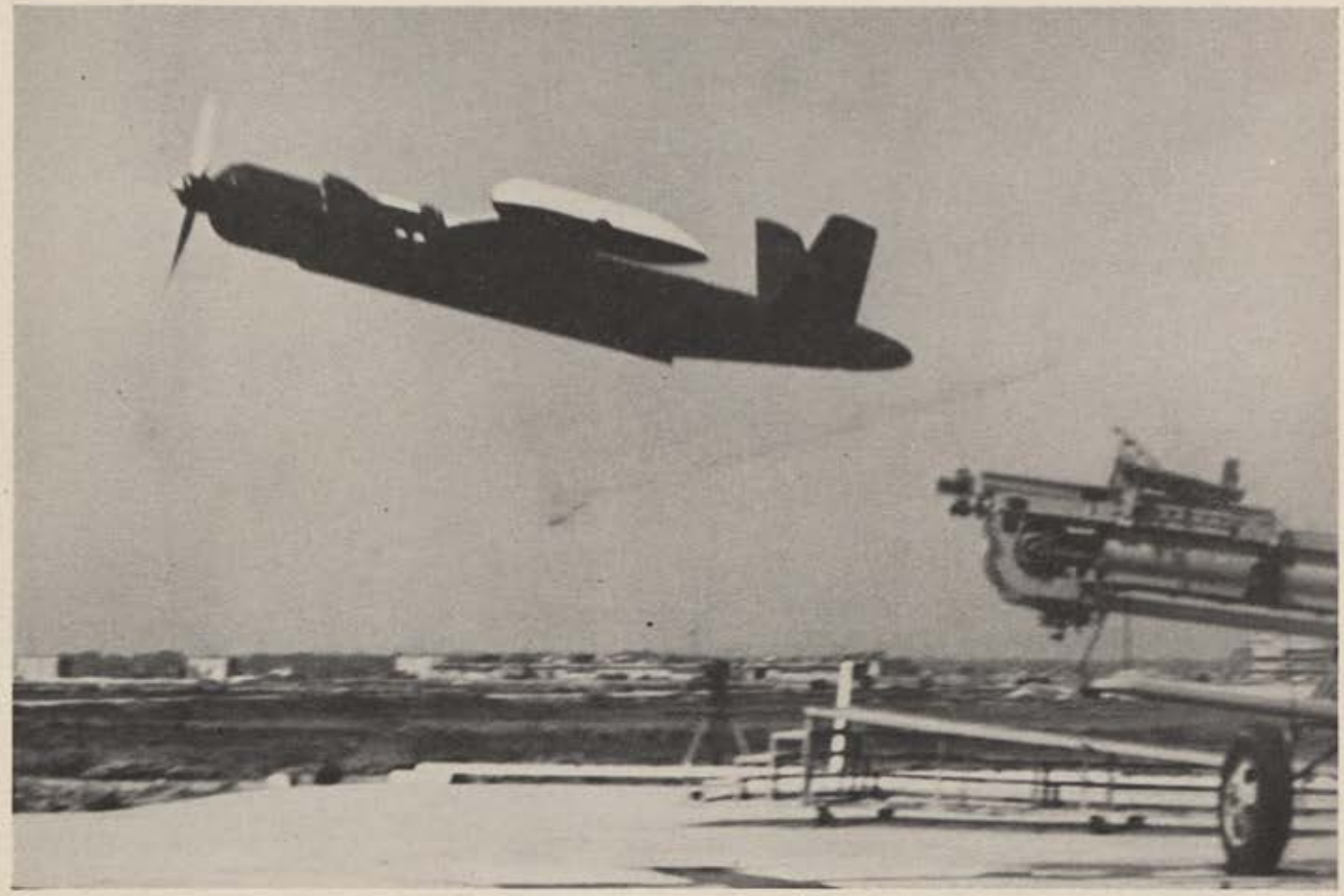
A. *Our national military organization, both operational and administrative (but especially operational at this time), should be one with which we can most effectively wage our next major war.* It will be disastrously handicapping to have to "fall out and fall in again," from the present archaic system into an effective combat organization when attack becomes imminent or after we have been "Pearl Harbored." It is essential that we have our war planning, our war organization, command relationships, and cadres, in being, trained, and ready, long before outbreak of war.

B. *Our combat organization should be premised upon basic and immutable principles of war tailored for the strategy and tactics imposed by present-day (and immediate future) weaponry.* We should not adhere blindly to past tactical and organizational concepts merely because they worked in World War II. Nor should we discard them merely because they are "old." Rather, we should evaluate the present and immediately prospective "battlefield" and weaponry objectively, discarding dead wood of the past and bringing our combat organizational concept up abreast of current tactics and weapons.

C. *One of the prime and immutable principles of war is unity of command.* The Chairman of the Joint Chiefs of Staff, preferably with a more descriptive title, should be invested with this operational command, subject to the direction of the national Commander

(Continued on page 11)

CAPABILITIES . . . Manpower, Tools and Experience



THIS UNRETOUCHED FIRST ACTION PHOTO RELEASED RECENTLY BY THE U. S. NAVY SHOWS THE BEECHCRAFT XKDB-1 DURING A RECENT EVALUATION.

Beechcraft's new target plane, pictured above as it leaves its special transportable catapult, offers maximum performance to all of the Armed Services of the United States. It is just one of an entire new family of rocket, turbo-jet, and supercharged powered craft being developed at Beech.

Here are just three occasions where this craft may be used: in procurement of information from behind enemy lines – either during the day or at night; for use as an operational target plane with ground or air launching – and with speeds up to 320 miles per hour; as a vehicle to deliver supplies to isolated combat units. It is now being delivered as the XKDB-1 to the Navy as a target aircraft.

Other Beech projects include research and development work on launching and recovery systems for missiles, drones, and manned aircraft; engineering test programs on aircraft emergency escape systems; and classified projects in the advanced fields of aerodynamics, cryogenics, thermodynamics, and aircraft range extension.

To put Beechcraft's capabilities to work to solve your research, development or production problems, telephone or write the Contract Administration Division today.

Beechcraft

BEECH AIRCRAFT CORPORATION • WICHITA, KANSAS, U.S.A.

Beech Builds: U S Navy T-34 • USAF T-34 • U S Army L-23 • Bonanza • Travel Air • Twin-Bonanza • Super 18 Executive Transport

in Chief (the President) and the Secretary of Defense. There should be similar units of command in each major strategical theater, and in each major tactical "battlefield" within such theaters. *Coordination* is *not* a viable substitute for *Command.*

D. *The selfish interests or prestige of individual services should not be considered except within the context of our national interest.* The criterion should be to maximize the capability of our whole military establishment to wage victorious war.

E. *As a practical matter it would, at best, take some years to thoroughly remold our military establishment into a more effective war-making machine.* The operational command structure, as the most vital aspect, should be stressed in the current first stage. The administrative aspects, including fiscal, budgetary, personnel, materiel, reserves, and mobilization will be more difficult of forthright resolvement. Congressional authority over administrative functions must be preserved.

Let's do our falling out and falling in again *now*—at least with respect to operational organization—rather than after we are fissioned and fusioned!

Vice Adm. T. G. W. Settle, USN (Ret.)
New York, N. Y.

Guided Missile Field

Gentlemen: I am writing in the hope that you can give me an answer to an important question: How can I get into the guided missile field? This may sound simple, but believe me, it isn't.

I am a first lieutenant, Regular Air Force. Last April I was grounded (I was a navigator-bombardier on a B-47) for ulcers. Since then I have been working in the Intelligence field. Last November, when I realized that I am quite well qualified for missile systems training, I immediately sent forward an application for this training. My application was returned approved up to Fifteenth Air Force, but no action taken. The reasons stated were that all Air Force missile schools were shut down due to a backlog of trained personnel and that the only people being assigned to "factory training" courses were staff personnel.

1st Lt. Ercole R. Leomazzi
March AFB, Calif.

● *There are more applicants for missiles courses than there are spaces in the schools to accommodate them, but the program is due for acceleration. Our best advice is to check the monthly USAF Training Prospectus for latest information on schools and courses.*
—The Editors

This extensively instrumented test bench is located inside one of the test cells in Pratt & Whitney Aircraft's Fuel Systems Laboratory in East Hartford. In this chamber engineers can minutely analyze the effect on fuel systems components of extreme environmental conditions—such as those encountered in advanced types of aircraft operating at high Mach numbers and high altitudes. This is one of many P&WA facilities unequalled in the industry.

FUEL SYSTEMS LAB

Another Unmatched Facility to Improve Fuel System Capabilities for Turbine Engine and Missile Application

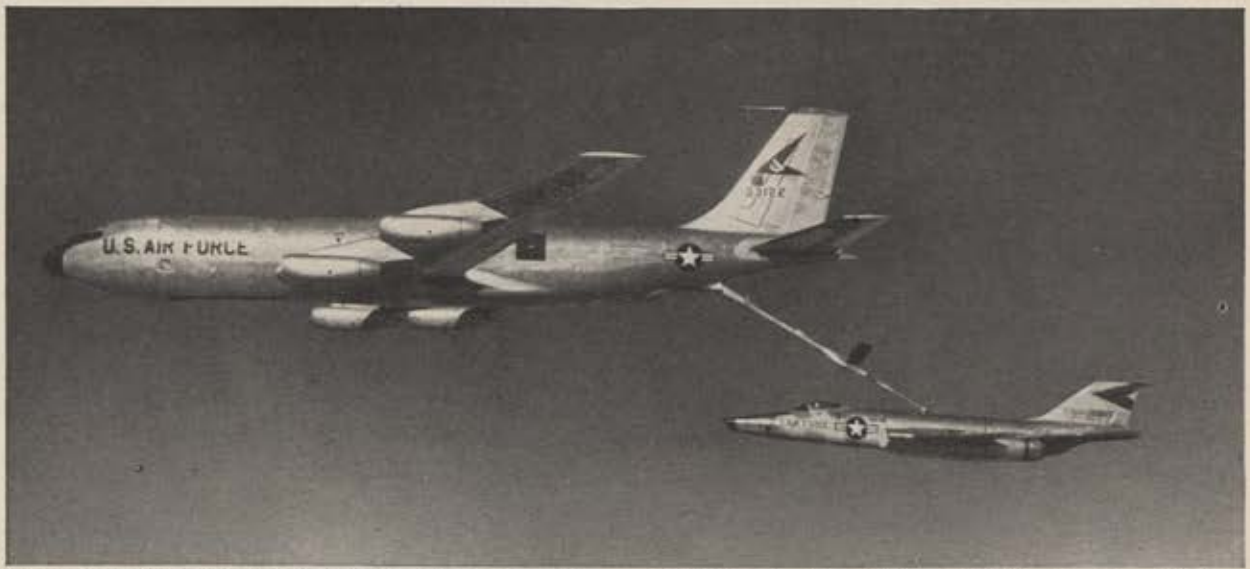
Fuel handling and control problems for turbojet engines capable of powering sustained Mach 2 flight are enormous. Some are still unsolved despite years of effort. But problems of this type for engines of the future—for aircraft to fly at Mach 3 or 4—are almost beyond belief in their complexity.

The Fuel Systems Laboratory at Pratt & Whitney Aircraft helps to solve such problems and many others in the design, development, qualification, and calibration of fuel controls and related engine parts, by permitting operation of these units at the conditions encountered at high speeds and high altitudes.

This multi-million dollar laboratory, unduplicated anywhere in the aircraft engine industry, was built and is owned by Pratt & Whitney Aircraft. Fuel handling test environments are provided from –65°F to 1000°F, and up to 60,000 feet in simulated altitude. A variety of fuels can be handled through a great range of flow rates, pressures, temperatures, and operating conditions.

Because of Pratt & Whitney Aircraft's foresight in making available this kind of facility, and the many other matchless tools and facilities which engineers at Pratt & Whitney Aircraft may call upon, the uniquely successful J-57 and J-75 turbojet engines have been made available to the world of aviation.

In these facilities, the next generation of aircraft power plants is now being brought along. And such facilities will be even more important in future years in the design and development of the world's best aircraft propulsion systems . . . in whatever form they take.



Pratt & Whitney Aircraft's J-57 engines power the outstanding Boeing KC-135 tanker-transport, shown refueling a McDonnell F-101, also J-57 powered and holder of the world speed record of 1207 mph. In April a KC-135 set a distance record for jet aircraft without refueling, flying 10,228 miles from Tokyo to the Azores. Facilities at Pratt & Whitney Aircraft such as the Fuel Systems Laboratory are behind the success of J-57 and J-75 turbojets in so many types of transports, bombers, and fighters.

Pratt & Whitney Aircraft

Division of United Aircraft Corporation, East Hartford, Connecticut

CONNECTICUT OPERATIONS—East Hartford. Major Branch Plants—Meriden, North Haven, Southington

FLORIDA OPERATIONS—West Palm Beach

Feats of Hercules, No. 2

New missile muscle now for NATO bases!

The mighty Lockheed C-130 HERCULES can transport 90% of all types of missiles now operational with, and under development for, the U.S. Armed Forces. The HERCULES will fly missile cargoes non-stop for distances over 3400 nautical miles, at cruise speeds of 305 knots.

The rugged "go anywhere, haul anything" capabilities of America's first prop-jet combat cargo carrier add new strength to NATO supply lines —at a time when these far-flung bases are more vital to the free world than ever before.

In addition to "beefing up" the global mobility of the Armed Forces, the HERCULES is making new friends for the United States by its prodigious feats. Example: a C-130 of the 322nd Air Division, 317th Troop Carrier Wing, Evreux-Fauville Air Base, France, transported a 28,700-pound generator from Laon, France, to where it was badly needed to supply electric power in Adana, Turkey—and flew the 1981 nautical miles non-stop in less than seven hours.

Like all Lockheed designed and built aircraft, the C-130 HERCULES can be counted upon to do its assigned jobs with outstanding ability, no matter how difficult the task. That's why—

Lockheed

means leadership

Lockheed Aircraft Corporation
GEORGIA DIVISION, *Marietta, Georgia*

AIRPOWER in the news

WASHINGTON, D. C.

■ There are so many facets to the current chaos in the area of military research and development that even the experts confess their heads are spinning. The subject is being tossed around, as we go to press, in both the space agency and defense reorganization hearings on Capitol Hill *(see pages 20 and 34)*. These have followed the run-of-the-mill, late winter quizzes on the Defense Department budget, where R&D was scrutinized again.

Major common complaint, of course, is about the alleged interservice rivalry. As we pointed out in last month's AIR FORCE, this situation is not without its defenders and some logical arguments to the general effect that competitive projects lend themselves to fast progress. So far, the unpublicized paradox is that the very people who moan the loudest about military conduct are themselves involved in a near-angry fight over prerogatives and jurisdictions. It may be that interoffice rivalry at the Department of Defense level is replacing interservice rivalry.

Steps have been taken to allay the fear of Pentagon, cannibalism we mentioned last month. On the third floor, Ring E, Corridor 10, there now exists a nonaggression pact, under date of April 7. It is signed by Paul D. Foote, Assistant Secretary of Defense (Research and Engineering), William M. Holaday, Director of Guided Missiles, and Roy W. Johnson, Director of the Advanced Research Projects Agency. Announced purpose of the memorandum is to "delineate the relationships" among these gentlemen. This means it is an effort to define their jobs and keep them out of each other's hair.

Here is a boiled-down listing of what they have accepted:

- Dr. Foote, whose duties appear to have been chipped away in recent months, still is called the staff adviser to the Secretary of Defense on "all military research, development, and engineering matters." He is ordered to recommend basic policies and an integrated program. We must, the paper says, be kept fully informed about what is going on in other offices, a clause that betrays some recent voids in this respect. Dr. Foote's staff is instructed to use reviews and analyses provided by the Director of Guided Missiles and ARPA as much as possible.
- Mr. Holaday is more important than Dr. Foote. He is an assistant, not an adviser, to the Defense Secretary. His authority is limited to the area of R&D, engineering, procurement, and production of guided missiles. It is in the area of procurement and production, mainly, that his bailiwick is bigger than that of the Assistant Secretary for Research and Engineering. He is instructed to get advice and assistance from Dr. Foote in the Research and Development areas.
- Roy Johnson, ARPA's boss, is described as a "line official" in R&D, limited to projects laid on his desk by the Defense Secretary. They will be assigned to a military department or some other agency once the R&D work is completed.

"The relationship between all three individuals," the memorandum says, "is one of close interdependence from the standpoint of keeping each other informed as to the breakthroughs, advances, and requirements in their respective fields. . . ." There will be no problem, says the paper in one understatement, if the total effort is adequate.

There has been no formal announcement of why it was necessary to circulate this treaty. At the time it was signed, ARPA was making good headway with a small staff headed by Dr. Herbert F. York as Chief Scientist. There were signs that ARPA was determined to gain technical competency, a circumstance that might embarrass the Director of Guided Missiles and/or the Assistant Secretary of Defense. After all, Defense Secretary Neil H. McElroy has displayed a heartening tendency to change his mind when the facts show a mistake has been made. It is reliably reported, for example, that Mr. Holaday's decision to put both the Thor and Jupiter IRBMs into production is going to be reversed as gracefully as possible. And there is the antimissile-missile muddle, discussed in last month's AIR FORCE. We have heard the sharp observation that the Director of Guided Missiles is working on the first system for this mission, but ARPA will develop the first *useful* system, once its technical proficiency is complete, the Army silenced, and the state of the art improved.

It has been made clear that the nonaggression pact will live only until there is a reorganization of the Defense Department along the lines proposed by the President. Only possible interpretation of this is that, if we get a new "Director of Defense Research and Engineering," he will have the power to knock heads together himself, and even knock some of them off.

■ **Agreement of House and Senate conferees on a $576,400,000 military pay rise bill, expected to go into effect June 1, was good news but not an unmixed administrative blessing. There will be a special bonus available for five percent of the captains and majors ($50 a month), ten percent of the lieutenant colonels ($100 a month), and ten percent of the colonels ($150 a month) on top of the general pay increase for all the armed forces, except those with less than two years of service.**

The rub comes in selecting the officers who show special proficiency in responsible positions. Designed to reward those who make real contributions to the service and help retain men with special skills, the bill would give them the kind of cash inducement already available for enlisted men. But how do we determine which areas are critical? And if the captain collects a bonus, must there be one for the colonel who gives him his orders?

As we go to press USAF is not alone in facing this problem. Implementation studies are under way for all the armed forces. Meanwhile, happy spending for all the family.

■ Working in Washington, above the corner of Pennsylvania Avenue and Seventeenth Street, it was not possible last month to face a typewriter without seeing on the street below (1) the Daughters of the American Revolution, (2) the Chamber of Commerce of the United States, and (3) the American Society of Newspaper Editors.

Delegates to the conventions of these three organizations

(Continued on following page)

were surrounded at all times and in all places by high school seniors scrambling in and out of buses from such places as Elmira, N. Y., Wetumpka, Ala., and Upper Sandusky, Ohio. Outside of Congress itself, it may have been the most interesting collection of Americana since the Scopes Trial in Dayton, Tenn.

Strangely, these visitors to the nation's Capital eschewed any mention of airpower *per se*, but at the same time took positions that have an important bearing on the subject. For example, the buxom and beribboned DARs still can be counted among the supporters of anything militant, including the military. Presumably this includes the Air

Force, flying B-52 bombers that cost something like $8 million each. At the same time the Daughters, generally more radical than the people they call leftist, came out in favor of abolishing the income tax. Their general idea seems to be that we can save enough money to buy a modern Air Force by throwing the United Nations out of this country and wiping out all foreign aid programs.

The Chamber of Commerce, which followed the good Daughters into Constitution Hall, started off their convention with a session on "America's Future in the Space Age." They heard William M. Holaday, the Defense Department's Director of Guided Missiles, say that Soviet development in this area is no better than our own. The delegates didn't know as they listened to Mr. Holaday that Jimmy Doolittle, who also knows something about airpower, was at that very moment telling a congressional committee the Reds are ahead of us in propulsion for missiles and satellites. General Doolittle was at the Capitol end of Pennsylvania Avenue and was not invited to the Chamber meeting, despite the fact that he is vice president of a well known oil company.

Another speaker before the Chamber was the Commander in Chief himself. Mr. Eisenhower said, "Our slogan is safety and solvency," and the businessmen seemed to like it. The Chamber's president pledged support to whatever spending program is necessary, a stand that sounded somewhat contrary to public sentiment of a year or two ago. When George Humphrey—a Chamber of Commerce type if there ever was one—served as Secretary of the Treasury, a lot of necessary defense spending programs were passed up, and Congress said it had a lot of telegrams demanding further economies. With a bow in the direction of the DAR, the Chamber of Commerce also lamented the income tax burden and suggested that a federal sales tax would be more fair and less painful.

Now for the editors, who were not particularly interested in how bills are paid. Mr. Eisenhower also graced their meeting and delivered a rousing speech in support of his Pentagon reorganization program. It was received with cheers. But it is hard to escape the observation that honest newspapermen had some reservations about their visit to Washington this year. They heard Murray Snyder, Defense Department spokesman for the people who decide what the public should know, put up a staunch argument for not telling the public very much. He did this with a sarcastic attack on California's meticulous Congressman John E. Moss, who has been leading a courageous war on secrecy. It is important to point out that a substantial part of the Moss offensive has been totally unconcerned with American military secrets. Nobody wants to print those. Much of the Moss fire has been centered on the Administration's stubborn refusal to tell what it knows about *Russian* secrets.

After all, when Sputnik went up it was no surprise to the Pentagon, the National Security Council, and the Operations Coordinating Board. It was a surprise only to people like newspaper editors, the DAR, and the Chamber of Commerce. The Palace Guard appears to be in favor of keeping these Americans as ignorant as possible, which may account in some degree for the resolutions they pass by acclamation. After all, how can they ask for an aggressive research and development program, which menaces the balanced budget, if they don't know how necessary it is? Anyhow, the editors held a banquet at the Statler Hotel and saw the Raymond Clapper Award presented to Chalmers Roberts. Roberts is a reporter on the Washington *Post and Times-Herald*. His claim to fame: He gave his readers a long and detailed account of what is in the Gaither Report, an evaluation of the threat to America that the Palace Guard stamped secret.

We have little to say about the great Spring Flood of high school seniors, here for a holiday. The boys are tall and, for the most part, handsome. The girls are pretty, every one of them. Like Admiral Rickover, the Navy's atomic submarine genius, we wish they knew more algebra and physics. They also are important to airpower.

■ The Defense Department says the Renegotiation Board has promised to recognize that incentive profits are earned and do not constitute an industrial swindle. If this turns out to be true in practice, it will mark a major victory for the aircraft industry, whose troubles with the profit motive were discussed in the April '58 issue of AIR FORCE. The Board, says the Pentagon, "has accepted and published modifications of its regulations which were designed to assure that incentive profits earned through the efficiency and economy of the contractor would be honored in renegotiation." Further good news is that the Board intends in the future to explain the basis for its findings. If both of these puddings are proved in the eating, aircraft makers will get what they have worked for. And if they don't, they will know the reason why.

On other complaints, the office of the Secretary of Defense stands firm. He has no intention of increasing progress payments or payments under cost reimbursement contracts, according to a letter to the Aircraft Industries Association. Neither will there be any help in the financing of research and development facilities, either through higher profit levels or more liberal sponsorship of Certificates of Necessity to permit fast tax write-offs. The government will continue to insist that it owns all the proprietary data it thinks it has paid for through contract.

—CLAUDE WITZE

Photo by Halsema

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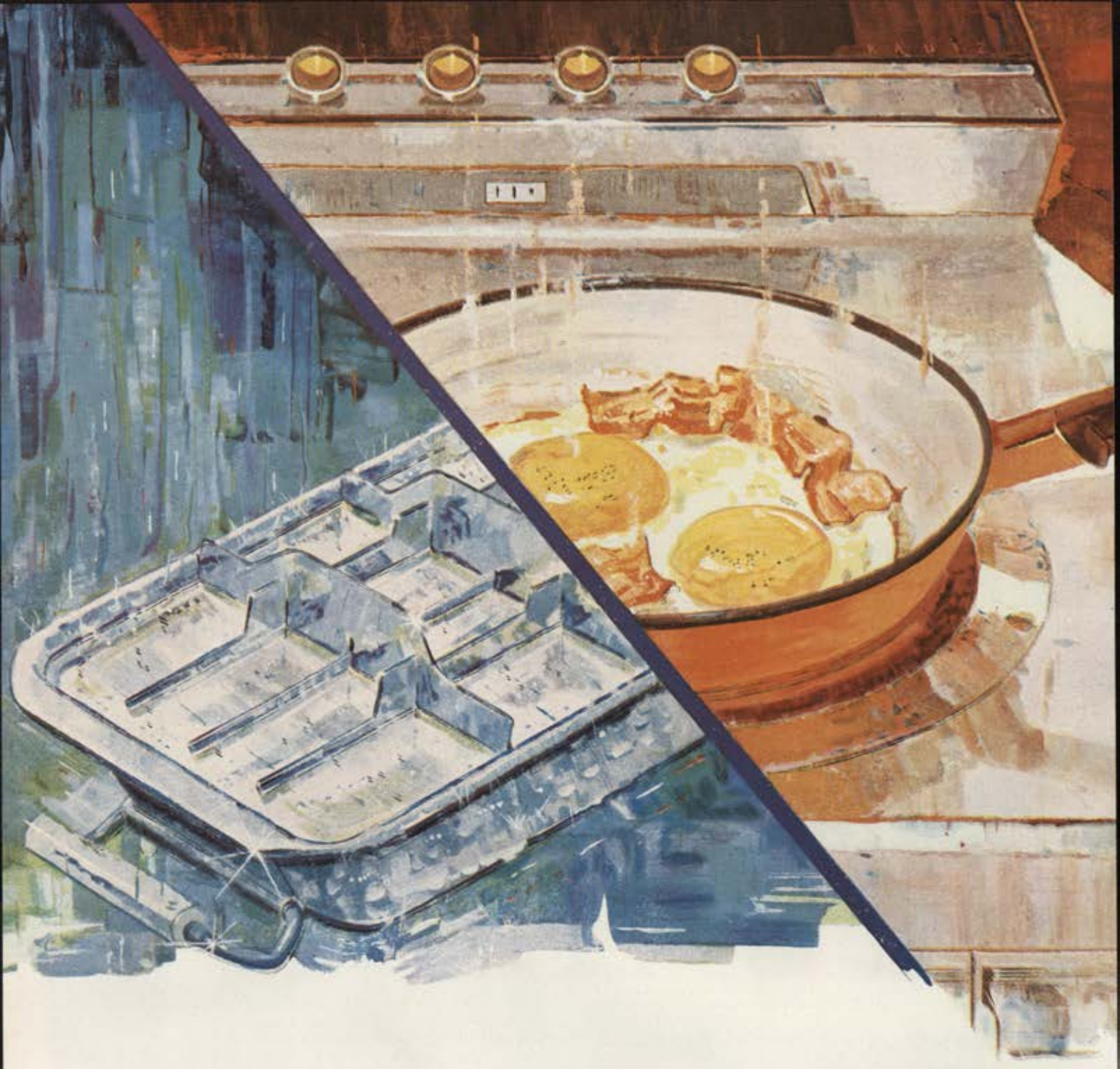

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SYSTEMS / CONTROLS

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 document the information beyond assurance that the sources are trustworthy.

US defense reorganization points up how the Russians have organized their own Ministry of Defense. All services are combined under this one title, though each has its own separate staff. Services are broken into many different units, such as Artillery, Armored Forces, Long-Range Aviation (equivalent to our SAC), Anti-Air Defense, Airborne Troops, Navy, and so on.

All of these work under over-all direction of a General Staff within the Ministry of Defense. The Soviets have used this system since World War II, with the Russian Navy in and out of the Ministry of Defense from time to time. At present the Red Navy is very much inside the Ministry of Defense.

° ° °

Russia has released more German rocket and missiles experts in recent months, another indication the Soviets are proceeding more on their own.

The German experts report that they were brought together in the Soviet zone of East Germany in 1945 and were given the task of continuing construction and development of German rockets, especially the A-4 (V-2). A year later, in 1946, all German rocket and missiles specialists in East Germany were put under one of their fellow countrymen, Herman Göttrup, a graduate engineer. By the end of 1946 he had some 5,500 German co-workers under him.

The Germans sought to remain in East Germany instead of going to Russia, and most of them were allowed to do so. However, late in 1946 the top 200 scientists and engineers were taken to the USSR. They were sent to Soviet engineering and development installations working on missiles and rocket engines. Later, some of them were again brought together in Russia to gain the benefits of their combined efforts.

This happened in 1948 and soon after the Russians began, with the help of these Germans, to develop research centers for rockets and missiles, and to set up production facilities. One establishment near Moscow began to work on the control problem for missiles, a field in which Göttrup is an acknowledged expert.

The different German experts who were reunited in 1948 included a Dr. Wolff, in charge of ballistics work; a Dr. Albring, who headed a department of aerodynamics (including preliminary design of both missiles and test facilities, such as wind tunnels); a Dr. Umpfenbach, who headed the development of missile powerplants; a Dr. Hoch, who worked in controls (including analog computers); a graduate engineer named Blass, who directed the actual construction of test facilities in Russia; a Professor Schütz and a Dr. Coerman, who worked on instrumentation; and a Dr. Matthes, who did chemical analysis and thermodynamics studies.

German rocket experts who have returned to West Germany have received offers from several foreign countries, including the United States, England, France, and Belgium.

° ° °

The Russians are credited with 700 MIG-17 fighters, a far cry from the approximately 15,000 MIG-15s that they built over the years. The MIG-17 has been superseded by the MIG-19 and other fighters.

° ° °

Present size of the Soviet Air Forces is put at about 20,000 first-line aircraft, according to NATO.

° ° °

A. A. Mikulin, veteran Russian aircraft engine designer, retired within the last few years. It is believed that his position was taken over by a designer named Tumansky.

° ° °

Like most other countries, Russia has tried to develop a good turbofan engine for greater thrust and lower specific fuel consumption. But they have had their troubles with this most difficult engine. Only Britain today has a successful turbofan engine in production. Engine designer Lulkov of the USSR is believed to have designed and tested a turbofan engine somewhat similar to that of the British, but it does not match the performance of the Rolls-Royce Avon developed in England, which is scheduled for use in the Douglas DC-8s ordered by Trans-Canada Air Lines. Because Lulkov's engine was no match for the British powerplant, the Russians have never announced their turbofan engine.

° ° °

Next Russian missile launching, long heralded in other publications, could turn out to be the famous T-4A, the glide bomber the Soviets are known to have under development. This could be manned or unmanned. Under proper conditions, it could be launched in the USSR and skip-glide its way to the South Pole, where the Russians have an important base and could provide homing and landing facilities. On the way to the South Pole, the T-4A would pass over the US and near the Panama Canal.

° ° °

Soviet Aviation Day, since last year scheduled for the first Sunday following the longest day of the year, should come on June 22. Last year's show was rained out.

° ° °

Top Russian physicist, Peter Kapitsa, is looming large in the Soviet atomic aircraft program. The Russians have said they are working on such an airplane, and Kapitsa himself has made public statements on some of the problems encountered.

Kapitsa also was on the Soviet Earth satellite committee, first announced in 1955—presumably only after the Russians were quite sure of what they could achieve. The fact that Kapitsa has discussed the development of an atomic airplane in the Soviet press indicates that the Russians already are well along in this field. US congressmen who have journeyed to Russia have confirmed Soviet atomic aircraft developments.

° ° °

The Soviet "dirty" nuclear bomb, reported from Europe to have been a Russian "accident," might have been something much bigger. There is no indication as yet, but the heavy radioactivity that came from the Soviet "dirty" test weapon could have been from a cobalt bomb, which would raise radioactive dust retaining deadly qualities longer than a hydrogen weapon.—END

Space Agency's First Problem:

LAUNCHING IN CONGRESS

By Claude Witze

SENIOR EDITOR

WASHINGTON, D. C.

THE Administration's bill to establish a National Aeronautics and Space Agency is being rewritten as this month's AIR FORCE goes to press. The job is being done in an atmosphere filled with brickbats and apprehensions, almost all of them figments of lively imaginations.

In view of the sound advice given by a gallery of America's most competent scientific and military experts before House and Senate committees, the current storm is almost incredible. The dark clouds, in our opinion, can be attributed in the main to two things—unbalanced reporting in some segments of the daily press and an unbalanced speech delivered on the floor of the US Senate by Clinton P. Anderson, Dem., N. M.

"Defense Official Cool to Space Bill," says a newspaper headline. It is accompanied by a picture of Roy W. Johnson, chief of the Advanced Research Projects Agency, with a caption saying he "opposes a civilian space agency." There are other examples, attributing disfavor for the Administration bill from such important Administration people as Defense Secretary Neil H. McElroy and Malcolm A. MacIntyre, Under Secretary of the Air Force.

Far from opposing a civilian space agency, Mr. Johnson went on record in favor of one. So did Mr. MacIntyre, and both of them joined witnesses who said the new agency logically should be the National Advisory Committee for Aeronautics with a new designation, new orientation, increased responsibility, and more money. Mr. McElroy himself said at the Pentagon, "We are favorable to the formation of some civilian agency which will give direction to the nonmilitary part of these space programs." Yet the morning paper headline declared: "McElroy Opposes Civilian Space Rule."

The bone being gnawed at this stage is a clause in the Administration bill that is certain to be revised before our readers get this report. Here is what the clause says in the original:

"The Congress further declares that such activities [research in space] should be directed by a civilian agency exercising control over aeronautical and space research sponsored by the United States, except insofar as such activities may be peculiar to or primarily associated with weapon systems or military operations, in which case the agency may act in cooperation with, or on behalf of, the Department of Defense."

This has created an issue, best defined and settled in the testimony of Lt. Gen. James H. Doolittle, Chairman of NACA and first president of the Air Force Association.

"One of the first questions most often asked about our national space program," he told the Senators, "is how there can be a clear-cut distinction between the space projects which should be under military control and those which should be under the NASA. The answer is that on the one side there will be projects clearly and obviously military, and on the other side, projects clearly and obviously civilian.

Wide World Photos, Inc.

USAF's Maj. Gen. Bernard A. Schriever, Commander of the AF's Ballistic Missile Division, faces House Space Committee. From left: Chairman John McCormack (Mass.), Rep. James Fulton (Pa.), and Rep. Kenneth Keating (N. Y.).

"In between, there will be projects with both military and civilian interest. Here, and I expect this will include many projects, there needs to be the closest sort of consultation to determine whether NASA or the Department of Defense [ARPA] should do the work, or whether it should be done cooperatively."

"For forty-three years," he added, "NACA has worked most effectively with military services. I would expect this ability to be carried over into NASA."

Then, with the keen insight General Doolittle has shown in his entire military and scientific career, he added:

"The caliber of the men and their desire to get the overall job done in the national interest will be even more important in handling this matter than the precise language in the bill."

General Doolittle did not turn his back on the Defense Department's vested interest. He said he supports the plea of the services to work on projects of military value, including their requirement for freedom to conduct research, or contract for such research, on space matters "that may offer promise of future military value."

It is true that concern over this issue has been voiced by Messrs. Johnson, McElroy, and MacIntyre. At one point ARPA's director bluntly asked Congress to fix the bill so it could leave no doubt about the military prerogatives. He said that if Defense decides it wants to put a man in space for military reasons, "it should not have to justify this

(Continued on page 25)

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activity to this civilian agency." At one point he offered, and withdrew, a suggested rephrasing of the controversial clause.

The Defense Secretary gave his blessing to Johnson's viewpoint and expressed confidence in the ability of NASA and the Pentagon to work together. McElroy said the bill may be revised, but not "because the Department of Defense is unhappy about the protection of its interest in outer space."

For the Air Force, Mr. MacIntyre said he interpreted the language of the bill to mean neither NASA nor the Department of Defense would be dominant. He said, at least by implication, that if his interpretation is not correct the language should be changed. In reply to questions, Mr. MacIntyre said he wants to make sure there will be no deadlocks in the "twilight zone of dual usefulness."

Probably more serious than this rhubarb over the semantics of joint responsibility is the harangue delivered in the upper chamber by Senator Anderson. The gentleman from New Mexico happens to be vice chairman of the Joint Committee on Atomic Energy as well as a member of the Special Committee on Space and Astronautics. Looking under the bed, the first alarming thing he saw was an omission—the Administration's space bill makes no mention of nuclear propulsion.

Neither, of course, does it mention diesel engines or rubber bands. Properly the bill does not go into the possibility of utilizing specific forms of propulsion, but to Mr. Anderson this is a slight to the Atomic Energy Commission. In addition, he indicated to the press, he sees an anti-nuclear-power plot sponsored by the manufacturers of more conventional engines and fuels. (This is a crack he made in the corridor immediately after hearing testimony from General Doolittle, an oil company executive.)

In support of his case, the Senator gave it as his opinion that nuclear power is suggested by the fact that launching vehicles for larger satellites will need thrusts of over a million pounds. He overlooked another fact, that a nuclear rocket (AEC's Project Rover) will contaminate the atmosphere. Strongest possibility is that it will not be used in any spacecraft until a chemical rocket, workhorse for boost propulsion, has lifted the vehicle to a harmless altitude.

Senator Anderson also finds something sinister in the composition of the proposed National Aeronautics and Space Board, on which the bill would put eight persons from government agencies and nine from outside, "eminent in science, engineering, education, or public affairs." The old NACA committee also has seventeen members, ten from government and seven from private life.

The Senator sees an "odious characteristic of private control" threatening NASA, and at the same time accuses the Air Force of seeking to hog the show, less in the interest of national defense than to provide billets for its officers. (Later, Senator Anderson, on the floor of the Senate, publicly apologized to the Air Force for this statement and withdrew it from the record.) In that connection he quoted Dr. Simon Ramo of the Ramo-Wooldridge Corp., as saying ninety percent of the space program must remain under military control. He suspects Dr. Ramo also fears a shift that would force him to do business with a civilian agency instead of USAF's Ballistic Missile Division.

Well, the history of the Ramo-Wooldridge management over our ballistic missile program and the pioneering of the Air Force in regard to the space mission both are on the books for all to read. Nearest to operational readiness is the Douglas-built Thor IRBM, and it may be the best-managed weapon system development program in modern history. It is true that Ramo-Wooldridge has been paid something like $60 million out of $4 billion in total expenditures. But without the R-W-Ballistic Missile Division management team, there wouldn't be a $4 billion program by this time and no Thor.

Adm. Lewis L. Strauss, chairman of the Atomic Energy Commission, was a witness before the Senate committee, and he did not display any misgivings about the objectives of the bill. He said he expects NASA will call on the AEC for help in the field of nuclear propulsion. Naturally, the Admiral doesn't give a hoot if NASA is entirely outside the bailiwick governed by the Joint Committee on Atomic Energy. Senator Anderson can worry about this all by himself. It is sad that in expressing his concern he found it necessary to impugn the motives, morals, and competence of so many outstanding Americans.—END

Wide World Photos, Inc.

Lt. Gen. Donald L. Putt, USAF Deputy Chief of Staff, Development, confers at Capitol with NACA's Dr. Hugh Dryden.

The bill "to provide for research into problems of flight within and outside the Earth's atmosphere, and for other purposes" was introduced in the House by Rep. John W. McCormack, Dem., Mass. (H. R. 11881), and in the Senate by Lyndon B. Johnson, Dem., Tex., and Styles Bridges, Rep., N. H. (S. 3609).

Major provisions of the Administration proposal were indicated in a White House message printed in the May issue of AIR FORCE. Highlights of the bill:

- It abolishes the forty-three-year-old National Advisory Committee for Aeronautics and transfers its property, personnel, funds, and records to a new National Aeronautics and Space Agency.
- The NASA will be headed by a director, appointed by the President with advice and consent of the Senate. Salary is fixed at $22,500 a year. Dr. Hugh L. Dryden, present NACA director, is generally accepted as the leading candidate for the post.
- A seventeen-man National Aeronautics and Space Board, with a chairman designated by the President, will meet at least four times a year and give advice on policies and programs. The Board may make recommendations on the choice of a director and shall be consulted by him on major decisions but he remains the top executive, responsible only to the President.

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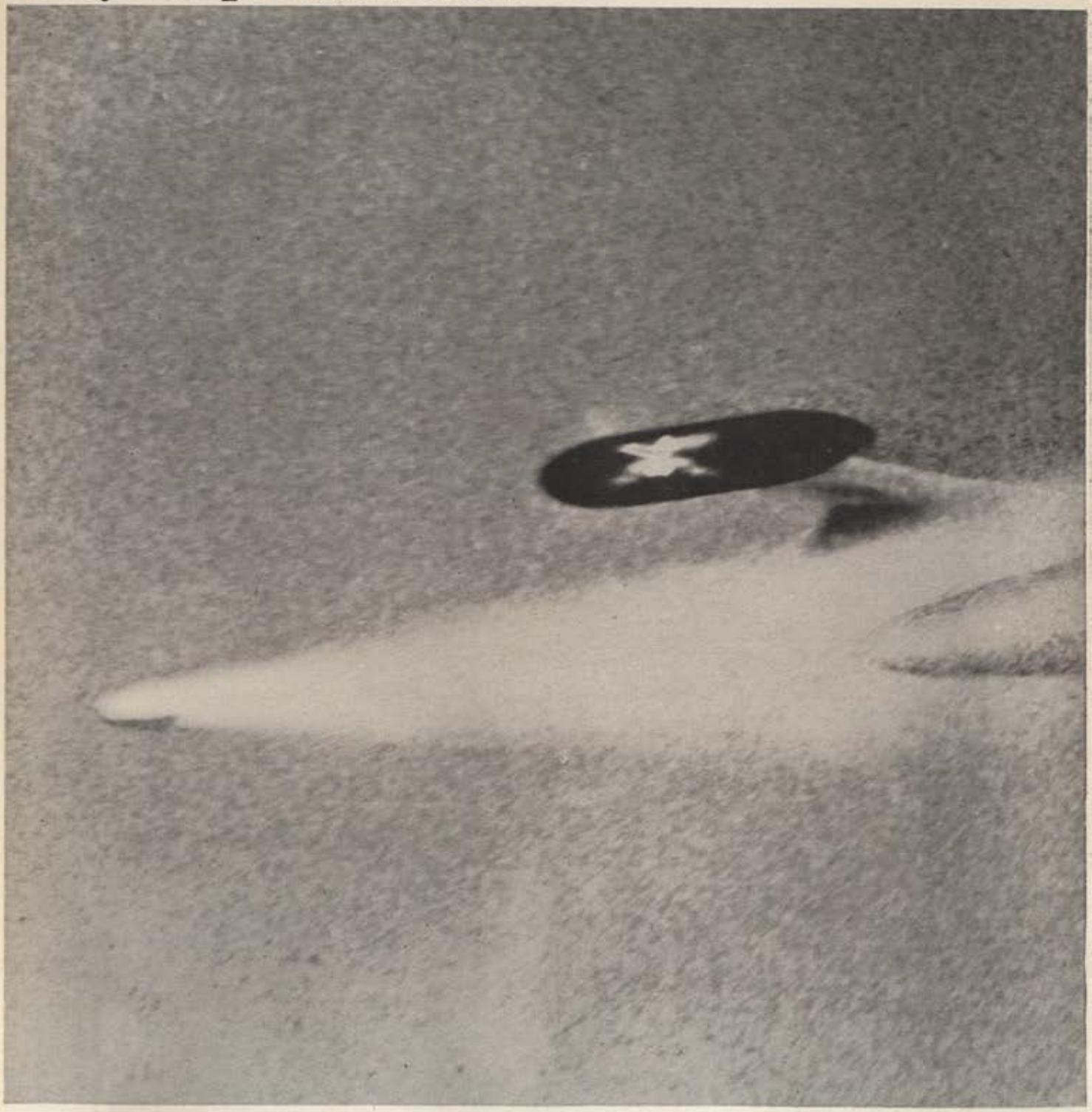

One-shot rocket blasts entire attacking fleet

Early last summer at Yucca Flats, Nevada, military observers saw the first demonstration of a new concept in defense weapons—the Douglas *Genie*...

Today this formidable nuclear missile is on operational duty with the Air Force—is the primary air-to-air defense missile in the U.S. arsenal.

The stubby *Genie* rocket is compact enough to be handled by a fast interceptor — yet can knock out an entire fleet of bombers with a single hit or a near miss. Designed primarily for use against high altitude jets, *Genie's* atomic warhead can be fired without radioactive fallout. It is thus usable against

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sneak attacks over our own or friendly territory.

Rapid development of *Genie* from design and test stages into quantity production is typical of the speed and thoroughness of the Douglas approach. To date Douglas has produced almost twenty thousand experimental and operational missiles for the Army, Navy and Air Force in *all four major categories:* air-to-air, air-to-surface, surface-to-air and surface-to-surface.

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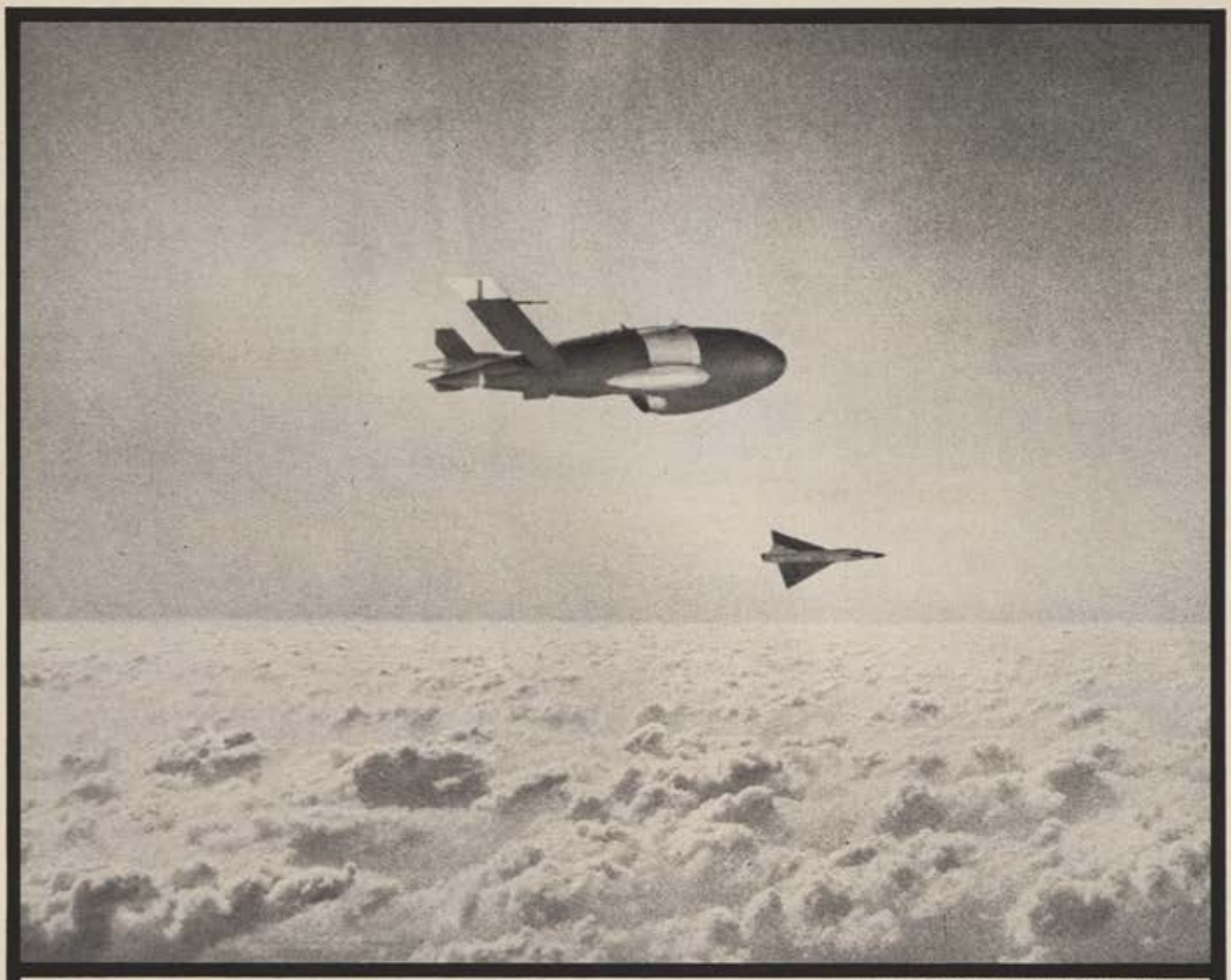

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Developed by Ryan for the Air Force (Q-2A), Navy (KDA-1) and Army (XM21), the Firebee is in volume production and operational use. It is being fitted with special radar and infra-red reflective devices for simulating varied target characteristics and providing broader missile-target compatability. The Firebee can be equipped with wing pods to carry added fuel... a warhead... photo or television reconnaissance gear.

The Firebee is an example of Ryan's skill in blending advanced aerodynamic, jet propulsion and electronics knowledge to produce a highly successful solution to a complex aviation problem... meet a vital military need. Other examples are the Air Force-Ryan X-13 Vertijet and Navy-Ryan AN/APN-67 automatic navigator for global jet flight.

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VIEWS & COMMENTS

Let's Not Over-organize... It's Fatal

The Navy's Rear Adm. Hyman G. Rickover had some incisive comment on the proper role of administrators in dynamic and creative organizations in a recent speech at the Polytechnic Institute of Brooklyn, Brooklyn, N. Y. Appropriately enough, Admiral Rickover's remarks, excerpts from which appear below, were delivered on April 19, the 183d anniversary of the ride of Paul Revere, whose exploit was a shining example of getting a vital job done expeditiously—and no paperwork at all, in fact.

MOST of the work in a modern society must be done by corporate bodies, simply because ours is a civilization of extreme specialization. Few tasks can therefore now be done by a single individual. Most tasks call for large numbers of people working together. Experience has shown this can best be done by establishing an organization. Someone must run things; lines of command and responsibility must be laid down and people must be allotted their several tasks. In any sizable organization there must be some people who merely maintain the proper environment in which productive work can proceed smoothly. They tend the physical plant and handle personnel matters—their talents are in housekeeping and administration, and their function is, or ought to be, entirely subordinate to that of the productive workers whose labors alone justify existence of the organization.

Whoever has had anything to do with organizations will have observed the tendency of the administrator to gain control over the whole corporate body. Yet it can be stated flatly that the success of any organization can be measured quite accurately by the relative position of the administrators and the productive workers. The successful organizations get along with a minimum of housekeeping staff and keep them confined to their proper place; those whose real work is declining almost always have swollen administrative staffs. Nothing worse can happen to an organization than usurpation of command by administrators. This is because a natural desire to enhance their own importance leads most administrators subconsciously to look upon the organization as an end in itself rather than a mere legal and administrative convenience. They are therefore natural boosters for size; they are inclined to foster expansion for its own sake—sometimes in inverse ratio to the amount of real work done; occasionally after production has all but ceased.

In this country we tend to turn every human occupation into a "business." We think that every organization profits by introducing what we term "business methods." But a businesslike attitude makes for efficiency only in purely routine matters. It is disastrous when applied to creative people whether they work in an educational institution, a research center, or a government department.

The role of the administrator is of necessity less important where creative intellectual work is done than where the work is routine. Any capable administrator can learn enough about the technique of routine production to organize it efficiently and to provide a proper environment for the worker. These are matters for which he has been trained. But few administrators possess the capacity to master the special fields in which creative brainworkers are expert; nor can they, as a rule, understand the mental processes of professional people and the atmosphere of intellectual freedom without which these people cannot work effectively. Without mastery of the subject and understanding of the people, there is little an administrator can contribute to improvement of the mental work done in his organization. Worse, he often becomes more of a hindrance than a help. Not infrequently, all he does is interfere with the professional staff and reduce real productivity by constantly bothering them with trivia. Nobody can waste as much time as a super-efficient administrator trying to run a group of "eggheads."

I fear that we have gone far toward lowering the output of our brainworkers by over-organizing them. We are drowning in paperwork. We are talking ourselves into a standstill in endless committees—those pets of the administrator. We are losing the genius we once had for improvisation. Nowadays nothing can be done without elaborate preparation, organization, and careful rehearsal. We have been diluting responsibility for making decisions by piling layers of supervisory administrative levels, pyramid fashion, on top of the people who do the real work. All of this has resulted in a dangerous lengthening of "lead time."

By lead time I mean, of course, the time which elapses between conception of a new idea and the moment when the idea has been transformed into a useful new object rolling off the production lines.

Lead time is an extremely important factor in military strength. Starting even, one nation will soon outpace another if it has no other advantage than ability to transform ideas more rapidly into mass-produced military hardware. We know that the Russians have overhauled us in the lead time for certain items which they have decided to concentrate on in order to achieve their goal of military and technological supremacy. We cannot permit this to go on. If over-organization lengthens our lead time, we must heed Thoreau's cry of "simplify; simplify."

The 'Why' Will Emerge

Why space research? In an anecdote which he included in his recent testimony to the Senate Special Committee on Space and Astronautics, Dr. James H. Doolittle, Chairman of the National Advisory Committee for Aeronautics, makes short work of objectors to scientific advancement.

THE question will inevitably and properly arise, what good will all this information be to the people of the United States? After all, they have to pay the bill, and it is a bill that annually, for years to come, will probably be counted in the hundreds of millions of dollars. I don't know all the good it will do and I doubt if any man alive today can give specific answers. But, in this connection,

(Continued on following page)

I am reminded of the story they tell about Michael Faraday, the English physicist, whose pioneering work in electromagnetics had a profound effect upon our later understanding of electrodynamics leading to useful electric power. About a hundred years ago, Mr. Faraday is supposed to have been asked, in the British Parliament, about the value of his electromagnetic experiments. His answer, so the story goes, was, "I can't tell you what it'll be good for. But I'll tell you this: one of these days you'll be taxing it."

I can't tell you precisely what of great value will come out of our moving into space to probe the secrets of the universe. However, I have the conviction—and in this I find myself in the company of some very wise men—that a century from now, perhaps much sooner, people will say that this venturing into space that we're planning now was one of the most practical, intelligent investments of our national wealth to be found in history. If we, in the United States, take the wisely bold action necessary to lead in exploiting the possibilities of space technology for science, all mankind will benefit. If Russia wins dominance in this completely new area, well, I think the consequences are fairly plain — probable Soviet world domination.

Candid Answers to Nuclear Question

The argument continues over whether or not nuclear tests should be stopped. Following is an excerpt from a speech delivered by the Atomic Energy Commission's Dr. Willard F. Libby at Amherst College, Amherst, Mass., a few weeks ago. He makes some cogent points about problems the country cannot overlook.

WHY should we continue nuclear weapons tests? The answer in its simplest form is, in my opinion, that they are necessary for the defense of our country and of the Free World.

Because we are a democracy, we are cast in the role of defenders, and we cede to totalitarian governments the role of aggressors. There is an enormous distinction in this statement of simple fact. The targets of the attacker are large (i.e., our cities). The targets of the defenders are small (i.e., enemy planes and missiles). The weapons of the defender, therefore, need to be far more sophisticated in design than those of the aggressor. They must be both more accurate and more numerous than the weapons of the aggressor.

We are now, as you know, in a transition period insofar as nuclear weapon design is concerned. In the case of every new weapon which has ever been invented, defense is late in overtaking the great advantage which accrues to the users of new weapons in surprise attack. We are just at the beginning of development of *defensive* atomic weaponry. Our position must be one of certainty that we cannot only retaliate against aggression but that we can blunt it if it comes.

Therefore, in defense of ourselves and our allies, we cannot place our dependence upon obsolete and obsolescent weapons systems and we cannot waive the use of defensive arms.

A further very important reason for continued testing is that we are in process of learning how to reduce the fallout from our weapons so their use in war would not necessarily bring the awful scourge of local fallout. There is absolutely no doubt that local radioactive fallout from surface-fired nuclear weapons, which receive an appreciable part of their energy from the fission reaction, is one of the two great threats of atomic war. It is estimated that an attack on this country could well cause millions of deaths in this way unless we had an adequate civilian defense plan for local fallout, which at the present we do not have. Were we forced to defend against an attack on NATO, the availability of tactical nuclear weapons of limited radioactive fallout would make possible a defense which did not endanger noncombatants and friendly countries by local radioactive fallout from weapons fired in defense. We must have further tests to complete this development in the smaller bomb yield range which is especially important for tactical use. To date we have accomplished this change only in the higher yields and further work is necessary for the kiloton class of bombs.

In view of these facts, I believe the defensive value of nuclear tests outweighs the hazards of radioactive fallout. Admittedly, this is a conclusion based on judgment. People may differ, but no one can claim that there are obviously overriding health or genetic considerations which require the halting of tests.

Facing the Truth

"Mutual deterrence" is a popular term these days, but how much credence can it really have?, Air Force Vice Chief of Staff Gen. Curtis LeMay asks. Following is an excerpt from significant remarks he made on the question recently at the annual convention of the American Newspaper Publishers Association, held a few weeks ago in New York City.

THERE is no threat to the security of the US that can remotely compare with the ever-present possibility of general war. Nuclear weapons and advanced delivery systems make general war a struggle for survival in near-absolute terms.

The military posture of the Soviet Union is a clear example of dedication to the development of overwhelming force. They have a large nuclear capability, modern and effective, backed up by sizable conventional forces. They can mount a two-sided offensive in peacetime. Their nuclear striking power can be used for atomic blackmail. Communist bloc conventional forces can be used as political pawns in lesser conflicts. These capabilities, supported by a controlled economy, give the USSR a safe basis on which to argue the case against nuclear weapons.

Even while propagandizing against nuclear weapons, the Soviet Union retains a general war capability in nuclear striking power and declines to join in genuine steps designed to reduce that power on both sides under adequate safeguards.

This attitude and capability leave the threat of general war a very real one in my mind.

The general war I speak of may come as an outgrowth

(Continued on page 33)

the S-Cope

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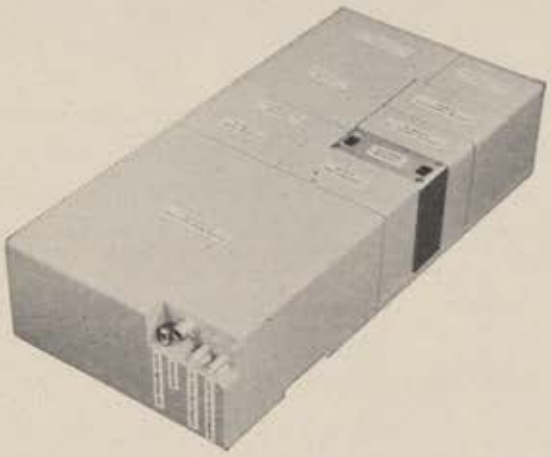
OF WHAT'S HERE AND WHAT'S COMING

from Electronics Division, Stromberg-Carlson, A Division of General Dynamics Corporation, 1466 N. Goodman Street, Rochester 3, N. Y.

THE GOOD NEW DAYS

In the field of aerial navigation, technological progress has been so rapid that much of the equipment in use only a few years ago seems rather primitive. An excellent example of the new methods of guidance is the NAVTAC system by Stromberg-Carlson.

This is our new en route navigation and instrument landing system—an integrated assembly of functional modules for modern high-performance aircraft which puts them on the correct approach and glide path and finally on the runway.



TACAN Plus

To arrive at the NAVTAC system, we started with the airborne unit of TACAN, which is familiar to you as the principal short-range navigation system, and of which we are the chief producer. To it we added a marker beacon receiver, glide slope and runway localizer for instrument landing situations.

The glide slope and runway localizer receivers operate in unison. Their channels are automatically selected in pairs via a common crystal turret containing the glide slope and localizer oscillator crystals. A common control box enables the operator to choose the desired ILS channel, while the marker beacon works independently. A new, light-weight TACAN unit provides accurate navigational information, including range and azimuth data.

The Modular Approach

We have used the modular approach in packaging the NAVTAC system. The result: you can vary the configuration of the package. I.e., the individual modules are relatively independent and can be separated up to distances of several feet without adversely affecting performance in the slightest.

Total volume of the equipment is 1155 cu. in. And if a single package happens to be the preferred configuration, the overall dimensions are 5" x 10½" x 22". Weight: 47.5 lbs.

Conditions: Rugged

Of course, versatility and campactness are not enough for today's high-performance aircraft, so we planned for rugged environmental conditions, too.

Accordingly, the NAVTAC assembly has an operating ambient temperature range of —60C to +125C. And the equipment is fully efficient at extremes of altitude, too. A pressurized module for the TACAN high voltage transmitter circuits permits operation at 0 to 70,000 ft.

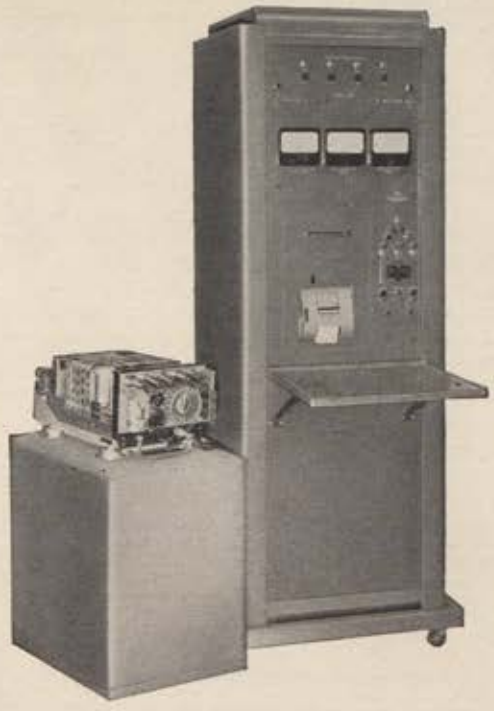
Also included in the design is the capability of performing complete pre-flight confidence tests on the equipment with the use of a small auxiliary test set. You need neither actual nor simulated beacon signals.

To sum up: we feel that the NAVTAC package contains the optimum combination of navigation and ILS equipment for the high-performance aircraft (military and civilian) which will be operational in the coming decade.

RAMIFICATIONS

Ever since 1953, when we first entered the TACAN field, we have found our activities here expanding to huge proportions. This situation has of necessity taken us into related fields, of which test equipment is an excellent example.

We recognized early the need for automatic test



devices to reduce the test time required by equipment as sophisticated as the ARN-21 airborne TACAN unit.

Covering All Bases

First, we designed and developed the TACAN Automatic Acceptance Tester. This cycles TACAN through tests on all 126 RF channels for automatic testing of:

1. Transmitter center frequency. This test verifies the correct placement of crystals in the turret assembly.
2. Transmitter power output. This test determines whether the second pulse of an output pair is 1 kw peak or more.
3. Receiver sensitivity. Here we determine whether the receiver will function properly at an input signal level of —76 dbm.

Space permits only a mention of other automatic test devices, namely: 1000mc beacon simulator, ramp test set (for flight line testing of TACAN-equipped aircraft), and 1000mc peak power test set.

All the above are items which we are currently producing or can furnish on short notice.

NEW DATA LINK

We've developed a new data link—full name: Light Aircraft Binary Information Link, generally designated by its initials as LABIL.

The LABIL Data Link provides rapid automatic transmission of flight information from light aircraft to central ground receiving and control locations. Data entered into the link by the aircraft pilot or observer is transmitted automatically on demand from the ground through the voice channel of *existing communications equipment.*

The ground-based data checking and printing equipment is fed directly from the communications equipment audio output. Reliability in printed data is of the highest order, and speed of transmission is limited only by the bandwidth of the accompanying communications equipment and/or print-out device.

On Land, Too

While LABIL is designed specifically for light aircraft application, the small size, light weight and low power drain of the airborne unit—plus the fact that the basic form of the data transmitted is quite general (arbitrary letters and figures)—make the equipment equally applicable to any other situation where data reports from mobile remote locations must be made quickly and reliably. Tanks and observation vehicles are typical examples.

If you'd like more details on any of the above matters, *or if you have a problem you'd like us to tackle,* please let us hear from you. Write to Military Marketing Dept. at the address on the masthead.

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of local conflict. Since the USSR would sacrifice any subsequent element of surprise, this case seems less likely than the possibility that general war will begin with a surprise attack. In *either* event, the issue is nothing less than survival.

You will wonder, perhaps, whether this threat is on the wane.

Various supporting reasons for this idea have been advanced—including the fact that relative nuclear parity will be a constraint on general war. There *is* constraint on general war, and in fact on *all* conflict, when nuclear weapons are clearly understood to be involved. But this constraint, derived from nuclear capability is a far cry from being "mutual deterrence." Let me elaborate briefly on this issue.

Life insurance does not eliminate the threat of death; it is a provision to ensure *family* survival. The prudent man does not assume immunity to disease just because he pays his policy premiums regularly.

Preparedness does not eliminate the threat of general war; it is a provision to ensure *national* survival. The prudent nation does not assume immunity to general war just because of regular payments for preparedness.

This is not to say that general war, like death, is inevitable.

General war *is*, however, inevitable for *any* nation in the path of Communist bloc ambitions and unable to achieve a deterrent posture alone, or in combination with others determined to stay free. General war *is* death for the nation that cannot provide or share, in the event deterrence fails, some measure of survival during and *after* the decisive phase.

The Air Force believes in deterrence. We do not, however, believe in the false security that derives from believing in the myth of *mutual* deterrence. In our view there *is no* similarity between the US and the Communist bloc when it comes to the use of aggression as a national instrument. We will not enter into conflict except in defense of ourselves or the Free World. The Communist bloc will aggress whenever and wherever the opportunity looks profitable. We did not aggress while possessing nuclear monopoly nor with clear superiority; they are under no such moral restraint should *they* achieve nuclear superiority.

As to deterrence, there is no more transitory state in the world's affairs than that of stalemate. The human impulse is for change and improvements. Stalemate is a natural enemy of progress, even progress in warfare. Our probable enemy is a believer in progress—in fact he is a demonstrated success at it.

The general war threat was never at a lower ebb than when the US possessed an atomic monopoly. It was at a low ebb when the US possessed atomic superiority. With every passing day the general war *threat* is increasing simply because the Soviet Union, which believes in aggression, is achieving a general war capability where none existed before. Their progress is marked and their confidence is real. Where before they had no capability for general war, today they have a nuclear stockpile, 25,000 operational aircraft, and a strong scientific and technical research and development program. The danger of general war is on the increase as these capabilities are molded to fit the desire of the Soviet Union for world domination.

It's Not Quite So Easy

A radical view of R&D, calling for more competition, "duplication," and "confusion," was expressed by Burton Klein writing in a recent issue of Fortune *Magazine. A portion of his argument, a view of exploratory research, follows:*

THE central fault with the current setup for planning and directing research and development is simply this: the uncertainties of the future cannot be resolved by pretending that they are certainties. Research and development is not a business that can be carefully planned and directed, not if you expect to make progress rapidly and economically.

To make better progress in military R&D, one thing we must do is put more emphasis on exploring many avenues of technology without insisting that a precise goal wait at the end of each avenue. This means both more basic research and more exploratory development. For example, scientists have suggested various possibilities for a manned flight to the moon, but until more experimental evidence is in, we can't say whether the successful development of any one possibility is ten or fifty years away. All we can be sure of is that the more possibilities we explore and carry into the preliminary development stage—in new kinds of fuels, power plants, structural materials, etc., the sooner success will be achieved. For in R&D success is not achieved by coordinating committees guarding against duplication; it is achieved by getting many ideas into practical demonstration.

This procedure need not be enormously expensive. To discover whether a new propellant, a new power tube, or a radically different type of aircraft engine or aircraft structure is likely to work, it is not always necessary to carry development through to the military prototype stage. Ordinarily the cost of bringing a new idea to a practical demonstration—the cost of determining whether it is likely to be a "right" answer—is but a small fraction of what is required subsequently to turn it into a useful military device. For example, it cost but $30,000 to bring the jet engine to a practical demonstration. But to develop a jet engine suitable for use in operational aircraft takes something between $50 million and $100 million. The expensive part of R&D is not the exploratory work but the subsequent development.

The Newest Revolution

PEOPLE sometimes forget that it takes business decisions and plants and manpower to translate into reality scientific and technical ideas. This was true of the First Industrial Revolution, when the concepts of the steam engine and the spinning jenny gave rise to new machines, new markets, new factories, new products. This is just as true in our times. That is why future historians may very well refer to our age as the Age of the Second Industrial Revolution. I say this because industry is reshaping our pattern of living by applying to it the tremendous scientific and technical concepts behind nuclear energy, ballistic missiles, moon rockets, advances in manned flight, electronics, and automation.

From an address by Richard S. Boutelle, President, Fairchild Engine & Airplane Corporation, at the company's recent Stockholders Meeting in New York City.—END

Pentagon Reorganization—An Editorial

Let's Stop the Bickering

By Peter J. Schenk
PRESIDENT, AIR FORCE ASSOCIATION

IF THE nation fails to obtain the unified military organization it needs in these troubled times, the blame can be laid squarely at the door of Navy partisans led by the Navy's self-styled "civilian arm," the Navy League.

Last month, as Mr. Carl Vinson and his House Armed Services Committee were winding up hearings on H. R. 11958, the bill designed to implement the President's Pentagon reorganization plan, this fact stood out crystal clear.

The list of witnesses who have supported the bill is an imposing one. As was to be expected, Administration spokesmen like Secretary of Defense McElroy and other Pentagon civilian officials were firmly behind the President.

Gen. Maxwell D. Taylor, Chief of Staff of the Army, testified for the bill on the grounds that the present "setup in the Pentagon is defective in that we do not have a permanent command post ready to conduct military operations at any hour of the day." General Taylor pointed out that the Secretary of Defense is charged with great responsibility and said he (Taylor) was "on the side of giving authority to the man who has the responsibility."

Gen. Thomas D. White, Air Force Chief of Staff, liked the idea of the Secretary of Defense acting "to get things done," rather than acting as monitor or referee. He admitted that "some of the things which we consider the vested interest of the Air Force might go by the board" but called this secondary to "the over-all interest of national security."

Adm. Arleigh Burke, Chief of Naval Operations, was not so enthusiastic. He was worried about divorcing the Chiefs from the day-to-day operations of their services and wanted safeguards in the law so as to "not permit [a] future Secretary to do drastic things which are not intended at the moment."

Gen. Randolph McC. Pate, Marine Corps Commandant, was worried about the autonomy of his corps, even though it is the only military service now protected by law as to size and composition. He was afraid the Marine Corps might get what he called "the bum's rush."

As you know, the Air Force Association is solidly behind the President in this matter. We have made our views known in letters to both House and Senate Armed Services Committees and to the White House, and AFA has offered to testify on behalf of the legislation. The Air Force Association's California Wing adopted a strong resolution in favor of the bill, and I expect that other AFA units will do likewise. Over the years, no organization has been as firm in its stand on unification of our defense effort as has the Air Force Association, and I am proud of our consistency.

In backing the President's plan we have been joined by the Association of the United States Army. We welcome their support and are encouraged by it.

But as expected, the Navy League is doing its best to torpedo the plan, just as it torpedoed true unification more than ten years ago. This time, though, the Navy League cannot point to unanimity among its membership. Its Philadelphia Chapter has come out sharply in contradiction of the stand of the national organization.

Our military elder statesmen, the two former Chairmen of the Joint Chiefs of Staff—Gen. Omar N. Bradley and Adm. Arthur W. Radford—are heartily in accord with the reorganization, and have so testified. So is the present Chairman, Gen. Nathan F. Twining. So are Jimmy Doolittle and Tooey Spaatz.

Opposition to the President's plan has centered around the argument that it would create a "Prussian General Staff," or pave the way for the proverbial "man on horseback," or both. But these are *straw* "men on horseback"—bogeys to divert attention from the real issue. I am sure that few Americans, familiar with our political system of checks and balances, will be fooled by them. Smoke does not always mean a fire. Anyone with military service knows it often really means that there's a *smoke generator* at work.

Let us not be deceived by the smokescreens. The issue is clear. Either one supports the President's reorganization plan or one supports the *status quo*. And it is difficult to see how any thinking individual, familiar with the implications of intercontinental missiles and thermonuclear weapons, can be a partisan of things as they are.

At this writing, the ultimate shape of the reorganization legislation is dim. That there will be changes in the language of the bill seems certain. But I sincerely hope that there will be no compromise with principles.

No one in his right mind expects this plan, or any plan, to be a substitute for weak or incompetent leadership. Organizational charts cannot replace either brains or guts. A bumbling Secretary of Defense will run a bumbling Department of Defense, no matter what the law might say, But the reorganization plan will permit an able Secretary of Defense—and fortunately we have one in Mr. McElroy—to do a better job than he can today.

Grass-roots sentiment in favor of reshuffling the Pentagon organization is running high. Editorial support of the plan is well-nigh unanimous from coast to coast. In the House of Representatives itself there is strong pressure on Mr. Vinson and his committee to report out a bill and get it on the floor.

Most encouraging of all, perhaps, is the outspoken support of another influential Democratic veteran of the House, Rep. Clarence Cannon of Missouri. As Chairman of the powerful House Appropriations Committee, Mr. Cannon knows a bit about the military, too. In a ringing floor speech, which received a standing ovation, he said:

"It is high time we put an end to this insane bickering between the services, and eliminated billions of wastage, and begin to develop sufficient military strength to keep us out of war."

We think so too.—END

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Men of the RCAF—aircrew and groundcrew alike—
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"SAC" . . . *the mailed fist and the velvet glove*

The greatest factor in keeping the cold war cold is our Strategic Air Command. This group of men has the supreme responsibility of preserving the peace of the world and its harnessed might is our best defense. The esprit de corps of these dedicated men has been whetted to a razor's edge and nowhere on earth is there a finer example of teamwork. Evidence of this kinship is the Kaman crash rescue helicopter – a velvet glove to stand on the alert with SAC's mailed fist.

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PIONEERS IN TURBINE POWERED HELICOPTERS

SHOOTING THE BREEZE

WITH THE EDITORS OF AIR FORCE MAGAZINE

It's not the fashion to question the views of competent scientists, but a panel discussion of the uses of man in space capability held at the AFOSR Astronautics Symposium in Denver a few weeks ago (*see page 48*) earned audible grumbles in the crowded conference hall.

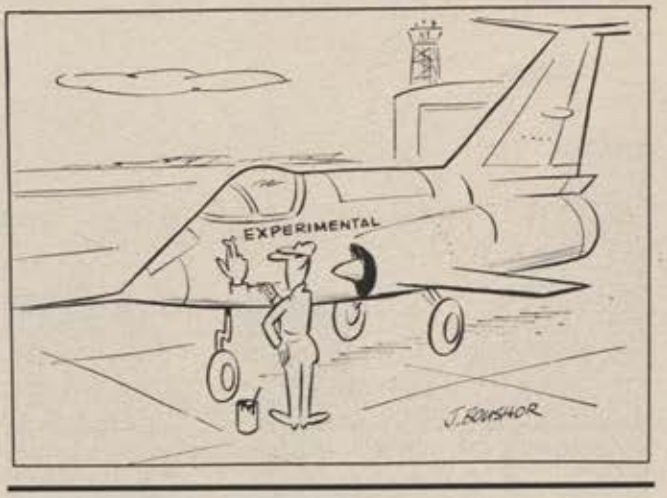
With the sole exception of USAF Col. Paul Campbell, space medicine pioneer, the panel minimized man's possible contribution to the gathering of scientific data by space vehicles. One panelist, Dr. Fred R. Whipple of the Smithsonian Astrophysical Laboratory suggested that man's purpose in space might be to eliminate the need for man in space. Another, Dr. William H. Pickering of the University of California's Jet Propulsion Laboratory, relegated human passengers to the role of mere noise and weight-adders. Happily, there was some acknowledgment that man might come into his own when the time to land on other planets came.

The strong dissenter, Colonel Campbell, expressed himself in vehement and what sounded to many delegates like more reasonable terms.

Said Dr. Campbell on the potential of manned laboratories in space:

"The presence of a trained man in the space laboratory is just as essential as it is in an Earth laboratory. He can at the same time be the observer and the observed. He can use scientific judgment to adjust to unexpected developments in the course of an experiment. He can observe and take advantage of chance happenings which, in an unmanned laboratory, might prematurely conclude an experiment.

"He is a relatively lightweight, low-energy-consuming, versatile computer with judgment, or we might say, horse-sense. He will always be the *father* of, and never the *child* of, a computing machine." The italics are ours.



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If ever there was a sellout, it was the March issue of AIR FORCE—the Space Weapons Handbook of Military Astronautics. From the day the issue appeared, AFA's Washington, D. C., office was flooded with telephone calls and letters asking for extra copies. In anticipation, we printed 108,000 copies, but now the cupboard is bare. What particularly gratified the staff that teamed to produce the special issue were the many compliments on the Handbook's readability and its making understandable a subject that to many had been a relative (and unnecessarily so) mystery.

☆

Project 20/20, symbolizing twenty years of progress and service and looking ahead to another such two decades, is the theme of this month's twentieth anniversary celebration of the passage of the Civil Aeronautics Act.

On the committee helping to plan the observance across the country are: Dr. Leslie Bryan, chairman of the General Aviation Facilities Group; Gen. Orval R. Cook, president of the Aircraft Industries Association; Rep. Oren Harris, chairman of the House Committee on Interstate and Foreign Commerce; Sen. Warren Magnuson, chairman of the Senate Committee on Interstate and Foreign Commerce; James T. Pyle, CAA Administrator; Postmaster General Arthur E. Summerfield; Stuart G. Tipton, president of the Air Transport Association.

☆

AFA members can swell with pride at the fine story on the aims of this organization and its contributions to air-

(Continued on following page)

Skin and core construction of this fiberglass reflector are the lightweight key to its projected utility in airborne fire-control systems. A product of the Narmco Manufacturing Co., the reflector is forty inches across, weighs about four pounds, thereby materially reducing the inertia loading on the drive mechanism. As the photo indicates, Miss Breezecake for June has no trouble at all holding it up.

power as related in the respected *Army-Navy-Air Force Journal* issue of May 10. The article, part of a series on the major service associations, listed many of the activities of AFA, including descriptions of the Flight Pay program, the missile seminars for newsmen and industry, the annual conventions and airpower panoramas, and the growing Airpower Book Club, plus the nationwide membership structure.

☆

Navy League order of battle against the President's reorganization plan for the Defense Department *(see editorial, page 34)* was not quite as solid as one might have expected at first glance.

Reported the Philadelphia *Inquirer* of April 19:

Photo courtesy The Columbus Dispatch

It took some extra planning, but SAC crewman Lt. James McElroy, Lockbourne AFB, Ohio, managed to get his family to church Easter Sunday despite being on alert. Chaplain Howard B. Franzen welcomes the McElroy family. The flight gear might be called the "SAC-look" for men.

". . . The Executive Committee of the Philadelphia Council of the Navy League at a meeting yesterday said that it 'respectfully takes exception to the position [on the plan] as stated by Mr. Bergen [John J. Bergen, League President], and believes that no criticism or opposition should be encouraged by the Navy League until the Congress and the citizens of this country have a full opportunity of examining the Reorganization Plan in detail. It is the firm conviction of the Philadelphia Executive Committee of the Navy League that when all of the facts in relation to the new Pentagon program are considered, the Congress and their constituents will have had ample opportunity to make an evaluation for themselves.'"

☆

With no attempt at judgment of the merits of either side of the argument, it's refreshing and indicative of the one area in which we definitely surpass the Russians—the freedom to discuss our own future—to report on the full-page debate on nuclear test continuation, as published by the Colorado Springs (Colo.), *Free Press*. One Saturday, the National Committee for a Sane Nuclear Policy took a full-page ad to call for US cessation of tests. The next Saturday, *Free Press* readers picked up their papers to read another full-page ad on the same subject. Robert Heinlein (he's the famed science fiction writer) and Virginia Heinlein denounced in bold copy the ideas of the Committee and what they called its "scare talk." It's hard to imagine such a debate in the "worker's paradise."

☆

TV viewers are in for a real Air Force treat come fall when a new half-hour dramatic series based on the adventures of Milt Caniff's "Steve Canyon" gets under way. Sponsorship will be by Liggett and Myers, and at this writing, major networks were vying for broadcast. The series will stress technical realism, have exciting and authentic Air Force background, and should really expand the Canyon horizon—already deservedly wide.

☆

What will undoubtedly be a valuable audio-visual aid for explanation of some of the problems of the new age of space is the new series of 16-mm. films released by the University of California, entitled "Space Technology." Narrators of the seventeen-part series, available on a rental basis, range from Dr. Hubertus Strughold, famed USAF "Father of Space Medicine," and Dr. Joseph Kaplan of the US IGY committee, to Dr. H. Guyford Stever of the NACA, and include an impressive array of space technology luminaries.

Information on obtaining the film may be gotten by interested organizations by writing to the Department of Visual Communications. Address is University Extension, University of Los Angeles, Los Angeles 24, Calif.

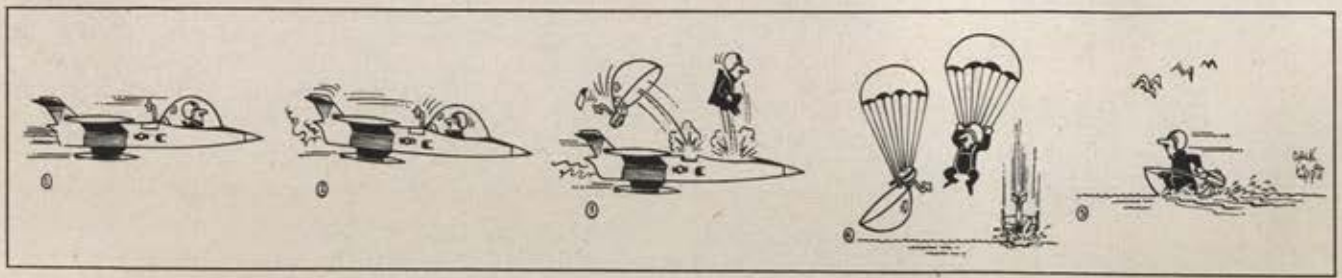
☆

For an informative "man-in-the-news" profile of the airman *US News and World Report* calls the "man the Kremlin fears most," see that magazine's May 2 issue, containing a three-page article on SAC commander in chief Gen. Thomas S. Power. The story gives a rundown on the SAC mission of deterrence and the background General Power brings to what is certainly one of today's most fateful jobs.

☆

What will probably save us, this column continues to

(Continued on page 41)



The General Motors Matched Power Team of Allison Prop-Jet Engines and Aeroproducts Turbo-Propellers Brings Flight-Proved Jet-Age Power to Airlines of the World in The New Lockheed Electra

ELEVEN AIRLINES CHOOSE ALLISON PROP-JET POWER. The flexibility of Allison Prop-Jet power enables the Lockheed Electra to solve major problems facing the airline transportation industry—bringing jet-age speeds and comfort to medium- and short-range flights *economically*. These flights make up more than *90% of all air travel*. The Electra, with its four Allison Prop-Jet engines and Aeroproducts Turbo-propellers developing a total of 15,000 horsepower, can operate from existing airports *quietly* and *efficiently* under present air traffic control patterns. Electra purchases totaling $300,000,000 have been placed by 11 world airlines—a demonstration of their confidence in the ability of this luxurious airliner to fulfill its mission for air travelers everywhere.

ALLISON DIVISION OF GENERAL MOTORS, Indianapolis, Indiana

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Lighter than Air

During World War II, a WASP was testing a BT-13 after a 100-hour inspection. She had trouble landing in a crosswind, and finally made a "controlled crash" after bumping nearly the entire 5,000-foot length of the runway. The tower officer, who had watched this spectacle, called the maintenance officer to make sure he checked the aircraft flight report to see how the WASP had written up the hard landing. The maintenance officer found these words in a dainty, feminine script:

"Both wings heavy. Aircraft makes consistently bad landings."

LT. COL. CARROLL V. GLINES
Air Command and Staff College
Maxwell AFB, Ala.

° ° °

This chuckle-and-snort corner is devoted to true unpublished anecdotes about Air Force life. Send us yours. We'll pay five bucks for each one published. All stories that we use become the property of AIR FORCE Magazine.

maintain, is our sense of . . . well, note this Washington nugget—a story now making the rounds in the town that puts New York City to shame in the business of stories making the rounds.

After many months of grimness, most of it going back to the days of Charlie Wilson and Robert Tripp Ross, who took a lot of the fun out of their toil, Defense Department press office employees are regaining their old sense of humor. Some new signs have appeared on the wall in the Pentagon Room 2E761.

"If you don't understand it," says one of them, "oppose it."

But this is our favorite: "If the boss calls, get his name."

☆

Robert E. Rodwell, author of "The V-Force Partners of SAC" (*see page 65*), believes in direct research for his authoritative copy on British military aviation. With his manuscript, he sent along an addendum which is in itself an exciting document. Space alone prevented our full use of it.

Wrote Rodwell of his ride in a Vickers Valiant:

"These high flying and speedy jet bombers combine capability with crew comfort unlike any bomber before them. At nearly 50,000 feet, the Valiant cruised rock-steady under the . . . sky, vibrationless and with the muted engine making a barely perceptible whine. With the cabin pressurized to airliner standards and the complete absence of noise, one could ignore such restrictive ties as oxygen and intercom leads, and conversation was easy. Only coveralls and parachute, and the functional decor indicated one was flying in a military airplane, for the cabin conditions were suited to fare-paying civilians.

"Final touchdown was gossamer-light . . . a further advantage of the moderate wing loadings of the Valiant. Checks were started even before the end of the short landing roll, and were made throughout the long taxi back to dispersal.

"There the crew chief took over his expensive charge and the air crew went casually off to change for tea."

☆

On the need for space research, from Dr. Hugh L. Dryden's recent address to the Tenth California AFA Wing Convention. He's Director of the National Advisory Committee for Aeronautics:

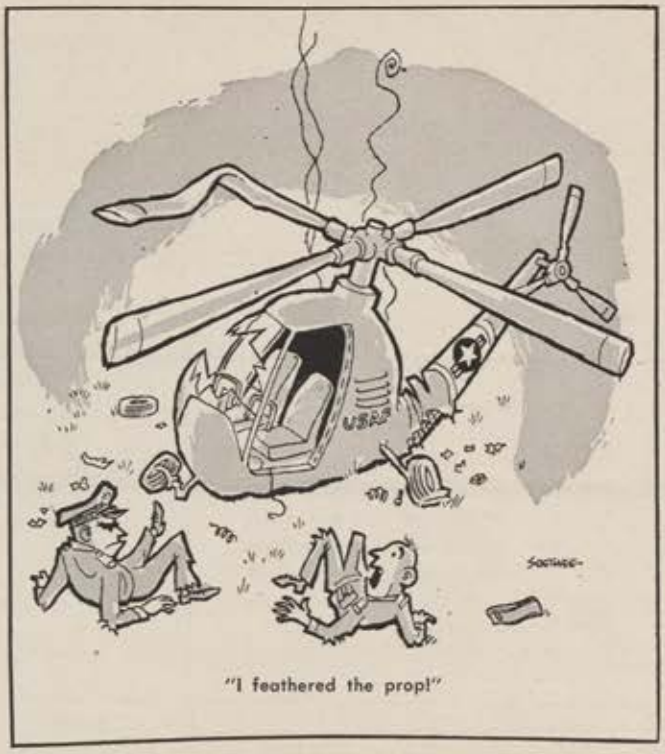
"I should like now to quote several scientists about the kind of fundamental new information in their specialties that use of space vehicles can be expected to provide. This type of information, I might add, can be obtained only from positions out in space.

"First the statement of a geophysicist: 'Observations of the man-made satellites will lead to important conclusions as to the precise shape of our planet. The plotting of the trajectories of . . . satellites . . . will enable us to determine the exact configuration of the Earth, an extremely important element in the study of the origin, history, and structure of our planet. . . . By knowing the satellite's speed we shall be able to calculate precise measurements of the distances between various points on the globe. . . .'

"Next, I quote a meteorologist: '. . . It will be possible to obtain detailed information about the movement and distribution of clouds throughout the globe, and consequently of the air currents over most of its surface. It is of great value in advancing studies of the general circulation of the terrestrial atmosphere and creating physically substantiated methods for long-range weather forecasts. . . .'

"And finally this quotation from an astrophysicist: '. . . Research on the how and where of the original processes which result in creating cosmic rays should be conducted beyond the Earth's atmosphere. . . .'"

Dr. Dryden's quotes were culled from statements of the members of the Academy of Sciences—the Academy of Sciences of the USSR.—END



"I feathered the prop!"

HOW THE TRAJECTOR WORKS

Unlike Miss Distance Indicators, the Trajector provides the third dimension in airborne scoring. The target is enveloped in a CW spherical radar field. By the use of Doppler shift and direction cosine techniques, the missile flight path and miss distance are registered, telemetered, and recorded continuously as the missile passes the target.

How sure is the "kill"?

Vital to any missile system evaluation program is proof of missile accuracy against actual airborne targets. High-performance drones can simulate virtually any type of intruder. But a drone becomes a useful target only when it is equipped with an effective three-dimensional scoring system. Simple miss distance indication is not enough, for missile kill potential depends also upon where the missile explodes in relation to the target flight path. Any scoring system, to be effective, must register *both miss distance and missile trajectory in relation to the target.*

The Trans-Sonics® Trajector* introduces the third dimension to airborne scoring systems to locate the point of closest approach in three dimensional space *and* to determine the flight path of the missile in relation to the speeding target. It presents a complete score on the ground ready for immediate use. Designed to fit all types of target drones, the Trajector operates independently of the missile, requiring no synchronization nor missile modification.

Tested, proved, and ready for operational service, the Trajector is the most effective answer to your missile scoring problem. Write for Trajector Booklet "How to Score the Effectiveness of Weapon Systems" to Trans-Sonics, Inc., Burlington, Mass.

*TRADEMARK

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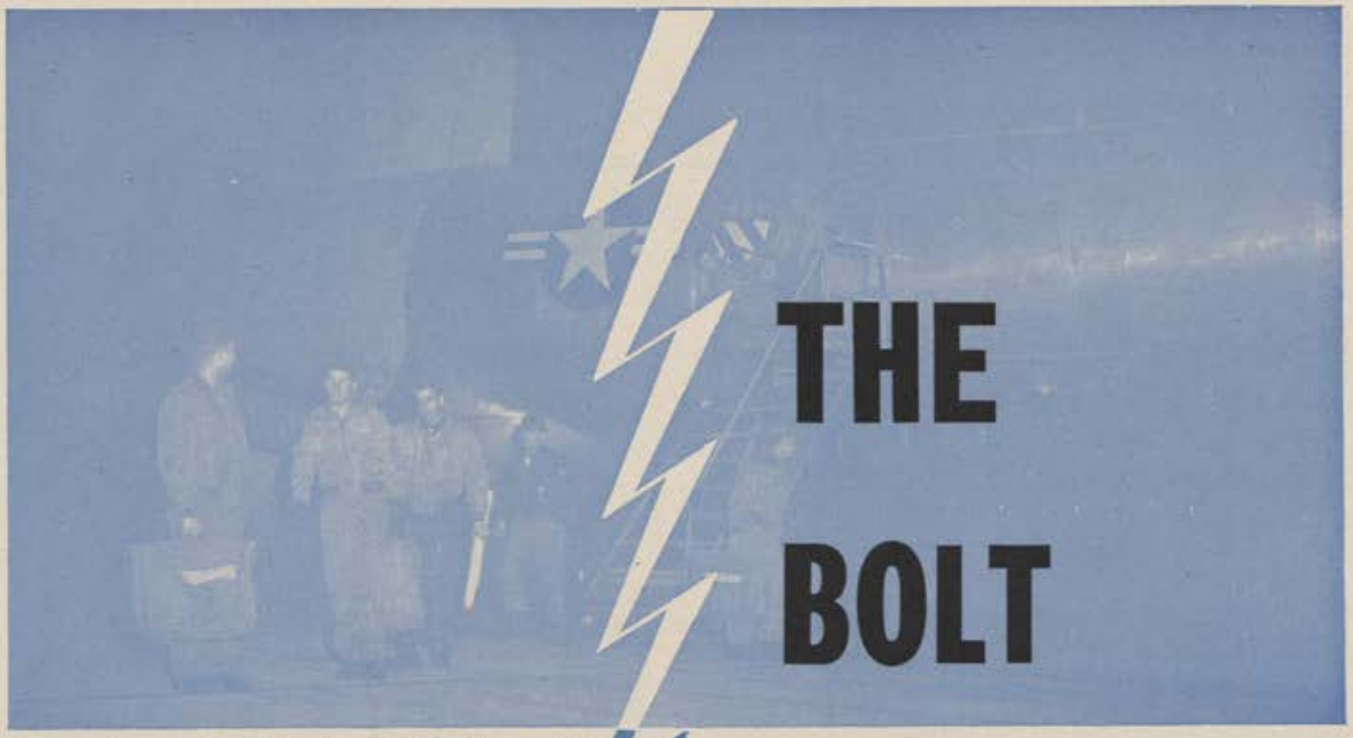


Crew ends patrol mission in RC-121. Same old trouble: static lightning that makes job even tougher.

THE BOLT CATCHERS

Weird fingers of fire make a tough job tougher for USAF shore sentinels

By Michael Gladych

THE cold, fluorescent light and the sound-proofed walls give the place the practical atmosphere of a business conference room. But the men who gather at the U-shaped table every two hours around the clock have no dollar signs in their eyes. Their attention is not on the stock market, but on the security of 170 million Americans. They are the flight crews of the 551st Airborne Early Warning and Control Wing of Otis Air Force Base, Mass.—one element of the radar sentinels of our eastern approaches.

The 551st, part of the Eastern Air Defense Force of the Air Defense Command, consists of some 3,000 officers and men. The Wing is equipped with forty Lockheed RC-121 Super Constellations, each specially fitted with more than ten tons of radar equipment. Every few hours, one of the $2.5 million planes with its crew of twenty men takes off for its patrol mission on a line about 500 miles out over the Atlantic.

Under the ominous ten-foot board showing the ditching stations aboard an RC-121 Super Connie, the briefing starts. Twenty men – young "scope dopes," navigators, and veteran pilots –focus on the closed-circuit TV set. The voice of a WAF forecaster drones on—weather en route—cumulus build-up on station—electrostatic discharges –lightning. . . .

The aircraft commander's lined face tightens. Lightning and the static fireworks are no picnic with twenty-two tons of gasoline on board, hundreds of miles offshore. For eight hours, the radar-pregnant RC-121 will have to stay on station and take it. And the lightning bolt battle damage to twenty-one aircraft within the past three months is a high-pressure reminder that luck can always run out.

But the mission goes on. Maj. Thomas C. Overton, the aircraft commander, wraps up the briefing with his usual message. "A hell of a lot of people depend on us," he says, "so let's not go to sleep on those scopes. That blip could be an enemy plane with an A-bomb on board."

After AOC (Airborne Operations Control) crew #52 files out, lugging their B-4 bags to their plane, Major Overton stays on for a few puffs of his cigar. "Lightning and the static discharges?" he says. "Well, they all heard the forecast. Those who haven't been hit will find out soon enough, and those like myself who know what it feels like, don't have to be reminded. Talking about it only adds to the strain."

Few people at Otis talk about the static and lightning although as Col. Richard W. DaVania, the Wing Commander, says, "This problem gives me more concern than anything else." And to see why Colonel DaVania loses

(Continued on following page)

sleep over lightning strikes, let's take a look at the "casualty list" among his forty pot-bellied RC-121s.

During a three-day period last February, for example, twelve aircraft came home with damage reminiscent of "Flak Valley" war days. Blasted nose radomes and the wingtip tanks "shot" full of holes top the pile of URs (Unsatisfactory Reports), although there have been cases of burned-out flight instruments. And one RC-121 has even limped home with its rudder skin chewed to shreds.

A nose dome with a twelve-inch hole costs you twenty-five knots of speed. Punctured tip tanks drain the gas reserves and create a fire hazard.

cut the master switches, thus saving his electrical instruments from burning out. But on the final approach to Harmon Field, Newfoundland, in instrument weather, he felt something was wrong. When he slowed down, his aircraft wanted to fall out of the sky. He landed hot—at 150 mph. And as he says, he was "a bit shaken up." The bolt had blasted his right elevator, and all that was left was an eight-inch piece!

As soon as the 551st started taking the severe bolt beating, DaVania went to bat for some kind of a "fix" of the predicament. He sent a top-priority hazard report to the Director of Flight Safety, ADC. The priority was down-

Static electricity is commonly regarded as fairly harmless. It can give you quite a jolt with its high voltage, but it has no amperage punch. That's probably why the Air Force's Wright Air Development Center and the prime Air Materiel Area had minimized DaVania's SOS reports. However, the radar-laden RC-121 develops a peculiar kind of static charge. This new static does have enough oomph to melt antenna wire and punch holes in the steel tip tanks. And the static discharge looks, feels, and sounds like honest-to-thunder lightning.

The man who first put his finger on this brand of static lightning is Lt. Col. Rollin R. Bullinger, former CO

In conference: Maj. Thomas Hennessy, Col. Arthur McCartant, Col. Richard DaVania, Col. Frederick Lindtner.

Beaming over their centralized maintenance operation are M/Sgt. Paul Best, Lt. Col. Robert Karr, Maj. Harold Toler.

And if the rudders lose enough skin, it might mean curtains, fire or not.

Looking at Colonel DaVania you'd think he didn't have a worry in the world. But catch him alone during a busy day and he'll tell you, "Things are so serious that I've been pulling aircraft off stations when they get into severe electrostatic conditions or lightning. I am afraid we might be pushing our luck too far—I can't afford to lose a crew and an aircraft."

Colonel DaVania, a veteran transport pilot with twenty years of Air Force service, knows what he is talking about. On one occasion, lightning broke both his HF antennae, which made a mess of his RC-121's fuselage. And on another mission, with a planeload of brass and GI dependents, he almost didn't make it.

Going through frontal weather over the Atlantic, DaVania once caught a direct hit. "I saw that bolt coming right at me," he says. "It lit up the whole aircraft and sounded like a 75-mm. shell going off in the cockpit." An old hand at the game, DaVania

graded, which meant untold delay. But persistent DaVania fired off another request for immediate help, and when that didn't work, he went straight to his boss, Maj. Gen. Edward H. Underhill, Commander of the Eastern Air Defense Force.

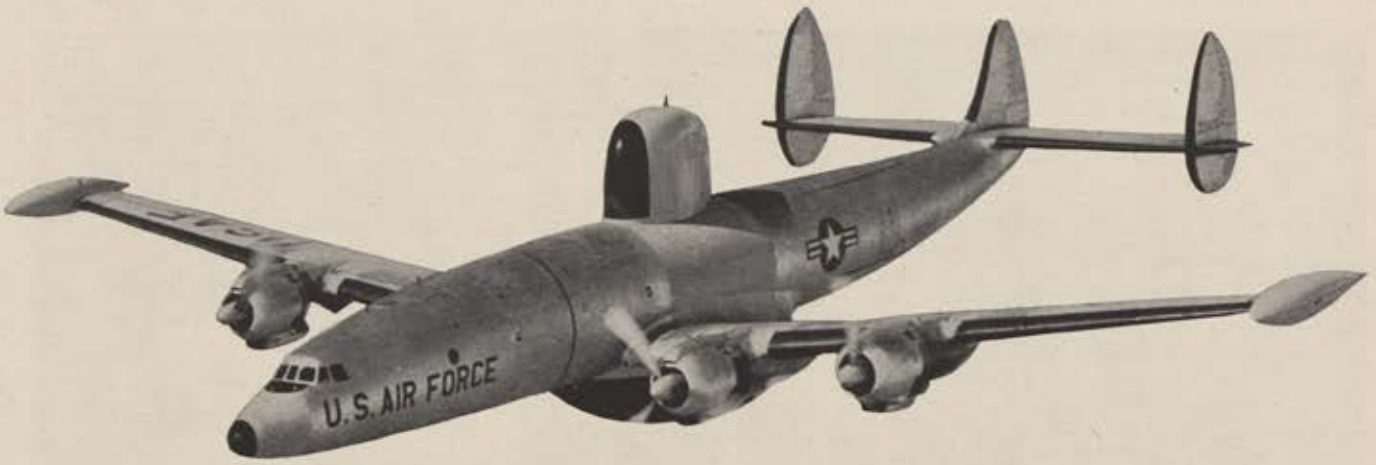
Lest you think that the Air Force is bent upon letting DaVania lose one of his aircraft, here's the big picture of the lightning and static discharge problem. Aircraft have been hit by lightning ever since Kitty Hawk and the corona discharge—the eerie St. Elmo's fire. But, while a bomber or a transport plane can bypass a storm or at worst, breeze through it, the RC-121s are tethered to their stations and must stay in the storm area for hours at a time.

The recent extension of the RC-121 reach puts the stations squarely in the Atlantic storm belt, and the optimum radar altitude makes the planes hover around the freezing level—the critical height where the static discharges really go on a spree. And it is static fireworks that do most of the damage.

of the 962d AEW&C Squadron at Otis. It may be his special kind of luck or his magnetic personality. But whatever the reason, Colonel Bullinger has become an ace bolt catcher with ten strikes to his credit.

The first one happened when Bullinger headed his '121 out over Nantucket Island on the way out to station. There were no storm clouds and no lightning. Suddenly, Bullinger noticed an orchid-purple ball of fire on the nose of his left tip tank. He watched it grow to basketball size. Weird fingers reached out of the fiery ball and entwined into a slim spindle, pointing ahead and illuminating the cloud like a landing light. St. Elmo's fire covered his windshield and the aircraft's nose, and then the right tip tank developed a fireball, too.

Bewildered, Bullinger watched the display. Suddenly, a blast rocked the entire aircraft. When Bullinger caught his breath, he checked with his crew over the intercom. The engines were all right, and the plane in one piece, but all his electrical instruments were



Symbol of vigilance—the RC-121 that carries the "Bolt Catchers" on their round-the-clock watch of America's coast.

burned out. And his radio operator reported, stammering, "A fireball bounced on the floor—right next to my leg. . . ."

As he flew on to his station, Bullinger called Nantucket radio. No, there was no storm, said the operator. "But I sure heard a clap of thunder a minute ago. It was loud enough to wake up all the dead sea captains on the island!"

From this and the subsequent similar experiences, Bullinger concludes that the RC-121 somehow *makes* its own lightning when the conditions are right. An old troop carrier pilot of World War II, Bullinger admits the static lightning has him worried. "I'll take flak any time," he says, "although I've been shot up five times. Here, I have the safety of a twenty-man crew on my mind plus the $5 million aircraft. And with so much electricity on the loose, I never know if those tip tanks are going to blow."

Colonel Bullinger stretches his lanky, six-foot-one frame and looks you straight in the eye. "Our mission has to go on, so we go out there and take whatever comes," he says.

"The mission has to go on" is a phrase you hear everywhere at Otis. Take the Field Maintenance Squadron—the hardware end of the lightning problem. As soon as a bolt-damaged RC-121 taxies back to the line, a crew chief and his two helpers go over the bird with the flight crew peering over their shoulders at the tank holes and the smashed nose dome.

Before you can say "Super Constellation," the aircraft gets towed to the hangar where the maintenance crew gives it the necessary facelifting. Each nose dome, if sent to the depot to be replaced, would cost $4,000. But under the pre-planned, centralized maintenance at Otis, the dome is repaired on the spot for a few dollars. The $2,000 tip tanks are fixed, too.

"If we had to, we could build an entire aircraft," Lt. Col. Robert Kerr, the 551st Field Maintenance Squadron CO, says proudly. They haven't had to yet. But the replacement leading edges made in the Squadron's sheet metal shop look every compound curve as good as those turned out by Lockheed.

The man who sweats most over the bolt damage is M/Sgt. Paul E. Best in Quality Control of the 551st FM Squadron. He flips through the stack of the URs with photos of the damaged parts. "The missions have to go on," he says, "so we fix the planes. But the kind of fix we need is something that would prevent the bolt damage." Sergeant Best, a former captain and veteran P-51 pilot of World War II with two Zeros to his credit, designed a "fix" which at least might lessen the damage. It's a simple rod grounded to the aircraft and protruding through the nose dome. He made a drawing, wrote a report, and sent both through channels. To date, he has not had a nod to go ahead with this simple project. "It's a little discouraging," he says, "but at least I've tried."

As one mechanic jokingly pointed out, perhaps the 551st maintenance men are "trying too hard" to take care of the bolt damage. For apart from the photographs and the copies of the URs, you would never know the problem existed as the RC-121s roll down the runway every two hours, day and night.

The centralized maintenance at Otis is Colonel DaVania's pride and joy. "It sure keeps us in business," he says, "just like our centralized operations control helps us fulfill the mission." And the 551st Control Center—the brain of the entire eastern Airborne Early Warning setup—is a masterpiece of organization that takes care of any emergency from lightning to hurricanes.

"Suppose we get severe static conditions on one station," says Maj. Jack H. Lawton, amiable Chief of the Control Center. "We are in touch with all our aircraft at any time. We can pull one out and still shuffle others so that the gap is filled until the conditions improve." Lawton looks as unruffled as an executive of a smooth-running corporation, but he admits that static lightning is a headache he wishes he didn't have. "And unless someone comes out with a fix that works, things are going to get worse when we get the new APS-70 radar," he says.

The Operational Plans—the crystal-ball section of the 551st Wing Headquarters that gets tomorrow's headaches today—anticipates the problems of the new APS-70 radar. However, Maj. Tom Hennessy, the section chief, is not likely to forget the present lightning problem. "True, we haven't lost any aircraft," he says, looking for a piece of wood to touch, "but the bolt business is hurting us all along—I've been through a strike recently, and I know."

The trouble is, Hennessy explains, that the RC-121 crew must stay on the ball during the twelve- to sixteen-hour mission. To do that, they have foam rubber bunks to rest on when relieved. "But how can you rest when you know you might get a strike?" he says. "Nobody's been hurt so far, but a static bang loud enough to blast you out of your bunk isn't going to help you relax. You get fatigue, and fatigue breeds anxiety—a vicious circle."

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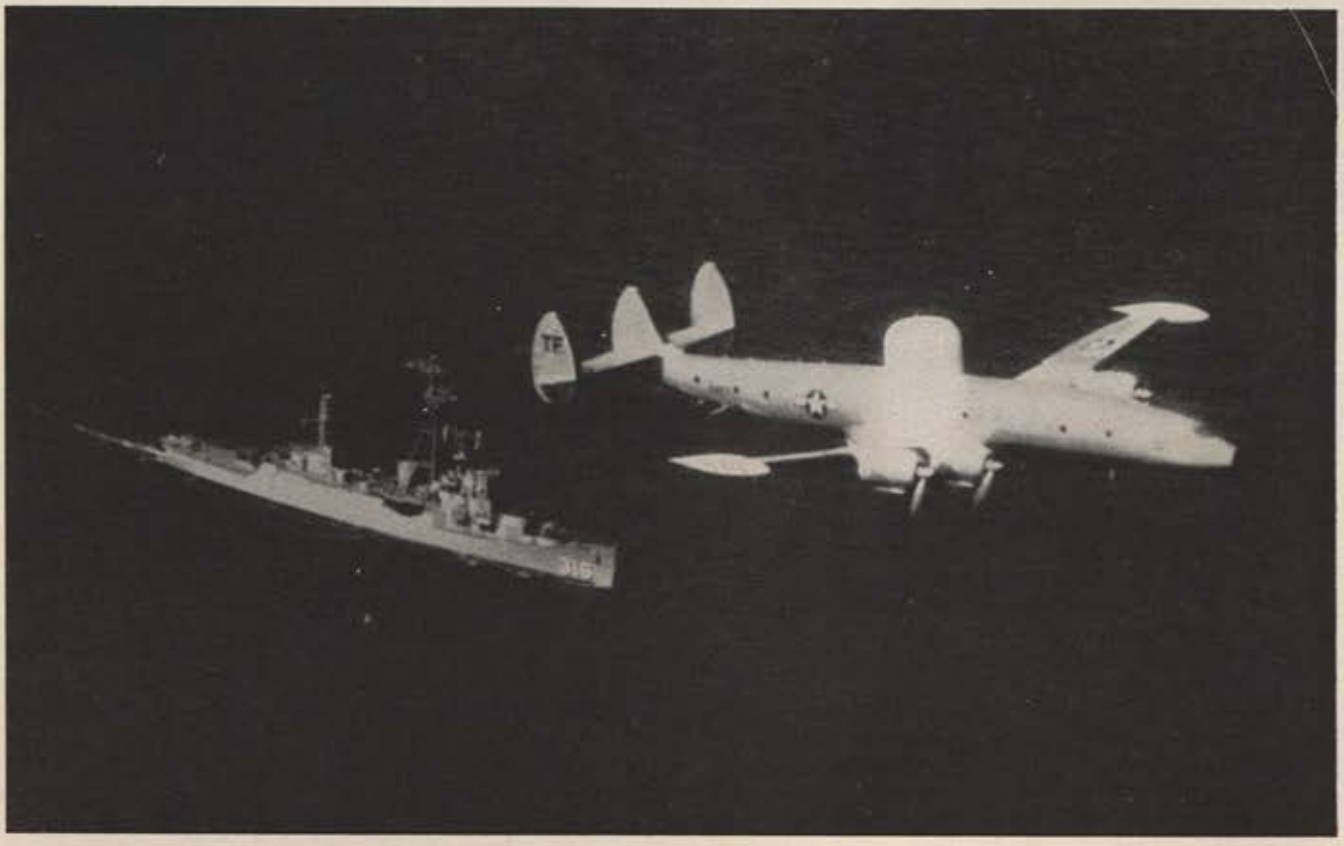

Teamed for shoreline defense, USAF's RC-121s and Navy's radar picket ships patrol coastlines all year round.

The 551st men we've talked with have been old hands at the flying game. Their experience makes them wary of what might happen on perhaps the next bolt-catching mission. However, the young blood—the new aircraft commanders with only a couple of thousand of hours—display a typical "no sweat" attitude.

Lt. Henry J. Glowacki, one aircraft commander, raises his eyebrows at the bolt problem. "Lightning? Discharge? Well, I did have a little difficulty with the static on one of my flights," he says, calmly, dismissing the matter.

But on reading Lieutenant Glowacki's report and listening to his navigator's account of that "little difficulty," you get a slightly different picture. Lt. Clifford Kreisser, Glowacki's "pathfinder" on that mission, says he has been on more peaceful missions.

One morning, at about 1030, Kreisser had just stepped to the plane's lavatory (the men of the 551st use the Navy's term—the "head"). Suddenly, there was a flash and a crash loud enough to make Kreisser disregard the call of nature. He ran out in time for another strike. "The flash ran through the aisle from the nose to the tail," he says.

Looking for fire damage, Kreisser went aft where he also checked on the HF antennae strung from the fuselage to the tips of the rudders. The left antenna had been cut in two by the bolt. One part slapped against the fuselage, while the other tore the rudder fabric. Kreisser's LORAN (Long Range Navigation system) set was out. Radar wasn't checking out right. And to top it all, the aircraft lost twenty-five knots of its cruising speed, which indicated more external damage.

Lieutenant Glowacki wisely decided he couldn't do much good staying on station and requested clearance to return to base. Lieutenant Kreisser is not a man given to panic or exaggeration. Without emotion, he remarks, "We were wondering about the landing. I've never buckled my seat belt so hard in my life, but we made it, no sweat. Glowacki is a good pilot."

Lieutenant Glowacki and other younger aircraft commanders certainly are good pilots which, as Capt. Lee Martin, Wing Flying Safety Officer, aptly explains, "is no accident. For two years those men flew the right seat with us older pilots," says Martin. "We've drilled them and pounded into them the responsibility for the crew's safety and I guess their 'no sweat' attitude toward the lightning problem stems from that. If they showed any anxiety, their crews might feel uneasy."

Evidently, the nonchalant younger aircraft commanders are doing a good job of winning their crews' confidence. S/Sgt. Lester Horne, a radar crew chief, puts it this way. "I figure I don't get the flight pay just to get rich—there's bound to be some hazard, lightning or not. But I don't let it bother me," he says. "I trust my pilot."

And M/Sgt. Noble A. Brown, a World War II waist gunner of a B-24 and now a radio operator and the NCOIC "A" Flight, 962d Squadron, applies some sound GI philosophy. "I've been hit three times on one mission," he says. "I saw that lightning bolt strike right between number one and number two engines. Sure, I was scared. But I can't worry about it and stay on flying status. For my money, the aircraft commander didn't get all that training for nothing."

It is the pilots—young and old—who

carry the burden of responsibility, compounded almost daily by the bolts and static strikes. Maj. William R. Williams, chief of the Tactical Evaluation Board, bears it out. "The fact that we haven't lost an aircraft may be due to luck, of course," he says. "But the tough training and high standards we maintain among the crews also have something to do with it. Because when fatigue and fear get into the cockpit the solid air discipline goes a long way."

Yet, in spite of the tough job well done, pilots are "expendable" when it comes to reducing the Air Force personnel. Says one officer, "Pilots are the first to get the chop at the Promotion Boards and RIF [Reduction in Force] Boards. And do you know what it costs to make an RC-121 aircraft commander? About $150,000! I guess the push-button age is responsible for the 'he's-only-a-pilot' attitude. But our pilots fly in weather that keeps even the missiles grounded."

To illustrate, he recalls an incident in Bermuda, where the RC-121s often stop over. He and a MATS Constellation pilot were checking the weather over the Atlantic. The MATS aircraft commander took one look at the frontal storms and lightning on the synoptic chart and decided to postpone his takeoff. But the "bolt catcher" made ready to go.

"You're not flying *there*?" said the MATS fellow.

"Sure," was the answer. "I've got to relieve a man who's been sitting in that weather for eight hours."

Weather or not, the AOC missions must go on. And especially with the bolt and static conditions, the Otis weather office is an important place. Every two hours there is a briefing in one of the three squadrons, and the weather picture is piped there through the closed-circuit "Weathervision" TV. The electrostatic conditions or possible lightning are faithfully drawn in on the cross-section chart and duly stressed by the forecaster.

However, in spite of the TV convenience and the care taken in drawing up bolt-static warning, Alan Gahan, the chief forecaster, isn't a very happy man. "We can predict the lightning and electrical conditions reasonably well," he says. "However, we can't do a darned thing about it."

Powerful lightning ignored the careful wick-type static eliminator, designed to fox nature, and blasted the ugly hole visible at upper right of photograph.

Still, there is at least one man at Otis who has been doing something about the bolt business. Capt. Lee Martin, an old timer with the 551st and the Wing's Flying Safety Officer, started chewing at the problem from the outset. First need was to learn about the situation, so he devised a special report form to be filled out by the aircraft commander after every strike. Martin was the first to alert higher headquarters about the operational hazard, and he dug deep into the scientific data on atmospheric electricity and passed the information to the flight crews.

Although Colonel DaVania thinks Martin is a "damned good man," Martin himself refuses to take any credit. "Just trying to do my job," he says. But he is proud when he shows you the recent announcement of a possible "fix." "Special kits are being worked out at Lockheed," he says. "When installed on the nose dome and the tip tanks, we hope they'll prevent the damage to the aircraft."

Will the "fix" work? Time will tell. If the "fix" doesn't help, you can bet your bottom bolt that Martin will keep clamoring and Colonel DaVania will go on fighting until they get something that does work.

Meanwhile, the young "no-sweat" pilots, radar and radio men, navigators, and the seasoned, wary aircraft commanders fly the AOC missions. The 551st "Bolt Catchers" will stay awake with their radar eyes peeled so that Americans can live and sleep in peace.—END

ABOUT THE AUTHOR

Michael Gladych, who will be remembered for the moving article he contributed to AIR FORCE *last November, is a veteran of flying service in the air forces of no less than four nations—Poland, France, Britain, and the US. An aeronautical consultant and member of the Institute of the Aeronautical Sciences, he has specialized in aviation writing for several years because, as he puts it: "I'm too old to be a jet jockey in the air so I try to do the next best thing—write about airpower." He lives in Hyannis Port, Mass., near Otis AFB, where the Bolt Catchers are based.*

The Air Force's

Office of Scientific Research

Exploring the Universe

By William Leavitt

ASSOCIATE EDITOR

IN THE crowded ballroom of a Denver hotel, a few weeks ago, nearly 1,000 space-conscious delegates to a scientific meeting sat enthralled by a heated discussion of the nature of the surface of the moon. The hour neared midnight, and the day's program had been packed ever since 9:30 in the morning, but if you looked around the lobby, or even in the hotel bar, you would have found them relatively bare. Nearly everyone was in the auditorium, listening intently to the viewpoints of three experts.

One, Dr. G. P. Kuiper of the Yerkes Observatory, maintained strongly that the large flat lunar surfaces called *maria* ("seas") are hardened volcanic flow. Another, Dr. Thomas Gold of the Harvard College Observatory, expressed his conviction that the moon is covered with layers of treacherous dust as much as a mile thick. And a third, Dr. Fred L. Whipple of the Smithsonian Astrophysical Observatory, also at Harvard, steered a middle course. He believes the lunar surface is of a hardened paste-like consistency—strong enough to support the weight of men and vehicles. The argument was enjoyed by an audience already well grounded technically but anxious to expand its knowledge.

As the discussion proceeded, you could sense the thought pervading the audience's mind—the only way we'll ever really know is to go there and see.

Dr. Kuiper, the astronomer who held to the lava theory, put the thought into words. After his talk, spiced by excellent slides of the moon's surface, he remarked how valuable a project it would be to "land on the moon and get samples of the soil." Implicit in his remark was the conviction that we will get there.

The lunar discussion capped the second annual Air Force Office of Scientific Research Astronautics Symposium, cosponsored this year by the Institute of the Aeronautical Sciences. It was but one of the numerous activities of the vital, yet little-publicized, exploratory research organization of the Air Research and Development Command—the AFOSR.

During the two-day meeting, delegates from universities, industry, and Air Force research personnel—a cross-section of the country's scientific force, civilian and military—sat in on sessions covering subjects ranging from the space environment to advanced propulsion systems. Their business was the business of every scientific meeting: the exchange of information and the stimulation of ideas. And they were there, thanks to the conviction of the Air Force that a free and vigorous scientific community is the greatest source of strength for the military forces that must carry the burden of deterrence in today's nuclear and tomorrow's space age.

Time was, and not very long ago, when such Air Force encouragement and sponsorship might well have been frowned on by purse-holding officialdom as unnecessary. But cynicism about "long-hair" research is increasingly absent today, thanks to Sputnik and the frightening pace of Soviet scientific advances. Only the utterly uninformed would smile today at an assention like that of AFOSR commander Brig. Gen. H. F. Gregory, who, months before Sputnik, told delegates to the 1957 Astronautics Symposium at San Diego, Calif., of his confidence in the Air Force mission of manned space travel.

General Gregory's "shop," the Air Force Office of Scientific Research, is one of the twelve subordinate agencies of ARDC. AFOSR's business is exploratory research. And it is a hard-working symbol of the Air Force's conviction that basic research—exploration of the pool of natural law, the search for knowledge for its own sake—is the key to tomorrow's weapon systems and personnel performance.

AFOSR's formal mission spells out clearly the role it is designed to play in an increasingly complex world: To sponsor "fundamental, theoretical investigation to increase man's knowledge and understanding of the natural world and to recognize the implications of new scientific knowledge [in terms of] new weapon concepts."

Operating on a tight budget, with minimum personnel (a total of 120 in its Washington, D.C., headquarters and its Pasadena, Calif., office), AFOSR is carrying out that mission, through a far-flung program of research contracts with leading universities and industrial centers throughout the US and Europe. In fact, its full list of research con-

(Continued on page 51)

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tracts, nearly 700 of them at present, reads like a gazetteer, with studies going on in this country, Great Britain, France, West Germany, Belgium, Sweden, Denmark, Switzerland, Norway, and Italy.

How does AFOSR operate? In a remarkably simple manner, with a minimum of red tape and a strong emphasis on freedom of inquiry, and with only the general requirement that the research contracts it sponsors and monitors be potentially related to Air Force areas of interest. Simply stated, these areas are superior flight and propulsion methods and the requisite superior materials for tomorrow's air and spacecraft, and a better understanding of the human requirements for the operations of those advanced systems.

Essentially, AFOSR is a translating agency between the scientific disciplines and the Air Force, receiving, judging, and sponsoring proposals for exploratory research. AFOSR does *not* direct research, and in so *not* doing, fulfills the most stringent demand of exploratory research—that it

". . . In a way, our researchers are working on answers to questions that haven't even been asked yet."

—Brig. Gen. H. F. Gregory, Commander, Air Force Office of Scientific Research, ARDC.

should *not* be devoted to finding specific answers to specific questions.

It is worth a pause here to examine the meaning of the term "exploratory research," AFOSR's stock-in-trade. In scientific terms, the word "research" by itself is practically meaningless. It must be qualified, and AFOSR's use of the word "exploratory" provides meaning.

As General Gregory sees it:

"The kind of research AFOSR is concerned with is the gaining of knowledge. We're not in the business of looking for answers to needs. That's 'supporting research.' ARDC's other organizations do that job. What we find out in our exploratory research contracts sometimes provides an answer to a requirement, but that is not the primary aim. We're trying here to expand the pool of knowledge. In a way, our researchers are working on answers to questions that haven't even been asked yet."

Most AFOSR staff people will acknowledge that the business they're in, the exploratory research program they manage, is an unglamorous operation. And a casual visitor to AFOSR's rather austere home in the line of still-standing "temporary" buildings erected for World War II use in Washington, might well have trouble guessing exactly what goes on in the AFOSR "Tempo" at Nineteenth and East Capital Streets, Southeast. There are no white-coated personnel, no test tubes or laboratories, no wild-looking types filling the halls. A closer look would reveal Ph.D.'s not hesitating to type their own correspondence; secretarial help is scarce. And reports on research projects have to be expedited.

AFOSR is a unique scientific management agency. Its *modus operandi* is surprisingly uncomplex. For operational purposes it is divided into several directorates, each covering a general scientific area and headed by an expert in the field. Currently, the AFOSR directorates include: aero sciences, bio sciences, physical sciences, material sciences, advanced studies, and research communications.

These directorates are the funnel through which new research proposals enter the AFOSR program. They are geared to the spirit of free inquiry that the agency believes is essential for fruitful research.

How does a research contract get started at AFOSR? Through quiet but steady promotion in the scientific community, at the many AFOSR-sponsored symposia and other scientific meetings held through the year, AFOSR "advertises" itself by means of a modest brochure and personal contact. When a researcher, at a university, in industry, or at a foundation, has a project he believes might interest the Air Force, he submits it to AFOSR's Washington, D.C., headquarters. European proposals are submitted through ARDC's office in Brussels, Belgium. The purpose, methods of approach, costs, and probable duration of the research are outlined. The proposal is studied by the AFOSR division covering that scientific discipline, and the decision is made as quickly as possible.

Every effort is made to expedite decisions and to see if the same line of approach to the scientific problem is being used in any other project sponsored by AFOSR or by other agencies. If the proposal requires special study, the division examining it may consult with other experts who serve as consultants to AFOSR. But the final decision is made by the division for the directorate. Once the decision is made to sponsor the research, the matter is turned over to the AFOSR procurement directorate, which works out the details. When the research gets under way, its cost is figured into the AFOSR budget and the budget of the directorate monitoring its results. Also—and this is one of those all-too-rarely-mentioned examples of interservice cooperation—special provision is made for project reports to be sent to all governmental or military research agencies that have an interest in the potential results and findings.

Speaking of budgets, the entire FY 1958 AFOSR budget *including* a supplemental appropriation, is just under $23 million, the approximate cost of only three B-52s. To a householder struggling with mortgage payments, this may seem a giant sum. But in terms of the cost of the complex business of science today, it is extremely modest.

The conventional way to dramatize research—any kind—is to cite examples of exciting "breakthroughs." Writers often give the impression that little, if anything, was known about a phenomenon, until that particular day when the brilliant young scientist in his gleaming laboratory suddenly saw the light. Such "breakthroughs" are extremely rare. In fact, they are, more often than not, accidental, occurring while a scientist is studying something entirely unrelated. The discovery of penicillin is a notable example. Its discovery came in the course of other studies. The enormous credit due penicillin's discoverer is for his alertness in grasping the implications of the mold that seemed to destroy bacteria.

In these terms, it is easier to understand the AFOSR mission and its approach to research.

(Continued on following page)

Let's take just one of AFOSR's directorates for a picture of some programs under way during the past few years, the Directorate of Bio Sciences, with its divisions, aeromedical and behavioral sciences.

The layman might wonder at the Air Force's interest in a study like "The Relation of the Brain Stem Reticular Formation to Animal Behavior," an AFOSR-sponsored project at Italy's University of Pisa. What is being studied is the possible connection between the nature of the cell formation in the brain and the behavior of the organism. Out of the project may (and there is never any assurance there will) emerge valuable information on the workings of the human brain. From that information could emerge further data on human performance. And human performance, in an age of projected spaceflight, is something the Air Force is very interested in.

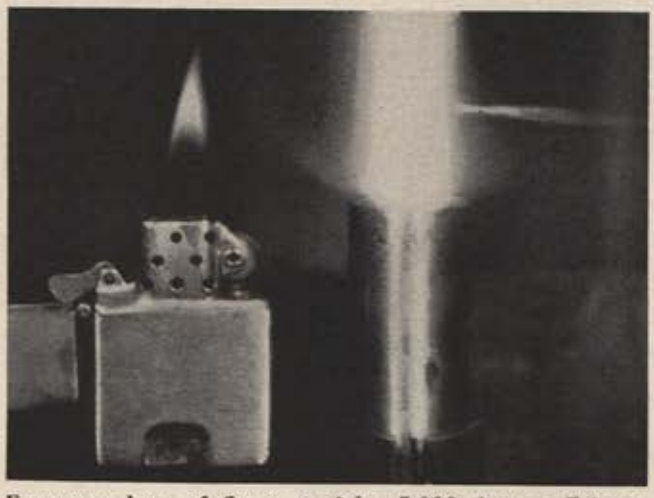
Or take another project under the sponsorship of AFOSR Bio Sciences. At New York's University of Rochester, universities, include "Behavioral Aspects of Man-Machine Systems," "Group Structure and Performance," "Psychological Characteristics of the Individual." Others are "Efficiency of Small Groups in Complicated Teams Tasks," and "Investigation of Attention and Maintenance of Alertness." In France, at the University of Lyon, a study is going on in "Neurophysiological Mechanisms in Conditioning and Learning."

This latter project is especially interesting because it delves into the question of just how the human brain goes through the function of learning. The study could produce answers to why some people learn faster than others, whether or not scientific methods can be used to speed up the process of learning.

Answers to these questions are going to be increasingly valuable to tomorrow's Air Force. That force will be a pool of personnel handling complicated tasks and machinery.

Right now, Bio Sciences is one of the smallest—budget-

AFOSR researchers ready rockets for the Operation Far Side firings that helped gain knowledge of outer space.



Enormous heat of flame at right, 5,300 degrees Fahrenheit, gives Temple U. researchers clues to rocket fuel.

"Cardiovascular Function During Unsteady States" is being studied. This is another way of asking what happens to the heart and circulatory systems under certain forms of stress. This question is of great importance in future Air Force planning. Knowledge garnered from the project could add significantly to the knowledge of human adaptability to unusual situations.

One special area of Bio Science interest is molecular biology, the study of the basic formation of the cellular structure of the human body. An AFOSR project in this category, under way at Washington University, St. Louis, Mo., is "Investigation of the Role of Free Radicals in Biological Processes." Free radicals are mysterious molecular fragments that do not seem to follow the usual laws of movement of nuclear physics. They are an enigma to scientists, and information on what role they play in bodily processes could be very revealing. The payoff in exploratory research is always in terms of "could be." Investigators are not after a piece of hardware to answer a specific purpose. They want information that others can apply.

The newest study area in Bio Sciences is its behavioral division. This division is geared to the study of man's mental processes, as an individual, in the group, in relation to systems he must operate or monitor; in brief, the general question of how his physiological and psychological makeup combine to create his inventory of capabilities.

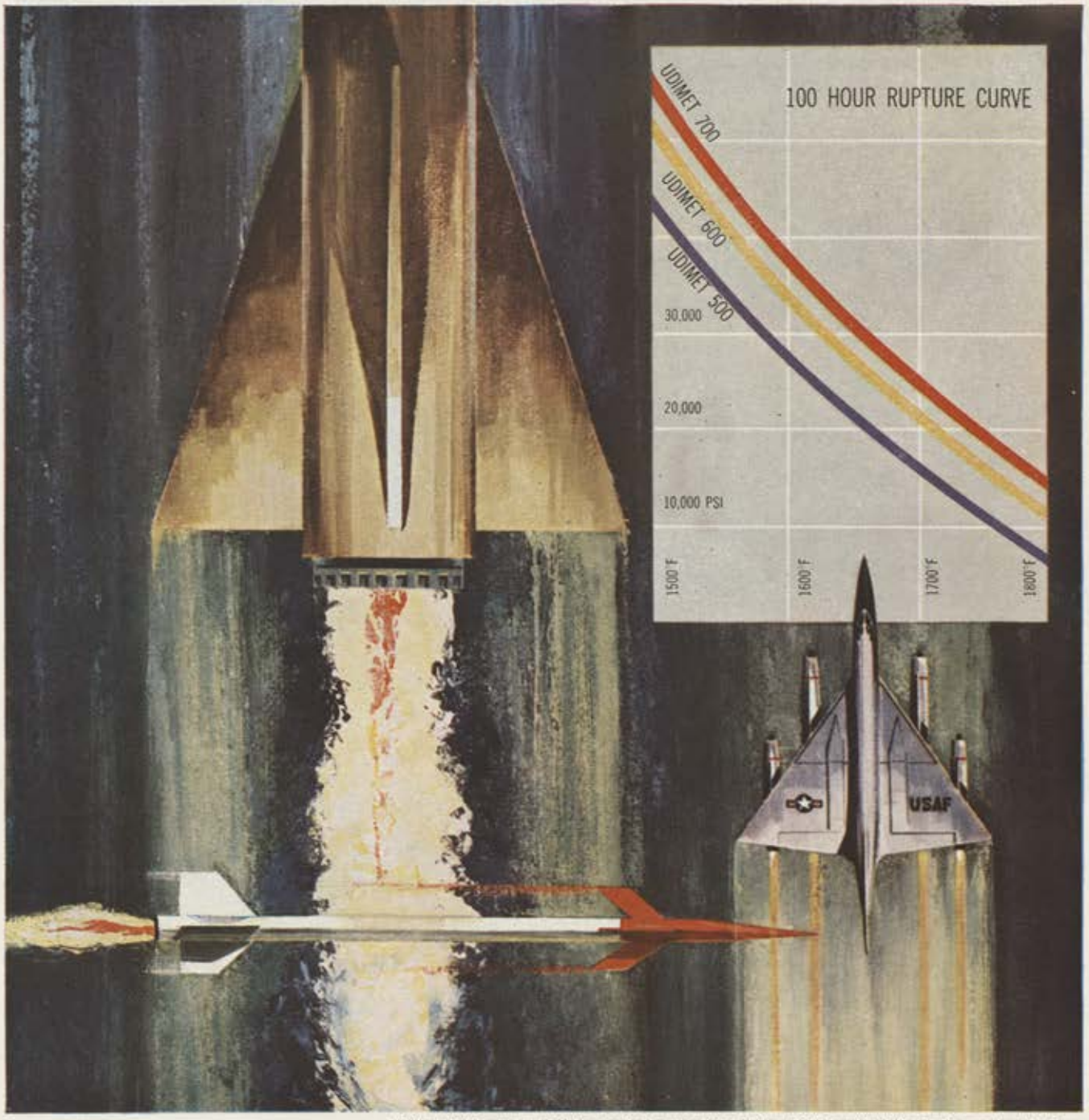
Some of behavioral sciences' projects, under contract at

wise—of AFOSR's directorates, using less than six percent of the agency's funds. But its people are hopeful that with increased stress on human factors, man in space, and the like, it will be able to expand its operations and sponsor considerably more research projects.

Although AFOSR has received little public notice, one of its directorates, headquartered at Pasadena, Calif., got some sizable headlines in late 1957, because of its sponsorship of the now famous Operation Far Side. Prior to the first Sputnik, Advanced Studies Directorate had embarked, through contract with Aeronutronic Systems, Inc., on a series of rocket launchings from balloon-raised platforms about 100,000 feet up. The program attracted relatively little attention until the world was jolted by the October 4, 1957, Soviet launching of the first Sputnik. Suddenly the Air Force was beseiged with demands that something, anything, be produced to offset the Soviet propaganda coup. The Far Side project catapulted into the headlines, although every effort was made to explain that it was designed solely for the gathering of space environment data and was not a part of IGY satellite plan. As it turned out, the successful firing of the Far Side rocket to a 2,400-mile-plus altitude—a world's record in its field—served a purpose it had never been designed for. It bolstered sagging American prestige.

It is a tribute to the purely scientific motivations of AFOSR that, throughout the entire affair, the agency

(Continued on page 55)



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maintained that Far Side was in no way related to US-USSR competition.

Like the rest of AFOSR, Advanced Studies Directorate is "far out," busy with the gathering of new scientific data. One field of special interest is exotic propulsion methods, a probable prerequisite for extended space travel.

In this area, Advanced Studies is sponsoring research by Giannini Research Laboratories on the feasibility of high-velocity plasma jets to produce usable thrust. Plasma is a combination of ions, electrons, and other particles, which researchers believe might be channeled magnetically for use as a power source. Other studies, at North American's Rocketdyne and Aerojet-General, include ionized fluid propulsion, a proposed method of separating ions from electrons and accelerating them by electrical means to extremely high velocities.

Another fascinating and possible "payoff" area of Advanced Studies-sponsored research is investigation of the uses of energy in the upper atmosphere at levels of about fifty to one hundred miles. At such altitudes, because of the action of cosmic and other radiation, atmospheric oxygen and nitrogen molecules are changed from their usual form. The theory is that if these molecules could be recombined, considerable amounts of energy could be generated for fuel purposes. This would allow unlimited travel of craft operating at such altitudes. Researchers suggest that other planets may have similar fuel potentials in their "atmosphere," enhancing space travel possibilities in their vicinities. Aerojet-General is carrying out theoretical research on the subject.

The Advanced Studies Directorate has also sponsored the Litton Industries High Vacuum Chamber (*see* March '58 AIR FORCE). This project has duplicated vacuum conditions at simulated altitudes of about ninety-five miles. And a space-suited man has worked inside the chamber to demonstrate that a protected human can perform successfully in high vacuum. The Litton project is expected to yield information on the "cold welding" process observed in vacuum—where lubricating surface films on metal are drawn off, increasing friction and causing metals to stick together. This data will be valuable in air and spacecraft design. The vacuum chamber may also be used to test the protective suits designed for the pilots of the Air Force-North American X-15 project.

Let's look at some projects in another directorate, Aero Sciences. This discipline is divided into three divisions: mechanics, mathematics, and combustion dynamics.

In combustion dynamics, Dr. Ernest Mayer of ARDE Associates, Newark, N. J., has evolved a simplified method of applying thermal and chemical data in the calculation of flammability limits in terms of pressure, temperature, and heat loss. This provides a valuable design tool for engineers, who will have to rely less on trial-and-error methods in the design of combustion engines.

At Baltimore's Johns Hopkins University, Dr. H. E. Hoelscher has developed a special type of holder which sets up a flat-shaped flame, allowing study of the configuration of fire. This will help provide important information on the process of ignition.

Aero Sciences, among its many other projects, is also attacking the problem of fuels and is sponsoring research in both liquid and solid fuels for rocket propulsion.

Equally important is AFOSR's Directorate of Physical Sciences, with its physics and nuclear physics divisions. The physics division is devoted to exploratory studies of molecular and atomic physics, electron physics, the physics of the universe, and thermodynamics—in short the state of matter, the flow of energy, and its possible control.

Man in a vacuum. Experimenter in AFOSR-Litton High Vacuum chamber demonstrates ability to work while in the suit.

Its sister division, nuclear physics, specializes in continuing investigation of the fission and fusion processes, with special attention to the possibilities of using nuclear energy for the enormous power needs of tomorrow—for both air and spacecraft.

Another directorate is Material Sciences, with divisions covering chemistry and solid-state studies. The chemistry division gives priority to investigations of the principles that govern the formation of materials. Knowledge gained in its projects can be teamed with the work of the solid-state division, which explores the possibilities of developing special new materials designed to meet particular requirements.

Nor is the increasingly complex field of information—its compilation and distribution—neglected in the AFOSR operation. Its Directorate of Research Communications is charged with supplying digestible research data to the other directorates and outside agencies. Research Communications also sponsors studies in new bibliography methods, and publishes *AFOSR Research Briefs*, which is distributed to interested agencies in ARDC, throughout the Air Force, and within the Department of Defense.

AFOSR, and this has been but a cursory glance at it, is a living symbol of the search for knowledge.

Its significance is perhaps best summarized by the thoughts of two of the staff people the writer talked with during his visits to AFOSR headquarters.

One, a physicist, said:

"What we're really trying to do here is strengthen the bridge between the engineer and the scientist. Years ago, the engineer's job was simpler. He built machines whose requirements were relatively simple. There was time for trial and error. But to build the complicated systems we need today, the engineer needs to know more and more of the natural laws. It's our job to keep him posted. It's not a matter of breakthroughs. We've had them, sure, but they aren't common. And it isn't even a matter of using up the pool of knowledge. It's a matter of learning to apply what we know, and adding new material at the same time."

Another member of the staff put it another way.

"We want to know, in the human area, what a man can do, in, say, a spaceship. To know, we've got to know more about man as a creature. So we study every possible aspect of his system. The approaches are numberless. If someone comes to us with an idea for studying similar processes in an ant, for example, we'll consider the idea. An ant is smaller; maybe the process is easier to observe. We might learn something. And everything we learn adds to the total."—END

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ARC's laboratory and flying field at Boonton, N. J., 1929.

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First Blind Flight was by Jimmy Doolittle in aircraft equipped with ARC radio range receiver, 1929.

Early radio altimeter work was carried on by ARC in 1929.

The first successful two-way voice radio equipment standardized for use on Army and Navy fighter aircraft was another important ARC communications development, 1931.

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The Realities of Disarmament

Discussion or disintegration? What the world fears, yet talks of unrealistically, is prevention of H-bomb holocaust.

By Earl H. Voss

IT IS a measure of the self-delusion of which man is capable that world attention on disarmament has focused for more than a year on an issue that is not disarmament at all—cessation of nuclear tests.

Halting nuclear tests—part of them or all of them—would not disarm anybody. Yet the Soviet Union scored its biggest propaganda coup since Sputnik I, perhaps its biggest ever, with the really empty "disarmament" maneuver of announcing a temporary ban on nuclear tests.

Soviet Foreign Minister Andrei Gromyko didn't offer to dismantle one bomb, to scrap one missile or airplane, to reduce by one iota the Soviet Union's present fighting strength. Nor did he offer to stop piling up nuclear weapons as fast as Soviet munitions makers can turn them out.

Admittedly, one important practical effect of the announced Soviet move—if it is actually implemented—would be reduction of radioactive fallout. But this is not the core of the disarmament issue. And such reduction would be in ironic contrast to the huge amount of fallout that the Russians dumped on the world in their most recent set of nuclear tests.

And if the pace of the latest Soviet tests—faster than any previous series—is any indication, Moscow was really rushing through a test series to use up all its test weapons before springing the "ban." American intelligence estimates the Kremlin won't be ready to test again for another year or year and a half. Future development of Soviet nuclear weapons will not suffer at all, then, until 1959.

There are recurrent rumors in Washington, too, that the Soviet Union may carry its paper disarmament another step by declaring a cutoff in the production of nuclear weapons.

Premier Nikita Khrushchev has already admitted publicly that such a step would be meaningless, too. He has hinted broadly that the Soviet Union can soon afford to stop making A-bombs and H-bombs because it has enough—that making more would be a waste.

Here is what he told his constituents in Kalinin during March, not long before he took over the premiership from Bulganin:

"The level of armaments in certain countries has reached such a stage that the time will come, and perhaps it has come already, when these countries themselves, irrespective of whether or not an agreement on the cessation of production of atomic and hydrogen arms has been reached, will have to say, 'enough.' If, formerly, old arms and the military techniques were replaced as new models were created, now it appears that a stage has been reached when it is difficult to invent more powerful arms than the hydrogen weapons, the power of which is limitless. . . .

"Common sense suggests to people the only way out of the impasse in which the disarmament problem has found itself. This way out lies in the complete prohibition of nuclear weapons. We are, apparently, approaching the moment at which the governments, if they want to preserve their links with the peoples, will no longer be able to turn a deaf ear to this universal demand of the present day, and even failing to achieve agreement among themselves, will be forced unilaterally to discontinue the manufacture of atomic and hydrogen weapons."

Mr. Khrushchev is not given to casual statements of fundamental policies in his formal speeches. Our intelligence officers have concluded this in the years they have watched the free-wheeling Soviet leader operate.

If the current Soviet drive to force the West into nuclear disarmament has been meaningless, is there, then, reason-

(Continued on page 61)

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able hope of achieving a meaningful disarmament agreement with the Soviet Union?

The Administration has decided there is. President Eisenhower, Secretary of State Dulles, former disarmament negotiator Harold Stassen, all think there is a basis for agreement between the Soviet Union and the United States. But the two great powers do not trust each other sufficiently to make mere promises stick.

The technicalities in policing an agreement are so great that it has been almost impossible to work one out. The principal stumbling block, of course, is the old one—the Soviet Union will not accept the amount of ground and air inspection considered necessary by other powers.

What is the basis for possible agreement?

The Administration has concluded that the Soviet government is sincere in its references to the crushing burden of armaments and that the USSR would like to reduce its spending (just as the US would) if a dependable formula could be found. The problem, of course, is that neither side has been able to develop one.

A fundamental reason is that the United States does not speak for itself alone in its disarmament negotiations with the Soviet Union. Washington must speak for all the Free World, and, more specifically, for Western Europe.

But Europe has basic differences with the United States over what a disarmament agreement must contain. The differences are so basic, in fact, that hope for a West-wide agreement with the Soviet bloc is slim.

Harold Stassen's experience in the London disarmament talks last year made this clear. He had come back to Washington in May to participate in the National Security Council development of a new, liberalized American disarmament position.

At one point in mid-June, the United States was ready to propose a ten-month suspension of nuclear weapons tests, divorced from the rest of the disarmament package. That is, without the prior provision that nuclear weapons production must be stopped at the same time, that reduction of nuclear weapons stocks be started, and that conventional weapons be cut, all under proper inspection.

Then Mr. Stassen made the mistake of mentioning this change in American position to the Soviet delegation chief, Valerin Zorin, before the NATO countries had concluded their study of the idea. France, particularly, but also Britain, set up a terrific howl.

Not only were France and Britain disturbed about Mr. Stassen's apparent move toward bilateral negotiations with the Soviet Union over their head, but they did not like the new American policy decision.

As this article went to press, France had yet to test its first atomic weapon—although there were repeated reports she would start testing soon. A test suspension, even if agreed to only by Russia and America, would make it extremely difficult for France to go ahead with her own tests. She would increase her present unpopularity around the world. France warned the United States it could not approve a test suspension that was not linked with both a cutoff of production and a reduction of stockpiles.

The national interest of France would not be served, French diplomats argued persuasively, if she were banned from the atomic club while the "big boys" continued to make nuclear bombs and increase their stockpiles.

Britain had the same misgivings, in a less acute form. The British had tested some atomic weapons, but had not made enough progress to provide either a significant deterrent or the prestige she coveted.

The outcome of the British-French resistance was a compromise. All fifteen NATO nations agreed that tests could be suspended for a year, but the Kremlin would have to agree at the same time to a cutoff of nuclear weapons production, effective at the end of that first test-suspension period.

Moscow, which meanwhile had proposed a two- or three-year test suspension *with modest inspection*, a notable concession, was not then ready for a production cutoff and the detailed inspection that would have been necessary.

To preserve NATO unity, then, the United States had been obliged to modify one of its own disarmament positions so that agreement with the Soviet Union was no longer possible.

There is now some hope in the United States government, possibly wishful, that Britain and France will cease their opposition to a halt in testing alone if Congress approves a share-the-secret liberalization of the Atomic Energy Act. The theory is that the US can satisfy British and French requirements for knowledge about atomic weapons manufacture by sharing the results of American testing.

What basis there is for the hope that this will satisfy Britain and France is not clear. State Department officials merely say it seems logical.

British officials comment privately, however, that they cannot see how the British Foreign Office could take any position until it knows what secrets the United States has.

British scientists are reported to have developed the clean bomb ahead of the United States. They are also at least abreast of the United States in peaceful applications of thermonuclear technology. The Atomic Energy Commission insists that the United States is neck and neck with the British in the race for thermonuclear power, but others wonder if Britain isn't a little ahead.

The point is that there is no assurance Britain would learn enough, once America's closely held secrets were divulged, to make it sound national policy for London to agree to a naked test suspension. The British might want to go on making their own type of bombs.

This difference between the United States and Europe over the link between testing and production of nuclear weapons is one of four fundamental areas in which American and West European security interests conflict.

A second, broader difference among the Western allies involves the relative importance of nuclear and conventional disarmament.

The United States might be satisfied if nuclear weapons alone could be eliminated. Europe could not. She lies under the muzzles of Soviet conventional guns—bigger and more mobile than the World War II types.

The Soviet Union also has a much larger force than NATO has been able to muster in Europe. Europe needs the nuclear deterrent unless a relative balance is established in conventional forces.

Great Britain made one decision in the spring of 1957 which practically sealed British disarmament policy in this respect. The British White Paper put all England's eggs into the nuclear basket; conventional forces have been reduced at a brisk rate since then. Her conventional forces alone would not represent Britain's fair share of the forces needed to stand off Russia.

Therefore, nuclear disarmament would strip the British of their one effective weapon against Soviet attack.

The United States has an advantage over Europe in geography, too. The Kremlin could hardly deal the United States a knockout blow with conventional forces alone. Missiles and long-range bombers without nuclear warheads would not have the capacity to wound America mortally.

Add to these strategic differences the European coun-

(Continued on following page)

tries' hope of recouping their lost prestige by developing a nuclear arsenal of their own, and the prospect of getting European agreement becomes extremely slim, if it exists at all.

There is another approach to disarmament which would take care of the United States' interest but not Europe's: through delivery systems. If America could get rid of the threat of attack at long range—by missiles and bombers—that alone would be enough disarmament to satisfy us.

For just as long-range delivery systems without nuclear weapons would be useless to Russia for attacking the United States, nuclear weapons without long-range delivery systems also would be nearly useless. True, the risk of Soviet submarine attack with shorter-range delivery systems would still exist. So, presumably, would America's overseas base structure and its own sub fleet. These could either be eliminated or allowed to remain as canceling deterrents. If allowed to remain, neither would hold the prospect of delivering a reliable knockout blow.

There is also the problem of developing clean nuclear weapons. The United States needs them as much to protect Europe as herself. The greatest advantage in dropping radioactive-free bombs in any new war would most likely go to heavily populated Europe.

So far the Soviet Union has shown absolutely no interest in the development of clean weapons. But the United States feels a responsibility to the European populations, both West European and Communist East European, to confine the radioactive-fallout blight to as small an area as possible. West Germany, for example, would not want to see its relatives in Eastern Germany hit with dirty weapons. The United States also feels a special responsibility to the people in the satellite nations.

There would be some military advantage to United States forces, too, of course, in using clean bombs over territory that they would have to enter later. But use of such bombs by the United States could not be expected to spare the US homeland from dirty Soviet bomb hazards.

Here is another pressure for continuing nuclear tests in which Europe has a special interest.

These, then, are four areas in which American and West European security interests differ: the test-cutoff link; the nuclear-conventional link; delivery systems; and clean bomb development.

In the past, the United States has modified its own disarmament package to accommodate European needs. To make a realistic appraisal of the probability of reaching a meaningful disarmament agreement, it is important to examine closely how the special European conditions complicate the problem.

Take the proposal of reducing East-West conventional strengths to a level of self defense only.

World statesmen tried from May 1928 to June 1934—roughly ninety-seven months—to produce a comprehensive formula for reducing the then military powers' conventional forces. Britain, the United States, and Japan scrapped some naval vessels, but the agreement did not last.

No over-all formula for reducing weapons or manpower was ever agreed upon. Hitler torpedoed attempts to reduce manpower by refusing to count his storm troops.

The same problem exists today. How does one measure military manpower? By the number of standing forces only? The Soviet Union has now taken to shuttling its huge military forces in and out of uniform, keeping the number in service at any one time considerably lower than before. What is the difference in military potential between a uniformed truck driver and one wearing overalls?

Finding a formula for scrapping weapons will be equally trying. The proper balance, of course, is between one side's offensive weapons and the other side's defense against it. This translates into X-number of Soviet Bisons against Y-number of American Century series fighters and antiaircraft batteries; X-number of American B-47s and B-52s against Y-number of Soviet Farmers and antiaircraft batteries. Since the Soviet Union has a greater periphery to defend, she should rightfully have more defensive air strength than the United States. And the Soviet Union's vast geography would require more bombers to cover it in case a retaliatory strike were ordered—so the United States ought to have more bombers.

These examples assume that both the United States and the Soviet Union will want to retain a minimum retaliatory capacity for many years. For there is no way of being sure that all nuclear weapons could be detected by an international inspection authority, even if a disarmament formula could be agreed upon. The only way to offset the possibility that one or both sides has hidden enough to deal a knockout nuclear blow is to rely on a limited deterrent rather than on complete disarmament.

Arms *limitation*, then, is a more precise term.

No list of reasons for being bearish about meaningful discussion is complete without mentioning the area which neither side even includes in its disarmament proposals—chemical and biological warfare. Genocide would be just as easy, perhaps even as fast, if East and West were to feel obliged to use their present stocks. And, of course, sprinkling radioactive waste products over a country would be slower but just as effective.

For some strange reason, the world places more faith in the deterrent principle when it comes to chemical and biological weapons. Disarmament in those areas is scarcely discussed. But in the nuclear weapon area, the fear prevails that an accident could set off a war.

There could be other potent weapons we don't know about. MIT Professor Jerome B. Wiesner, a Gaither Committee member suggests:

"One of the frightening things to me, and a source of real danger to us, is that some inconceivable development, some new idea, some new scientific insight might give the discoverer a decisive advantage if he chooses to exploit it."

That the outlook for true disarmament is bleak is really nothing new. But it is something frequently lost sight of in the straining by both Moscow and Washington.

It is important, too, to keep in mind that all our differences are not with Moscow—many are with Europe.

What must happen before a disarmament agreement of substance is concluded?

Europe will have to accept bigger risks in the conventional field. Or the Soviet Union will have to be persuaded to reduce its conventional forces to the European level. Or Europe will have to increase her conventional forces to match Russia's. Or the United States must go it alone with Soviet Russia, reducing the greatest threats at the price of rancor or disaffection among America's West European allies. Or all the world can go on talking fruitlessly.

It remains true, then, that our best hope is still maintenance of a powerful American deterrent.—END

ABOUT THE AUTHOR

Foreign affairs writer for the Washington (D.C.) Star *for the past seven years, Earl Voss has contributed often to* AIR FORCE. *Before joining the* Star, *he served for six years in General MacArthur's Tokyo office, writing for the public relations division.*

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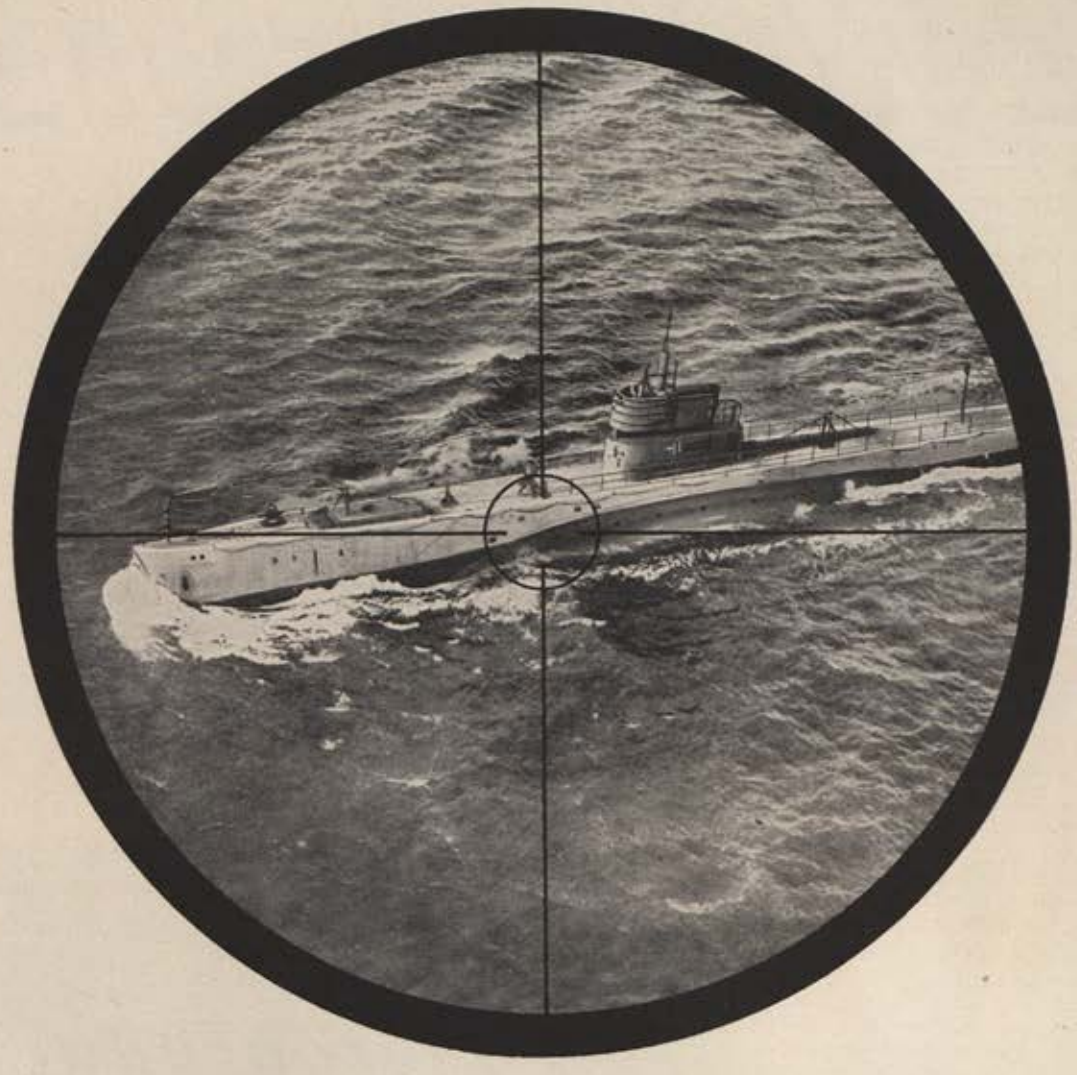

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Britain's V-force bombers in flight. From top: Victor, Vulcan, Valiant.

The V Force Partners of SAC

By Robert R. Rodwell

FOR ten years the US Air Force alone wielded the deterrent power that effectively thwarted the expansionist ambitions of the Communist world, and Western allies and neutralist countries were sheltered solely by the protective wing of the Strategic Air Command's nuclear striking capability. Now SAC's deterrent power has been enhanced by a strong contribution from a previously sheltered nation, enhanced by Britain's RAF V-bomber force.

The V-bomber force is a small, highly trained cadre of squadrons flying high subsonic and transonic four-jet bombers, Valiants, Vulcans, and Victors. The V-force is equipped with thermonuclear weapons, and gives for the first time since World War II the RAF strategic striking power. For years RAF Bomber Command was impotent, operating only war-tired Avro Lincolns and a few dozen redundant B-29s, lent by SAC.

That weakness was the result of a decree by the first postwar British government, which postponed major reequipment of the RAF for ten years, and allowed only developments of wartime airplanes to be produced. The one exception to this ill-advised policy was the twin-jet Canberra tactical bomber, a strikingly successful airplane which entered service in 1952. The Canberra gave Bomber Command valuable jet experience, but it did not give it strategic power. That did not come until 1955.

That was the year the first Vickers Valiants reached the squadrons. Design of the three V-bombers was begun in 1947, and the Valiant was conceived as a comparatively unsophisticated aircraft, to enter service before the radically different and advanced delta-wing Avro Vulcan and the crescent-wing Handley Page Victor. The Vulcan became operational last year, and the first Victors are now in serv-

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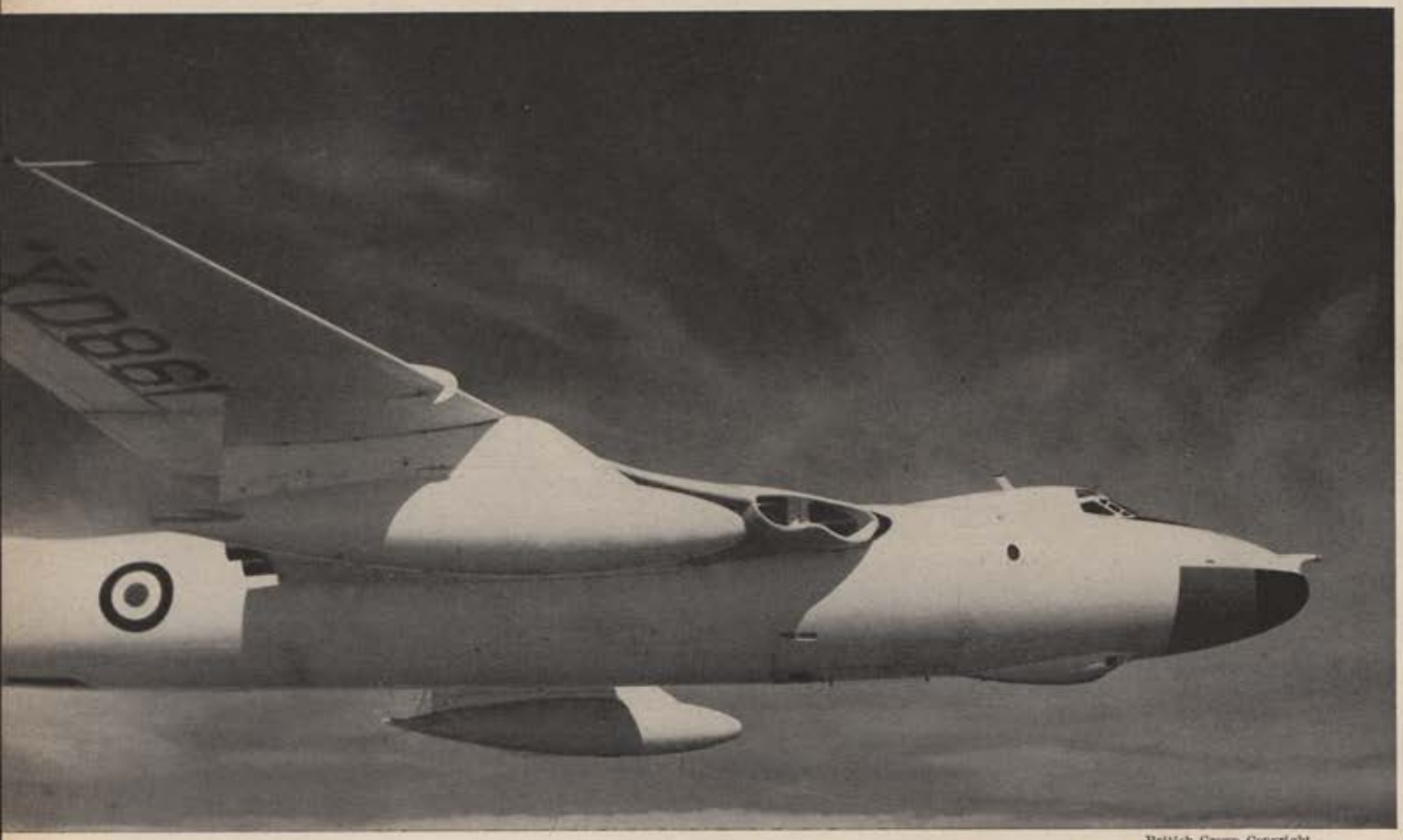

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Close-up of Vickers Valiant shows limits of bomb bay. Note underside fairing, housing aimer's coach for visual bombing.

V-FORCE PARTNERS OF SAC

ice, too. So it is only recently that the V-force achieved effective maturity.

As a new entrant to the nuclear bombing "club," and the Free World's second, the RAF has been quick to learn from the old hand, SAC, and apply the lessons in the creation of a combat-ready striking force. The emphasis on instant readiness is the same as SAC's, and the ways in which it is maintained are similar. But the airplanes in particular differ in conception from the craft which give SAC its teeth.

Britain is nearer the potential targets, a factor which, if not easing the task of those responsible for the early-warning system, at least simplifies the British bomber designers' problems regarding range. Without the tremendous fuel capacities which are an inherent feature of American bomber philosophy, the British bombers have lighter wing loadings, on the order of seventy pounds per square foot, and only fifty pounds per square foot with the Vulcan, compared with American loadings of about two hundred pounds per square foot.

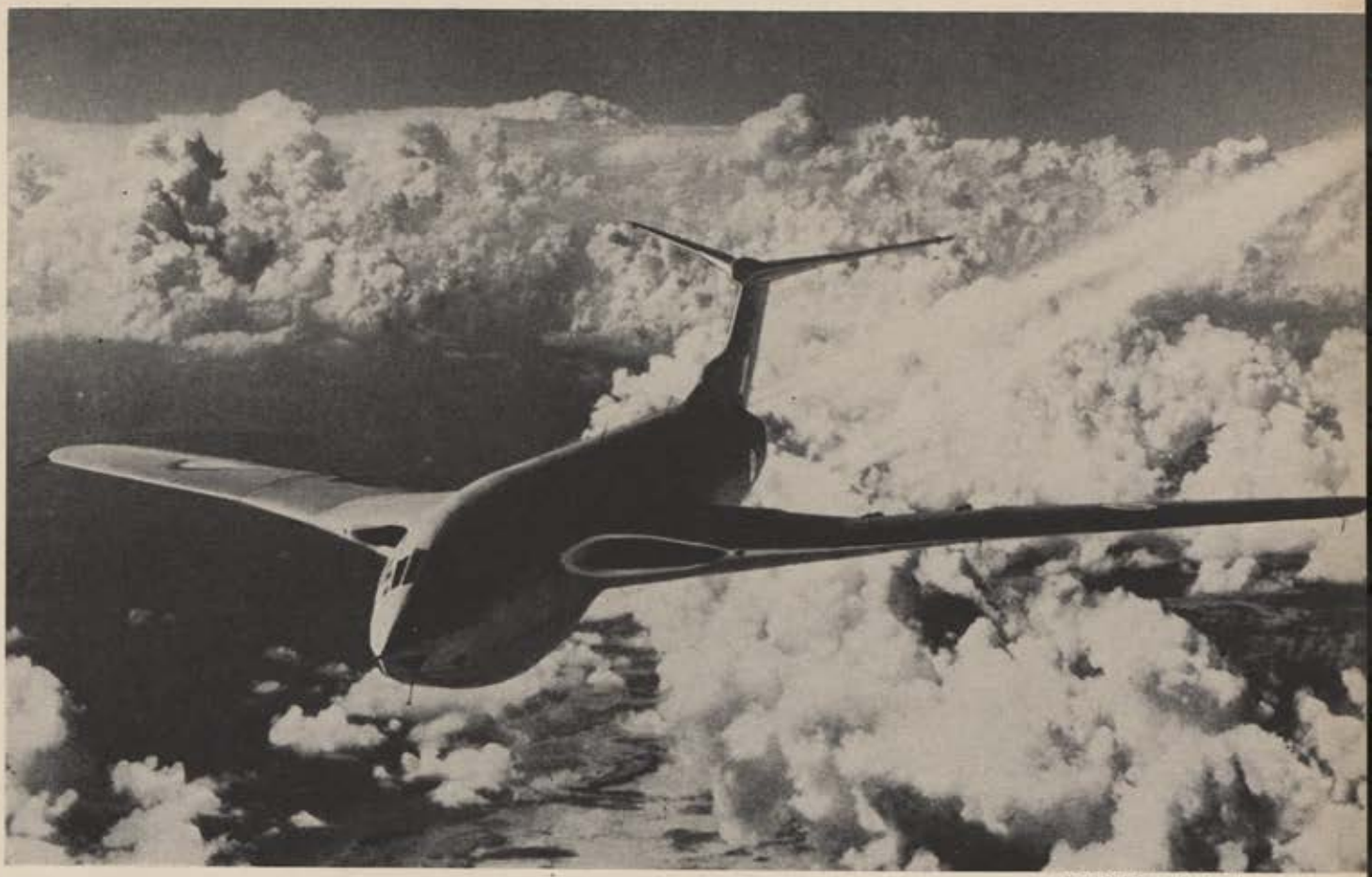
Lighter wing loadings give better altitude capabilities, so the RAF bombing altitudes are higher than SAC averages, 50,000 feet to about 35,000 feet. This operating difference leads to the primary equipment difference—the V-bombers carry no defensive armament. They rely on great altitude, dash-over-target accelerations, "dog-leg" approaches, and good high-altitude maneuverability to avoid interception.

Although there is no tail armament, there are detection devices operating in this quarter, together with various electronic countermeasures. Some V-bombers have recently been seen with sealed bomb bays and profusions of nonstandard antennae. The belief is that special electronic warfare units have been formed to supplement the countermeasures of the standard bombers, and to fly in advance of a bomber attack, throwing the enemy's radar defenses into confusion.

In addition to avoiding interception, there are other operational advantages gained from flying higher. At the heights common to V-bomber operations, turbulence is rare, and smooth, steady runs up to the target can almost be guaranteed, without any buffeting to upset the radar bombing system. For astronavigation purposes, the higher altitudes are again advantageous, since there is less chance of clouds obscuring the stars. Takeoff and landing speeds are reduced by having low-wing loadings (a fully loaded Valiant takes off at about 130 knots indicated air speed, and the landing speed is about one hundred knots), and operations from shorter runways are possible.

The Valiant, Vulcan, and Victor are all flown by crews of five: two pilots, a navigator/bomber, a navigator/plotter, and an air electronics officer. The cabin layouts are similar in all three aircraft. The pilots sit side by side on a raised platform. Behind and below them the three crewmen sit, in rearward-facing seats, at one long desk across the fuselage.

The training aim is that these three aircrew members shall be fully interchangeable among the different V-bombers, because the electronic and navigation gear is common to all three types. Normally, crews are formed during operational conversion training,



British Information Services

The Handley Page Victor is a crescent-winged, four-jet craft with cruising speed of more than 700 mph at 60,000 feet.

CONTINUED

and are posted as entities to the squadrons. The usual RAF operational tour of two and a half years has been lengthened to five years in the V-force, to maintain continuity and reduce the training effort.

The USAF found in the early days that it is the older, more mature flyers who make the best nuclear bomber crews, and RAF experience confirms this. The RAF has set its highest standards ever, and before selection, all aircrewmen must have their station commanders' recommendation.

To be selected as a potential V-bomber captain, a candidate must have at least 1,200 hours' flight time, including 200 hours or more jet time, and preferably heavy four-engined aircraft experience. Copilots must have 700 hours' flight time, including at least one full tour on jet aircraft. Navigator/bombers and navigator/plotters have to complete one or more tours before V-bomber training (the navigator/bomber's training on radar bombing systems lasts eleven months). Air electronics officer is a new aircrew grade instituted specially for the

(Continued on following page)

The delta-winged Avro Vulcan is a formidable member of the British RAF V-force.

highly complex V-bombers—candidates are air signalers with at least one tour's experience in Bomber, Transport, or Coastal Command. This crew member is responsible for inflight communications, the operation of electronic countermeasures, and all electrical trouble-shooting in flight.

Capital investment in the V-force is high. Little has been spared in the way of expensive training aids and airfield reconstruction at V-bomber bases. Chief among the training aids are comprehensive electronic flight simulators at both operational conversion units and operational bases. This is the first time the RAF has used these aids in a big way, and training on simulators is done for up to twenty-four hours a day—pilots on operational squadrons "fly" the simulators for at least twenty hours each month.

To maintain the instant readiness necessary with a bomber force in the nuclear age, the RAF has overhauled its maintenance structure. The peculiarly USAF idea of a crew chief—a senior technical NCO in charge of the servicing of one particular aircraft—has been adopted. Previously, a senior technical NCO in the RAF may have been responsible for the line servicing of a whole squadron's aircraft.

The complexity of the V-bombers demanded the change, as it demanded "package maintenance." By each servicing area on the V-bomber bases is a "cab-rank" telephone, for maintenance crews to call direct to technical stores for new components to be immediately sent out by truck. Few things are actually repaired in the aircraft; instead, a defective unit is immediately replaced, and later serviced in the workshops.

The technical stores and workshops themselves are new structures at the V-bomber airfields; large and lavish electronics centers have been built, with air-conditioned and dust-free workshops for the servicing of the delicate electronic gear. All this is radically new to the RAF, a measure indeed of the importance attached to the V-force by the British government and the military chiefs. Other buildings added to RAF bomber airfields in the past two years include new operations blocks, containing well-guarded target identification and briefing rooms, and specialist sections for safety equipment, aircrew clothing, navigation information, and so on. Another change at the bases that marks the V-force as being in a highly strategic business are the security precautions taken. RAF security, by American standards, is often lax, but there is little chance of one's wandering over a V-bomber base without the requisite passes and a close escort.

The nature of the nuclear deterrent, of course, allows no time for reconnaissance once the "balloon goes up." Targets must be known beforehand, selected in order of importance, and individual crews briefed to attack them. Simulated training must be given each crew in the radar identification of its particular targets. Primarily, one must know which targets are the vital ones, to be struck in the first hours of a nuclear conflict. All this accentuates the importance of the intelligence services and of strategic reconnaissance. Strategic reconnaissance is a function assumed quite recently by Bomber Command, and the RAF Central Reconnaissance Establishment is directly under its jurisdiction. Performing this vital supporting role are squadrons equipped with high-altitude photographic versions of the Canberra, and a photo reconnaissance version of the Valiant, with a camera package installed in the bomb bay, is now in service.

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Vulcan captain signs ship over from crew chief just before the takeoff.

This concept of the simple adaptation of basic bomber airplanes to suit them for supporting functions also applies to flight refueling. Britain's slim budget could not support the development of a specialized jet tanker for the bomber force, comparable to the Boeing KC-135 for the USAF. Instead, a simple "package" tanker modification kit has been developed. Winched up into the bomb bay of a Valiant, the package converts the airplane into an aerial tanker, and is installed in about six manhours of work. Reconversion to standard bomber takes about the same time. Air-to-air refueling has not figured largely in the routine training program to date, but is now beginning. The refueling method employed is the hose and drogue method, and in the tanker role, the navigator/bomber operates the fueling controls. In the receiving aircraft, the copilot controls the take-on operation. Fuel sequencing and fuel planning, together with cabin conditioning, are at all times the copilot's primary responsibilities.

The tactical mobility of the V-force has been enhanced by the development of liquid-fuel, rocket-assisted takeoff units, permitting operations from short runways, or from high-

(Continued on page 70)

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RAF crewmen service a Valiant at night. On the nose is stub for refueling, now becoming a regular operation.

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Escape shield on the door of this Victor is visible as crew readies for training mission from snow-covered field.

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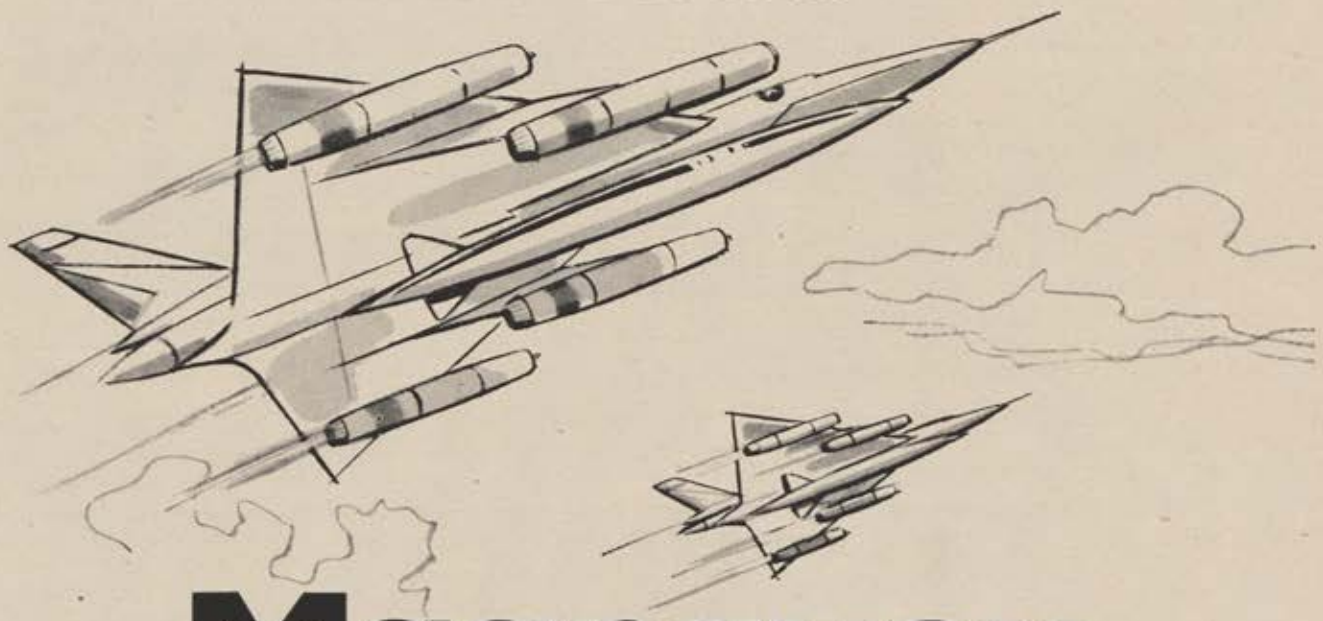

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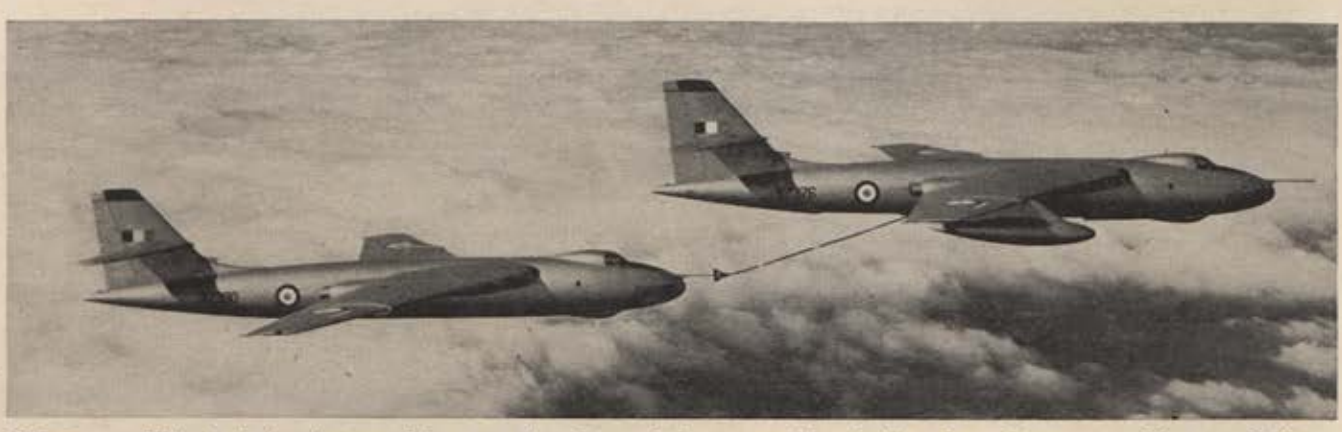

V-force capability is being increased by use of probe and drogue aerial refueling, here demonstrated by two Valiants.

altitude and tropical airfields with limited runways. (These latter airfields may be situated in the Kenya-Aden-Singapore triangle, the second of Britain's "central strategic areas.") Developed by de Havilland, the Super Sprite rocket for the Valiant, and the Spectre for the Vulcan and Victor, are installed, one under each wing, and parachute down after burnout, landing on inflated cushions, to be refueled and used again.

As the V-force was evolving, some people felt that Britain was equipping herself with the means of waging nuclear warfare, but would be ill-equipped to deal with any minor local war, where the use of nuclear weapons would not be justified, for fear of starting a larger conflict. This particular fear is valid now that the British government has abandoned the development of future manned bombers, and is placing all its faith in guided missiles, but the criticism was soon disproved with regard to the V-force.

Using conventional high-explosive weapons, a small number of Valiants was engaged in the Anglo-French Suez action of October 1956, for precision bombing which destroyed Egyptian airfields and aircraft, but left the civilian population unharmed. The V-bomber crews proved then that they, and their aircraft, were capable of moving swiftly into action for a local "hot" war in distant parts of the world. A manned bomber force possesses two great advantages that ballistic missile units will not possess—instant mobility and the ability to contain local conflagrations by precision bombing, with high-explosive weapons, of purely military targets.

The British government's decision, taken last year, to abandon development of the eight-jet Mach 2.5 manned bomber, designed by Avro to succeed the V-bombers, has been condemned in many quarters. For, in addition to possessing the mobility mentioned earlier, only manned bombers can take advantage of the immensely long periphery of Russia—a geographical factor in the West's favor, for such a periphery is extremely difficult to defend. Only the manned bomber can probe and find the weak defenses in the periphery; missiles launched at Russia from Britain will travel in a narrow and comparatively easily defended cone. Furthermore, the immense areas over which strategic targets can be dispersed in Russia, and uncertainty as to their exact location, can make missile attack wasteful and ineffective.

Many observers feel the British government has fallen for the error of assuming that what is best for Russia is best for Britain, too. The British Isles make an ideal target for missiles. Small, densely populated, and highly industrialized, it needs only a few nuclear rockets, not particularly accurate, to cause complete havoc. But, being so small, it is comparatively easy to defend against manned aircraft (as the Luftwaffe found to its cost). Thus, Russia places its faith in the ballistic missile. But a manned bomber force can be rapidly dispersed in the face of a missile attack, to ride the initial strategic blow, and so deliver the retaliation. The United States has not abandoned the manned bomber, *viz* the Convair B-58 and the North American B-70, and the British government should not have done so, many think.

But what of the present? The primary deterrent at this moment, and likely to remain so for at least ten more years, is the threat implicit in manned bombers carrying thermonuclear weapons. This applies equally to the USAF, to the RAF, and probably to the Russians, too. The deterrent effect of the RAF V-force will be increased by the Avro stand-off bomb now under development. This will climb to about 90,000 feet on a ballistic trajectory and dive on to its target at supersonic speeds. To carry it, developed versions of the Vulcan and Victor are in the works, designed to cruise above 60,000 feet over substantially longer ranges, having more power than the models in service now. (Both the Vulcan and Victor, in their present forms, have flown at supersonic speeds in gentle dives.)

What does Britain have now, in the V-force, which has accounted for about ten percent of her defense expenditure in recent years? She has a force with which to take independent action to protect her interests when—as happened at Suez, and can happen again—these interests are not common with those of the United States. But primarily she has under her direct control a potent and valued part of the West's deterrent forces, increasing her standing among the Western nations, and entitling her to full consultation with the United States over any strategic action.—END

ABOUT THE AUTHOR

Author Rodwell, who is a staff writer for the British magazine Aeronautics, *researches his stories realistically. The cut shows him clad for a ride in the V-force Valiant, part of his preparation for this article. Mr. Rodwell, who specializes in military aviation writing, has flown in many modern British and American military aircraft and is qualified to wear the "Mach Busters" pin, having flown supersonically in an F-100. Readers will remember his January '58* AIR FORCE *article on NATO force jet training.*

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Present, widely diversified activities in such fields as missiles, guidance, electronics, servo-mechanisms and rocket power, as well as aircraft, are continuing and enhancing Bell's stature as a leading research, development and production organization.

Its air-to-surface missile, the GAM-63 Rascal, for which Bell has complete weapon system responsibility, has recently been assigned to the Strategic Air Command.

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But the past and present are only springboards to the future in a keenly creative, progressive organization like Bell. The brainpower of its highly skilled scientists and the knowledge and experience gained through the years are being applied to many new, ultra-advanced concepts to help keep America strong in the air and contribute to its victory in the race for outer space.

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FLYING GOES TO COLLEGE

By Louis Alexander

Collegian Bob Wunderlich gets set for some flight time in a Cessna 140 and a head start toward a USAF pilot career.

FIFTEEN years from now you'll be telling your children about the first day you soloed," the instructor told AFROTC Cadet J. E. Gray.

He pulled out a pocketknife, untucked Gray's T shirt, and slit a piece from it. On the cloth Gray scrawled his name and the date—November 11, 1957—then triumphantly posted it beside a few others on the bulletin board at Easterwood Field, College Station, Tex., a few miles from Texas A&M College.

On that same day another student pilot, Bob Wunderlich, took off for Wichita Falls and Dallas for his first solo cross-country flight. With twenty-five hours' flying time behind him, gained in three weeks, Wunderlich was out in front of the rest of the flying college students.

The training Wunderlich is getting will put him—and Gray and about a thousand other young men—out in front of others who this year enter training to become Air Force pilots *without* previous flight experience.

Wunderlich was one of the first young men to learn to fly under government sponsorship while still a senior cadet in the Air Force Reserve Officers Training Corps program. When he graduates from college this month, he will have a civilian pilot's license and thirty-five hours' flying time.

This training will make him—and more than 1,200 others in ninety-five colleges throughout the United States—better able to complete the USAF's stiff program of pilot training.

Col. Henry Dittman, commander of the AFROTC detachment, of which Wunderlich and Gray are members, believes the training will save the Air Force—and the taxpayer—money that otherwise would be spent to weed out the candidates likely to wash out from Air Force flight training.

For a $600,000 investment, Congress and the Air Force will get about a thousand eager trainees by the beginning of this summer—ready, willing, and already partially qualified to become Air Force pilots. The money enables the Air Force to operate the program in ninety-five colleges; and some of it may go to additional colleges where there are as many as five Air Force ROTC students who want to learn to fly and can pass the qualifying examinations.

These hundreds of newly commissioned officers who have completed flight-training programs in college will make up a sizable portion of the total number of young men who enter Air Force pilot training from all sources this year. Colonel Dittman believes the group flight trained in college will make up an even bigger percentage of those who finish AF pilot training next year—for among them will be mighty few who cannot make the grade.

The flight-training program for senior cadets at Texas A&M is the biggest of the college programs backed by the Air Force. Last year about 125 cadets entered the program, and—despite stiffer eligibility requirements which included signing contracts to serve for five years in the Air Force—more than fifty cadets were enrolled

(Continued on following page)

One of the cadets checks fuel tanks of the Cessna during preflight inspection.

Hangar-flying session in the ready room helps to keep the students interested.

by early last November. Ohio State University, too, has a large contingent of flight trainees. Other programs are under way at colleges across the country.

Preparing cadets for successful training in the Air Force is a major purpose of the college flight program authorized by Congress in August 1956. But it is not the only benefit that has resulted from the program.

Many cadets are signing five-year-service contracts in order to be eligible to fly while in college. Campuses from California to New England report a general uplift in cadet corps morale. Airplanes and flying are not something remote and imaginary. They're real and they've invaded college life.

For good measure, the program saves money by the tens of thousands of dollars, Colonel Dittman believes, by preventing the Air Force from wasting $50,000 or so on the education of a prospective pilot who winds up his training as a washout. His flight instructor will ascertain in a lightplane—before the government begins paying him the wages of an active-duty lieutenant—whether each man can adequately acquire pilot know-how.

The collegians take flight training on their own time. They sandwich it in between classes, squeeze it in on weekends between work and Saturday night dates.

Take Toby Hughes of New London, Tex., for instance. Toby finished work on his job each morning at eight. He didn't have to go to his first class until nine. In that one hour he would speed out to Easterwood Field, get in a little dual flying time, and race back to the campus in time for class.

But the college tries to help. Although Easterwood Field is just down the road from the A&M College campus, it is a long, long walk for Charles Lessard of Panama City, Panama, and a few other cadets who don't own cars. When Lessard asked Colonel Dittman for two days' leave of absence so he could locate a used car that he could afford to buy, Dittman refused and came back with a counteroffer. He lent Lessard his 1950 Oldsmobile, the Dittman family's second car, whenever the youth needed to get to Easterwood Field for a flying lesson.

To sign up for flight training requires each young man to search his mind and heart about his objectives and to agree to stay in the Air Force for five years.

"This has made young men make up their minds about the five-year program," Colonel Dittman says. "If they want to fly, they sign up.

"The flying program has built up the morale of the students. The five-year program is giving us men who desire to fly, who desire this kind of life. Their having this desire makes it better for the Air Force. And this should be reflected, to a degree, in their future success in pilot training in the Air Force," he adds.

Examples of this spirit are plentiful. Rollins Bilby switched from navigator training to pilot training in order to join the college flying program. Dittman knows a student of aeronautical engineering who decided that none of the dollar-fat offers of industry were as attractive as a five-year-service contract and a seat next to the flight instructor in a Cessna 140.

Another candidate, Bob Skinner, had a job in College Station and stayed on during vacation. He went out to Easterwood Field before the government program started, and paid Whiterock Aviation, Inc., for a few flying lessons out of his own pocket.

Wunderlich applied to A&M College to study personnel management. For him the opening of flight training was a bonus. It became available to college cadets just before he became a senior, and he eagerly signed up. He was first in the group to solo and first to go on his dual and solo cross-country flights. Yet Wunderlich's previous airplane experience had been confined to a few passenger rides in a crop duster piloted by his uncle during a summer on a farm.

Wunderlich was all ready to solo,

(Continued on page 77)

to make the moon the free world's high ground

The skills and talents of the Westinghouse Electronics Division have been directed to research and development in these critical fields to help find the answers to man's next major space accomplishment . . . reaching the moon . . . and beyond.

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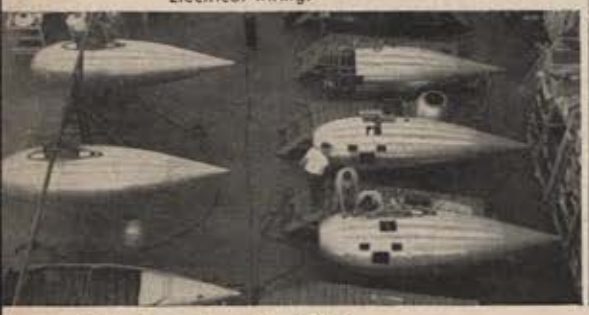
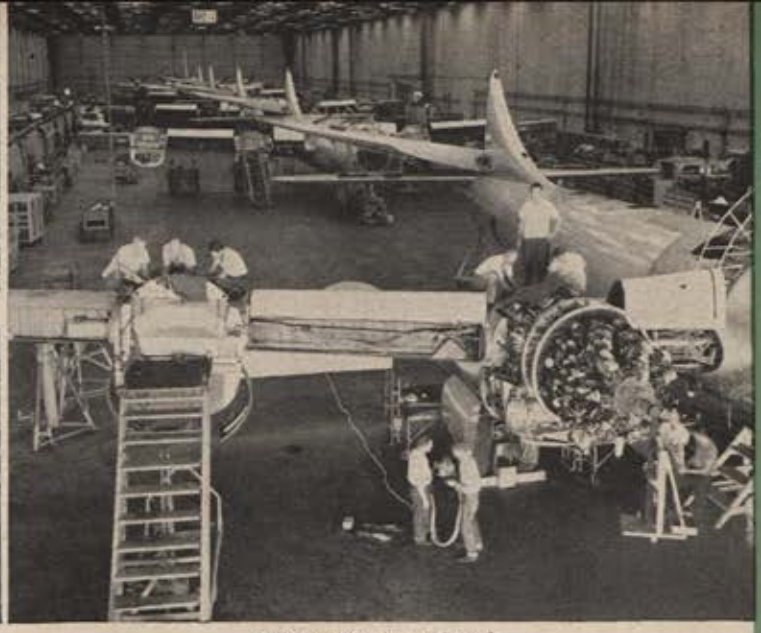


Refueling reel pods for KB-50s.



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Jet-augmenting tankers, missile work, infra-red research and production, instrument overhaul, design and manufacture of remote channel indicators, technical publication writing; design and production of electrical, electronic, hydraulic, and mechanical components and power plant systems; helicopter maintenance, fabrication of refueling wing-pods, research in aerodynamics. From wiring circuit design and installation to complete modification of multi-engine aircraft, Hayes has the facility and the skilled staff necessary for engineering, manufacturing, quality control and cost control in widely diversified work on aircraft.

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Classroom work is an important part of the training. Here Capt. R. E. Griffith demonstrates action of the controls.

Distaff side is oriented on what it's like to fly. Wife of one cadet here gets a cockpit check at the airfield.

one afternoon late in October, when he realized he didn't know the procedure for going around the traffic pattern again if he didn't complete his first approach for a landing. Just before his instructor got out of the plane for the big solo, Wunderlich popped the question, and got the answer.

Just in time, too. Without the weight of the instructor, Wunderlich's Cessna 140 ate up the route around the traffic pattern. He was rapidly catching up to the plane ahead of him on final approach when the control tower flashed him a red light and made him use his last-minute knowledge.

That empty right seat in the side-by-side trainer bothered Wunderlich and irritated Gray on their solo flights. The empty seat first winked at Cadet George McKnight, then practically leered at him, and made him nervous. It was hard for them to realize that the absence of the instructor was also a blessing.

"All of a sudden I could see easily to the right to make sure that area was clear of planes," McKnight reported.

But it had disadvantages, too. Cadet James Moore of Houston bounced his plane in for his solo landing, without the extra weight of the instructor to hold it down.

Forced landings taught the cadets a lot about flying in a hurry. "See those seven green lines on the field you have just picked for your emergency landing?" an instructor pointed out.

"Those, son, are fences."

On one of his unexpected quests for a place to set down, Moore was about to land in a grassy pasture when a cow loped in front of his plane. His instructor poured the coal to the Cessna and lifted Moore, himself, and the airplane just over the cow's broad, beefy back.

Motivation is an important part of the program. The professors of air science took a new and subtle tack last fall, and got better results from their cadets.

The problem was that some boys were making decisions against flying and the five-year contracts for reasons that weren't consistent with what was known about them. It was soon realized that the wives and girl friends were influencing decisions against flying.

So the air science department conducted a campaign on two fronts, one on the cadets and the other toward the wives, mothers, and girl friends.

Personnel officers of major corporations were all over the campus, making attractive offers to the students and painting bright portraits of life in their industries. Capt. Glendon Jones and the others paralleled this procedure. They set up "job interviews" for each of the 200 cadets in the graduating class.

Each cadet was to paint a picture of his interests for the future—pay, vacations, working conditions, advancement, retirement, and buying a share in the business.

Then the cadets were shown how the Air Force's five-year job security stacks up against industry's. The officers pointed out that industry offers considerable security, but rarely offers a guaranteed five-year contract. Each cadet was told, "We offer you a five-year contract as part of a twenty-year or thirty-year plan."

The "job interviews" also answered cadet questions about vacations, sick leave, working conditions, life overseas, life in the Strategic Air Command, and about advancement. As for a share in the business, the air science professors pointed out that as a taxpayer each cadet does have an increasing share in the business, and, as citizens, cadets are vitally concerned with the nation's defense and international policies.

Then the air science department officers handed over to their wives the management of the more subtle part of the campaign. The wives invited to the campus the mothers of all the graduating cadets, the wives of the married ones, and the girl friends of the single ones. On a football weekend the meeting in the student center drew forty-five women.

Each officer's wife described her experiences in living in one overseas area—Europe, the Far East, Panama. Following the verbal fifteen-minute tours of life around the world, the ladies were told: "I'd like to tell you the questions about life in the Air Force that were raised by your sons, your boy friends, and your husbands. I'd like also to tell you the answers we have given them."

Pay and advancement possibilities were discussed—matters of great interest to girls like Jo Ann Lisotta of Texas Christian University, who was going to marry Cadet Richard Stephens, commander of Cadet Squadron Six.

One student wife asked, "Isn't flying dangerous? I'm afraid of my husband flying."

(Continued on page 79)

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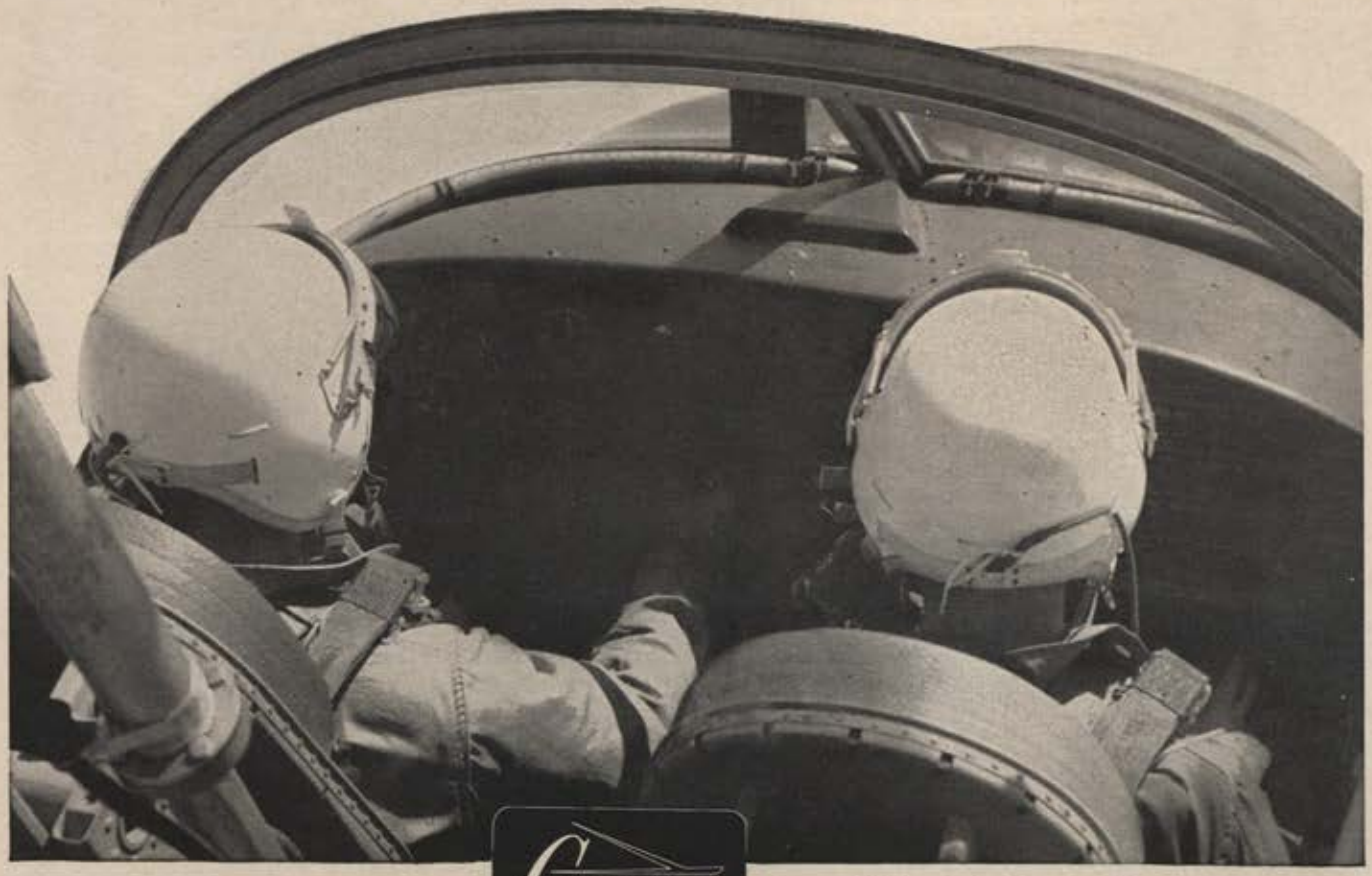

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The reply: "For the *average* person, flying *is* a more dangerous form of transportation. But your husbands are not average. From aptitude tests and physical examinations based on fifty years' experience, we know they are *better than average*. The tests indicate these men have aptitudes for flying, and are capable of coping with all the problems."

The clincher—especially for girls like Nancy Webb of West, Tex., who had come at the invitation of Cadet Bob Matus—was a twenty-five-minute ride in a four-passenger Cessna, during which they got to see just what flying feels like, and to experience personal thrills or chills that helped them to understand what flying means to their menfolk.

"Nancy didn't want me to fly," Matus said, "but that twenty-five-minute ride in the air really changed her attitude."

Mrs. Raleigh Lawrence of San Antonio said, "Whatever makes my husband happy is what I want. The girls at work tell me that I'll be a nervous wreck when my husband is flying jets.

"But I tell them I worry much more about him when he is driving a car."

Mrs. Farrald Belote, of Garland, Tex., said, "Seeing the plane and knowing what it is that he flies, and what he does, was a big thrill to the wives. Most of us were pretty well sold, even to start with."

The sight and feel of an airplane does things to wives, girl friends, and to cadets. There's something personal about the relationship between man and plane that no guided missile can ever stimulate; a comradeship between man and metal beast that speaks of adventure and challenge.

One student said he likes the sense of complete freedom that he feels in the wide open sky. Another said that getting to fly an airplane during his college days bolstered his decision to make the Air Force his career.

All this adds up to a lot of points for the Air Force, and for the Congress and the ubiquitous taxpayers for their horse sense in putting up a few hundred thousand dollars to set a thousand youths on the flying path. —END

ABOUT THE AUTHOR

An aviation-minded Texan who has written for AIR FORCE *a number of times, Louis Alexander is an active member of the Aviation Writers Association, and served as chairman of that organization's convention last month in Houston. Lou is an Air Force Reservist and the father of two children.*

11,000-mph Missile Slowed

PHOTOS COURTESY OF THE NEW YORK TIMES

The tortuous journey begins at dawn as the Atlas is loaded onto giant truck in San Diego for the trip to Florida.

Rolling over a desert highway, the Atlas starts its 2,700-mile trip. It's shrouded against weather and the curious.

Atlas squeezes under a low bridge in Arizona. Internal jacks let the crew adjust trailer's height.

No boon to the smooth flow of regular traffic is the truck-borne missile. Here's one jam near Mobile, Ala.

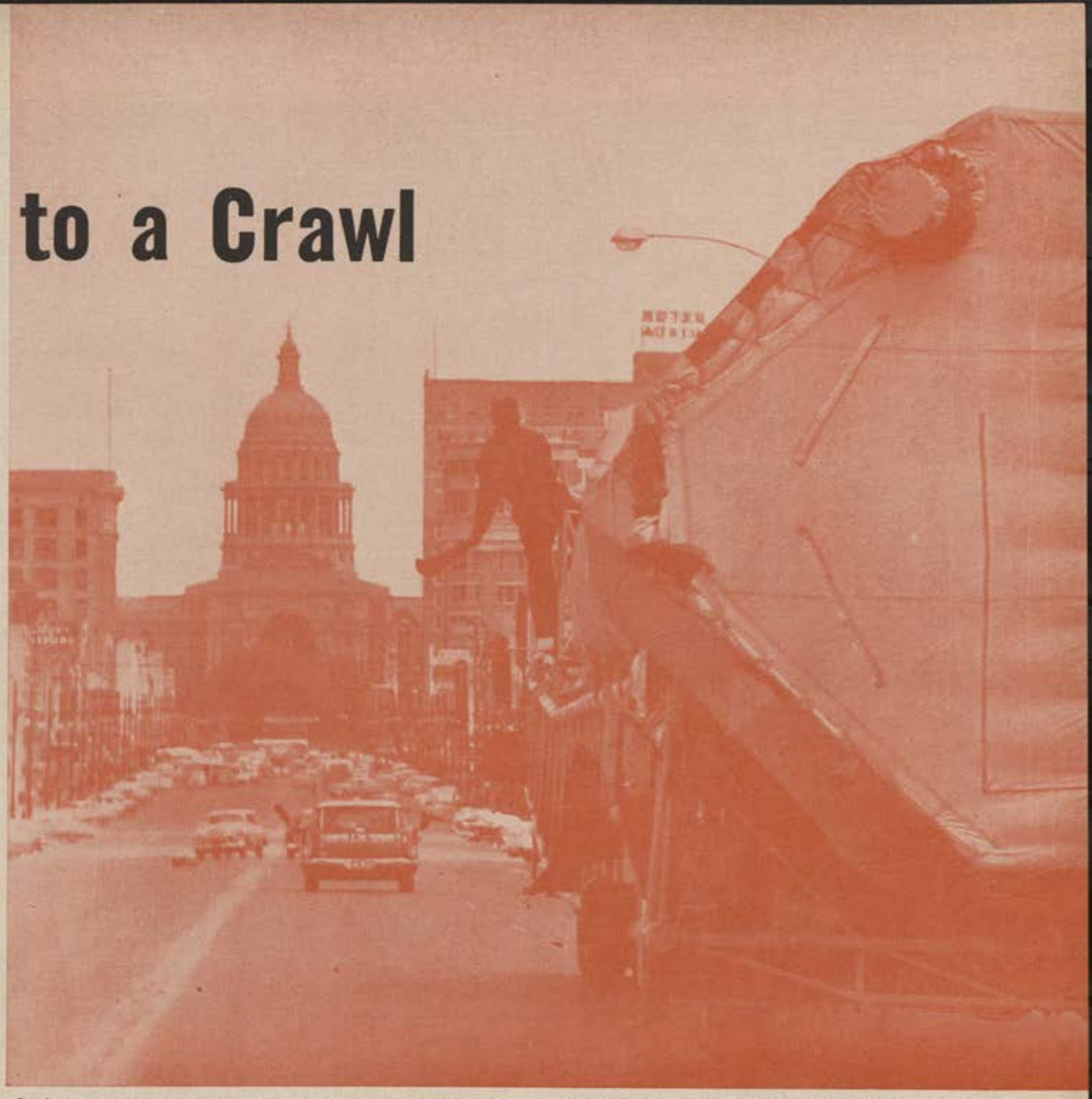
IT'S A Space Age paradox that before the enormous USAF Atlas intercontinental ballistic missile can be tested for its hoped-for 5,500-mile-range flights from the Air Force Missile Test Center at Cape Canaveral, Fla., it has to be tortuously brought by truck from the plant of its origin, General Dynamics' Convair Division at San Diego, Calif.

With the nation's air logistic system lagging badly due to shortage of funds, the logical way to get the "bird" from plant to test site—by air—is out of the question.

So the $2 million missile, carefully shrouded and protected, is loaded onto a specially built truck for an approximate eight-day cross-country trip over about 2,700 miles and through eight states.

On its trailer, the ICBM jounces across deserts, around cities (whenever possible), and with its own convoy of

to a Crawl



Snaking around a corner in Mobile. Because of the missile's size, the convoy can travel only during the daylight hours.

supplies and Air Police. Best speed is about forty mph . . . in vast contrast with the missile's eventual 11,000-mph potential—5,500 miles in half an hour.

Bad weather, tight turns, low bridges, traffic jams, scared motorists, the need for guards throughout the trip —all these combine to make the week-plus trip no fun for the men involved.

Three station wagons and a van convey the trailer, with two-way radios linking the procession. Routes must be painstakingly charted ahead of time.

For all concerned, it's a considerable investment in time and money. And for the civilian bystander, gawking at the "bird" as the trailer creaks around a tight corner, it must be a real enigma.

"Why don't they put that thing on an airplane?" he probably wonders.—END

Arrival at the Missile Test Center, where the Atlas will be readied for firing—at much more than 40 mph.

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Power output	20 mw (min.)
Reflector voltage	0 to –500 vdc
Beam voltage	350 v (max.)
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de SEVERSKY ON STRATEGIC ORGANIZATION

Alexander P. de Seversky

World War I combat pilot for his native pre-Bolshevik Russia, later a noted aircraft designer who founded what was to become Republic Aviation, and the author of the classic volume Victory Through Air Power, *Alexander P. de Seversky has long been respected throughout the world of aviation for his candid and prophetic views. What follows are some of his thoughts on defense organization in an age fraught with peril.*

IT IS heartening that, at last, a public debate on our national defense is under way. I hope that this debate will not be confined to Washington but will be joined in every hamlet in the United States. Tactics and weapons are the province of the expert; but broad national policy is the province of the people. It is primarily the product of logic and wisdom.

Strategy cannot be kept secret. This is evident from the size and allocation of appropriations and from the country's industrial effort. A free society cannot win a war by deception or surprise. Our strength must be inherent and obvious to all. But, in order to acquire this necessary strength, reshuffling of our present defense establishment is not enough. The whole military philosophy, the whole approach to our national defense effort must be changed if we are to survive.

What then must our course be? What sort of a defense establishment must we have in order to create a strategy attuned to the technology of our times? Eight years ago, in my book *Air Power: Key to Survival*, I tried to warn the Congress and the American people that the Unification Act of 1947, as amended in 1949, was "neither fish, flesh, nor fowl and will never project a single strategy for victory"; that we were "proceeding to create three separate strategic forces, each demanding the largest possible share of our security potential—which amounts to a guarantee that none of them will attain the magnitude and concentration for victory"; that the Act attempted "to perpetuate by law the strategy and tactics of World War II"; and that "we are opening ourselves to the confusion that existed at Pearl Harbor, only this time on a global scale and prescribed by law."

In other words, I warned that, because of a fallacious setup, there was the danger that our defense program would develop a disease that would threaten the very life of our nation. Now, eight years later, when the disease has become malignant and has been made apparent to all through Russia's military technological lead—as demonstrated by their Sputniks—we are told how the malady

(Continued on following page)

was contracted. But, instead of the bold and skillful surgery required to remove the growth and restore the patient to health and vigor, we are offered a conglomeration of potions that will hopelessly snarl our national defense establishment. I agree entirely with the conclusions of AFA's Airpower Policy Committee (*see* AIR FORCE, *May* '58) that the trouble with the President's plan is that it does not go far enough. I, personally, am sure that the cure will be even worse than the disease. "Confusion by law" will be replaced with chaos by executive edict.

Under the beguiling claim that the new setup will provide greater integration of the services and unity of strategic effort, the plan actually fragments the Defense Department and multiplies the number of agencies, each of which will demand the major portion of our national effort. It chops the fish, chops the flesh, and chops the fowl into one unpalatable stew.

Here are a few concrete examples:

● In his new plan, the President states, "We must free ourselves of emotional attachments to service systems of an era that is no more." And since "the products of modern technology are not, in many cases, adaptable to traditional service patterns . . . we cannot allow different service viewpoints to determine the character of our defense." This sounds inspiring. It appears as though, at long last, we are taking a bold step forward, to radically revamp our archaic military setup. But in the next breath, alas, we take two steps backward, by stating that, "This recommendation most emphatically does not contemplate repeal of laws prescribing the composition of the Army, Navy, Marine Corps, or Air Force. . . . We should preserve the traditional form and pattern of the services. . . . I have no intention or desire to merge or abolish the traditional services." To me, these two statements are contradictory and irreconcilable.

● Also, in his message the President infers that in Washington the interservice rivalries are magnified by the press and congressional activities and adds: "Parenthetically, I may observe that these rivalries, so common in the national capital, are almost unknown in the field." I don't want to sound pedantic, but I am afraid that, in this case, strategy is being confused with tactics. In the field, a unified commander is given a definite objective, certain forces, and weapons with which to accomplish his task. It is only natural that everybody strives to do his best with the means available and there is, therefore, no cause for rivalry or bickering. All this is tactics. In Washington, on the other hand, the over-all national objective must be defined. The grand strategy must be devised, the military forces must be created and weapon systems must be developed to implement the basic strategy. All alternate ideas must be scrutinized and the final plan must be accepted by the Congress and the Administration. In strategy, there can be no compromise. The strategy is either right or it is wrong—and we cannot afford to be wrong. That is why, in Washington, everybody fights for his innermost convictions because as long as we have three separate services we will have three separate approaches to the problem of security.

● The reorganization plan recommends that a new office of Director of Defense Research and Development be established which would, in effect, separate research and development from the military services. But, in order for the new weapons to fulfill their purposes, they must be the product of a definite strategic concept, backed by trained and dedicated men who possess the necessary military and technological skill to carry out the mission. They must be developed, under military supervision, for the military. Therefore, it simply doesn't make sense to develop the new weapons in the abstract and feed them to the traditional services which, in turn, will supply them to unified commands for use in battle.

● The Administration plan also recommends a rather novel personnel procedure for top-ranking officers. "Before officers are advanced beyond the two-star level, they must have demonstrated, among other qualities, the capacity for dealing objectively—without extreme service partisanship—in matters of broadest significance to our national security." But since the President insists that "we should preserve the traditional form and pattern of the services," we must assume that the officers are expected to develop the understanding loyalty and *esprit de corps* of their distinctive branches. Then, after thirty or forty years of dedicated service in their particular departments, the Secretary of Defense pins the third star on their shoulders, and presto! they become utterly detached from their deep-rooted convictions and philosophies and acquire "the capacity for dealing objectively without extreme service partisanship." This is a good psychic trick if you can do it. I am afraid that, under this personnel procedure, it may not be the professional military experts who will wind up at the top but the politically minded officers who put personal ambition before the security of our nation.

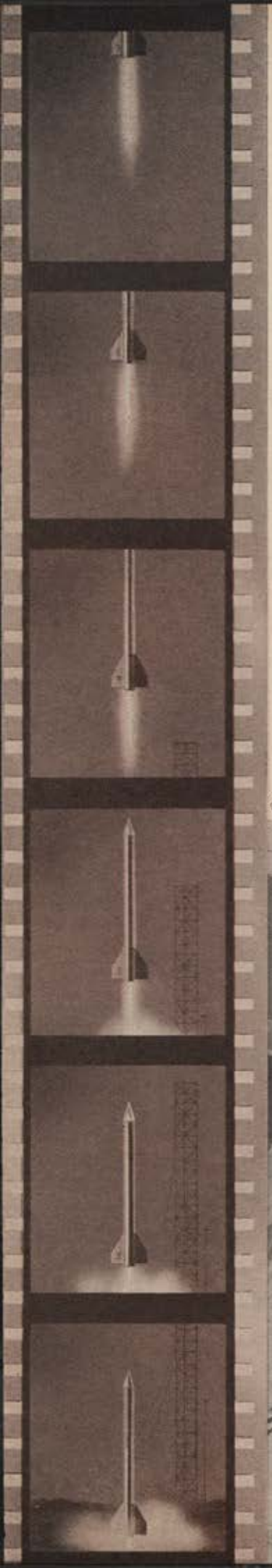
● And, finally, the plan would authorize the Secretary of Defense to transfer officers of any rank among the services but—and this is the weirdest thing of all—"with the consent of the individual in each case." Either the Secretary of Defense has the right to transfer the officers or he has not. And, parenthetically, it is obvious what will happen to the officer who doesn't choose to be transferred. During the Russian Revolution, when I was in that country, the Kerensky regime gave the order that no officer's command should be obeyed unless his subordinates consented. The Russian army promptly fell apart. Our military establishment may suffer the same fate and for the same reasons if this provision is adopted.

Civilian control of the military is being emphasized throughout the reorganization of our national defense. With this principle everyone agrees; but too many fail to understand that centralized authority to settle arbitrarily strategic disputes, even if vested in a civilian, is incompatible with such control. A dictator in mufti is no less a dictator than one in uniform. What we will have under the new setup is dictatorship by the party in power through complete subjugation of the military to its political whims.

The essence of civilian control is wide, popular participation in primary strategic decisions that effect our entire nation. It means the unabridged right of the people to know, through their Congress, the pertinent facts and problems and their unabridged obligation to take part in the decisive choice.

The trouble with our present military setup to date has been that, for the most part, the vital decisions were made in a spirit of compromise behind closed doors. As a result, the Congress and the people, in most cases, were kept in ignorance of the state of our national defense—until the Sputniks disclosed the shortcomings of our military effort. Under the new setup, the situation will be even worse. The civilian Secretary of Defense, who may not have any military training, may disregard the professional advice of the Joint Chiefs of Staff. Congress could be reduced to a rubber stamp. How illogical it is to insist on maintaining the traditional services, providing the environment for development of their distinctive mili-

(Continued on page 87)



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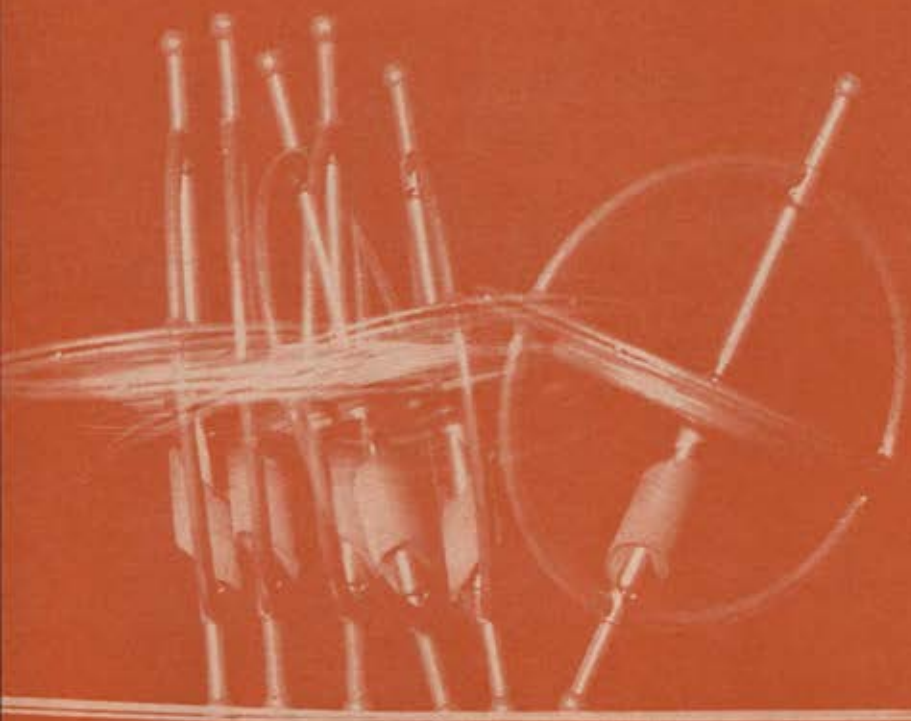

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tary concepts and philosophies and then, when these officers have reached seniority, give the Secretary of Defense the power to bang their heads together and knock out of their brains their lifetime convictions!

The trouble with the proposed changes in our national defense is twofold: First, the plan has been masterminded by people who are emotionally unable to divest themselves of habits and traditions that have been deeply implanted in their minds from the early days of their respective services. Second, the pace of military technology has accelerated at such a breath-taking rate that, unprepared by education, knowledge, and experience to meet this new environment, our top planners are confused and bewildered.

In his State of the Union message, the President stated that "the advent of revolutionary new devices . . . creates new difficulties reminiscent of those attending the advent of the airplane half a century ago. Some of the important new weapons which technology has produced do not fit into any existing service pattern. They cut across all services, involve all services, and transcend all services . . . in some instances they defy classification according to branch of service."

I agree that the airplane did create new difficulties in the defense area half a century ago because it transformed the space above the surface of the Earth into the most efficient medium for carrying destruction to the enemy. The Air Force was created to exploit this third dimension. Since then, man has flown four times faster than a bullet, faster than a sixteen-inch shell, and faster than some ballistic missiles. With rocket propulsion, the weapons of the Air Force no longer depend on the atmosphere for sustenance and propulsion. In fact, they are already space vehicles. The sky is no longer the limit. There is no actual ceiling to the atmosphere; it does not end abruptly at some layer, beyond which outer space begins. One fades into the other gradually over hundreds of miles of altitude. Airpower is spacepower. They are synonymous. The space above, therefore, is the natural domain of the Air Force, and since airpower is spacepower, supersonic vehicles, missiles, and satellites do not revolutionize warfare. They are simply more efficient weapons of air and spacepower. I am compelled to disagree that these new weapons transcend all services. They logically belong to the Air Force, which has for years prepared itself to wield these new instruments of war. The Air Force is not wedded to aircraft. It is a tri-dimensional military force that, because of its philosophy, has the organization and skill to keep abreast of space technology.

Shorn of their former strategic significance and trying to escape strategic unemployment, the elder services succeeded in selling the idea that they should leapfrog over the Air Force into space. The Vanguard project was assigned to the Navy to give it an opportunity to stake a claim in space with a token six-inch "moon." The Army developed its Jupiter-C and wishes to launch the first manned satellites to assert itself as a spacepower.

Naturally, once given the necessary funds and teams of talented scientists and engineers, the services made a valuable contribution to the conquest of space. But by devoting their efforts to these projects, the elder services are actually deserting their primary missions on land and sea. Furthermore, such scattering of effort will lead to military absurdity. No matter how they are coordinated, it is ridiculous that all three services should try to become spacepowers. How illogical it will be to have the space around our planet infested with silver Sputniks of the Air Force, golden Sputniks of the Navy, and khaki Sputniks of the Army, all trying to accomplish the selfsame mission in their own respective, inimitable ways.

In his reorganization plan, the President declares at the outset that "separate ground, sea, and air warfare is gone forever. If ever again we should be involved in war, we will fight it in all elements, with all services, as one single, concentrated effort."

To begin with, separate ground, sea, and air warfare went out with World War I in 1918. It was World War II which was won with combined teams of land, sea, and air forces, "fighting as one single, concentrated effort." The next conflict, unquestionably, will not follow the pattern of the last war. It will be just as different from World War II as World War II was from World War I. The next conflict will be geared to one decisive force projected through air and space—which it *must* control—with all other services acting in supporting auxiliary roles.

In any future war, no military force will be able to survive on the surface of the Earth. The Army will have to go underground, the Air Force will have to remain airborne, and the Navy will have to go underwater. It would end down below, anyway, in case of hostilities, so why not plan it that way in advance to obtain the maximum strategic capability—particularly now, when the submarine has become the new capital ship of the modern Navy. The "traditional" forces will be able to return to the surface of the Earth and fulfill their missions only after the question of who controls the air and space above has been resolved. And that decision will be gained by the Air Force, in a well coordinated, perfectly timed offense with planes, missiles, and, if needed, satellites.

Whether a ballistic missile is viewed as a supersonic vehicle of the Air Force, or simply as long-range artillery, the fact remains that all these vehicles—ballistic and guided, manned or unmanned, maneuverable or orbital, whether for offense or defense—operate in the selfsame space. The air ocean and its endless outer space extension are one and indivisible and should be controlled by a single, homogeneous force.

The argument that we still must adhere to the balanced forces concept in order to fight so-called limited wars with conventional forces all over the world cannot hold under close examination. I am convinced that we are not going to fight such wars—that is, unless we take leave of our strategic senses. To understand my reasoning, I would like to define what constitutes total and limited war.

Total war is one fought primarily between the United States and the USSR, in which each side makes a supreme effort to destroy completely the other's capacity to wage war and in which any and all nuclear weapons are utilized.

Limited war is one in which the forces of Communism and the United States may be involved but it originates in territory other than their own or their allies'. Neither side has any intention of letting the conflict spread to their homelands and each one believes that his objective can be accomplished by a limited investment of manpower and weapons.

I am convinced that:

1. We cannot win a limited war fought with traditional forces regardless of whether conventional or nuclear weapons are used because of numerical lack of our manpower.

2. We can make limited war impossible if we make clear to the world that we possess a retaliatory force with the strategic scope and tactical flexibility to crush local aggressions anywhere on the globe.

Limited wars, whether fought with conventional or

(Continued on following page)

nuclear weapons, can never be decisive. They can be fought only with the consent of the belligerents and, therefore, are bound to end in a stalemate. At best they are a reconnaissance in force, useful to gain a better knowledge of the enemy's capabilities and his political intentions, with the inevitable result of disclosing our own hand. Korea and Suez are proof that limited wars will always end precisely where they started, the *status quo* prevailing, unless they explode into a major atomic conflagration. The only difference between a limited war fought with conventional warheads and one fought with nuclear warheads is that, in the latter case, the investment of human life by both belligerents will be unacceptable, and the small nations we are trying to protect will be even more thoroughly decimated than Korea.

The very same technology that makes a total war between equally matched protagonists suicidal makes limited war idiotic. Russia has apparently sensed this new power relationship. That is why she stopped inciting Turkey and Syria against each other. She has also demobilized further her conventional forces, diverting that manpower toward increasing her potential for total war and forging the tools of economic competition.

We cannot preserve the traditional pattern of the Army, Navy, Marine Corps, and the Air Force and at the same time create a family of individual unified commands completely divorced from the parent services that are supposed to provide the wherewithal to make them combat worthy. Under the new setup, these unified commands will be an entirely different species. As a matter of fact, each one of them is to become a defense establishment in itself, demanding its own research and development for weapons with military characteristics peculiar to its own missions.

Take, for example, the proposed Limited War Command. This, alone, would demand the biggest Army, the biggest Navy, the biggest Air Force, the biggest Marine Corps—the biggest of everything. It is bound to absorb such a huge portion of our national defense effort that it will forever preclude the creation and maintenance of adequate forces for air and space warfare.

In view of this new power relation, it simply doesn't make any sense to "preserve the traditional form and pattern of the services." No juggling around of these traditional services and their respective roles and missions will stave off confusion. The Unification Law must be repealed in its entirety. The principles upon which it was founded must be repudiated.

The inexorable progress of technology has already made our Navy about ninety percent air force. It wants to project its power through the air and space by planes, missiles, and satellites. The Army, likewise, demands its own independent aviation in order to project its power with planes, missiles and satellites.

Our nation must understand that there can be only *one* strategic plan. Its goal must be indisputable control of air and space. That is why it is unsound for three separate agencies to attempt to fight the same air and space war with the same weapon systems; namely, planes, missiles, supersonic-manned vehicles, or satellites. In order to implement the strategy of the future, we must integrate our three services into one single military service with one uniform, one promotion list, and a single staff. The new establishment must be, for all practical purposes, a congenial Department of Air and Space, in which we have a Bureau of Naval Forces, a Bureau of Ground Forces, Marine Corps, and other surface warfare and logistic units.

The Chief of Staff is bound to be an outstanding military man, a renowned expert in the field of strategy, with no allegiance to any political party. His powers will be similar to those of the Chief of Staff of the Army or the Chief of Naval Operations under the old setup when these departments were autonomous. The Secretary of Defense will be, essentially, an over-all administrator, the personification of civilian control over the military. The Chief of Staff will be accountable for his actions not only to the Commander in Chief and the Secretary of Defense but also to the Congress, since Congress, in the final analysis, is charged by the Constitution with "raising and maintaining armed forces." Therefore, the outcries that such a direct line of authority when the chief of a single staff, in carrying out the will of the people, makes the necessary strategic decisions smacks of totalitarianism and creates a military Solomon, are utterly unwarranted. Such an organization in a totalitarian state, under the orders of a dictator, is one thing; the same organization, under the system of checks and balance in our republic, is quite another.

The changes I have recommended cannot, and should not, be expected to come from the Pentagon. They are the duty of the lawmakers. Even though some of our top military leaders individually see their logic and timeliness, they cannot criticize our over-all policies without being censured.

There is only one source from which the necessary changes can come and that is the American people, bringing pressure on their representatives in Congress. But they cannot act unless they are brought to realize the dangers inherent in our present military system.

Pressure *must* be brought on the Congress because in this fight our representatives find themselves between the devil and the deep blue sea. On one hand, if they take no action, they will antagonize their constituencies—the popular vote—which, through common sense, realize that competition and rivalry between the armed forces must be stopped and our military effort unified. But if they do not make fundamental changes, they will antagonize the entrenched vested interests behind the orthodox military structure. These vested interests control political districts and, therefore, the organized vote. As a result, the Congress shies away from the issue, endeavoring to maintain *status quo*, and will do nothing until compelled by the swell of popular demand to take action.

We are still the greatest industrial nation on Earth. We still have the necessary creative brainpower pool to regain world leadership.

But we can never achieve our nation's aims unless we streamline our defense organization to take full advantage of our unique talents and skills—the product of our free way of life. We must make fundamental changes, no matter how deeply they cut through sentiment or tradition. I respect and admire tradition. I value the importance of *esprit de corps*. But when these fine heritages interfere with human progress and threaten our very security, I feel that we must have the moral courage to relegate them to the nostalgic past and to make the necessary fundamental changes in our military setup. If we wait until such changes are forced upon us by the march of events, they may come too late. They must be made now, as a product of foresight and logic.

Only by organizing our entire defense effort into a single, homogeneous whole in compliance with the military axiom of unity of command and economy of force can we gain the air and space supremacy indispensable for the survival of freedom in a world where force is still the final arbiter among the nations.—END

Giant C-133 turbo-prop transport is tested at —65°F in mammoth ice box at Air Proving Ground Center, Eglin Air Force Base. *U. S. Air Force Photo*

USAF AIR PROVING GROUND CENTER SIMULATES POLAR COLD IN FLORIDA

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Has the Air Force developed

TOO MANY LEADERS?

By Lt. Col. William A. Breeze

DURING the next five years, some 35,000 Air Force officers will complete twenty years' service and become eligible for retirement. More than half of these—around 20,000—will be excess to the needs of the Air Force and are expected to leave the service by 1963. These retirements, a full ten years earlier than normal for military officers, will place on the American scene in considerable numbers a new type of retired person. In their early forties, when most men are just reaching the peak of their productivity and earning power and when their income needs are greatest, these officers must find new outlets for their productive efforts and new sources of income. The challenge, in some respects, will be as great as any they have faced.

Concepts for air warfare in the future and the age of the officers involved are responsible for the early return to civilian life of these military professionals. In considering the size and type of forces the US will need in future wars, planners must allow for a realistic spread in ages of military personnel, particularly the leaders. The age distribution of Air Force career officers today, especially majors and above, is anything but ideal. With only rare exceptions, present-day majors and lieutenant colonels entered the service at the beginning of World War II and are now between thirty-seven and forty years of age. Continued active duty and nominal advancement of all this group would completely disrupt the rank structure. One step in working toward a more desirable age spread among Air Force leaders would be the release by early retirement of twenty thousand or so of those officers in this bracket.

The problem was created when the brash but small Army Air Corps, back about the time of Pearl Harbor, recruited so successfully for its aviation cadet and other officer procurement programs. The lure of silver wings, an officer's commission, and a chance to roam the "wild blue yonder" brought in the cream of young American manhood. Of these, only the physical and mental best were accepted. After the war, many thousands of this select group—by then combat veterans and seasoned officers—stayed in to form and man the separate US Air Force.

These men have developed and grown with the new Air Force. Through the years they have served as fighter pilots, transport and bomber crews, assistants in staff positions, and in technical jobs in many fields. Those still on active duty have survived the temptations of young manhood and world travel and have weathered the continuing program to dispose of misfits, marginal producers, and disciplinary cases. They have demonstrated, down through the years, that they can handle increasingly responsible jobs. The fact that they are still on active duty indicates further advancement potential. In another period, when controlled input had kept a better spread in age and service, most of these officers could have looked forward to a full thirty-year career and retirement as colonel, or even general.

While these Pearl Harbor-vintage flyers were young and growing, the fact that they were all about the same age with the same length of service caused little concern. Now, fifteen years later, this group has advanced in age, rank, and job responsibility until the Air Force faces, in the foreseeable future, a surplus of senior officers. There just won't be as many executive positions as there are officers with the potential to fill them. The Air

(Continued on following page)

LEADERS? ——— CONTINUED

Force, in facing this problem squarely, has warned Reserve officers on active duty to begin thinking in terms of twenty-year retirement. Regulars, too, are now permitted to apply for retirement on the same basis.

What now for these soon-to-be civilians? What are the problems they will face and how well and how soon can they adjust to a life they haven't known since their youth? As military officers, they are well educated, successful in their profession, competent in many Air Force skills. As civilians, they will be middle-aged pensioners looking for a place to settle down and a source of income. The struggles within our capitalistic system will concern them more than the struggle to protect it, which has occupied their minds and efforts for so many years.

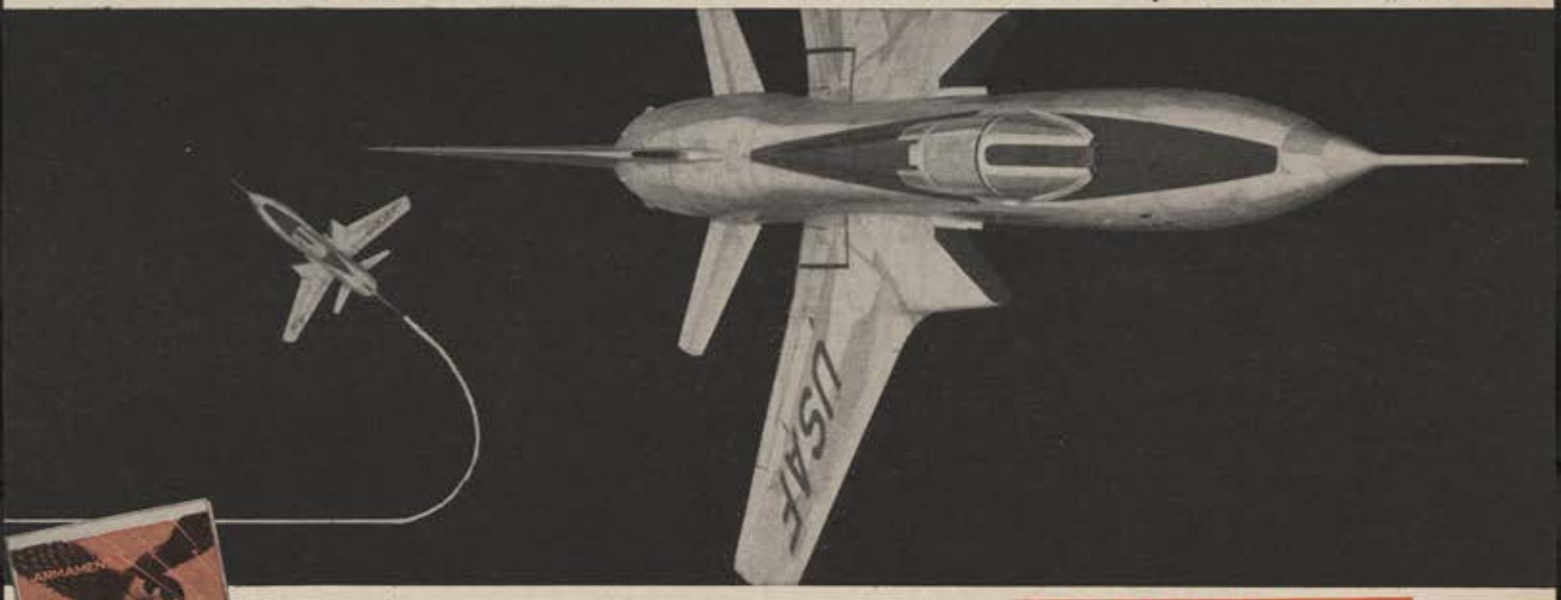
For most, a job will be their first interest. Men of forty to forty-four years of age usually are not psychologically ready for a shuffleboard-and-fishing type of retirement, even if they can afford it. An active flying career just doesn't prepare a man for rocking slowly and writing memoirs. Family responsibilities also discourage even thinking about the type of retirement usually enjoyed by the sixty-and-over age group. Although the average of $300 per month retirement pay earned after twenty years is quite generous under the circumstances, it will not be enough. With a growing family, teenage children in or soon to be ready for college, and an accustomed living standard to maintain, these officers will retire at a time when their expenses are highest. In most cases, a business suit rather than walking shorts or fishing attire will replace the neatly moth-balled blue uniform.

Unless he is a very unusual person, the last thing the retired flyboy will want is a flying job. Although it's the thing he knows best, he also knows that forty-plus is no time to start a civilian flying career. Realizing this, he may feel, with some frustration, that his Air Force experience is of no value in seeking employment outside the service. Properly applied, the things he's learned and practiced as a military officer can be invaluable in establishing a successful career in almost any field he chooses.

His greatest assets are his demonstrated qualities of leadership and the ability to get along with people. Although the popular idea is that an officer merely barks orders and the men rush to obey them blindly, no aircrew, staff section, or command has ever been operated in that way for long. Air Force officers lead American

(Continued on page 95)

LMEE puts lethal talons in the Republic F-105



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TOO MANY LEADERS?

CONTINUED

airmen, and our ways are much the same in or out of uniform. The officer completing twenty years' service will have learned, under the most basic and practical of circumstances, the art of judging and picking men. His life has probably depended upon the actions of others he has selected and instructed. He has developed, of necessity, an ability to adjust to change, to adapt available resources and known methods to new and unforeseen demands. He can and will make decisions, quickly and firmly—flying requires this above all else. These qualities are necessary for successful management in any organization, civilian or military. Generals MacArthur, Clay, Gruenther, and many others have shown that military leadership can be converted to civilian management successfully and on a high level. To a lesser degree, of course, retired majors and lieutenant colonels should find that their military experience is useful and in demand after they leave the service.

Military officers enjoy a reputation for high standards of honesty, loyalty, and integrity. Twenty years of living up to these requirements make personal responsibility and proper conduct habitual. The newly retired officer will find that the reputation he has ready-made, and which the public accepts, is invaluable in his dealings outside the service.

Of considerable value also to a man seeking to enter the business world are the good health, quiet dignity, and conversational ability developed—almost forced—by military service. The rigid discipline of cadet days, the bearing and grooming which become second nature, the social life of an officer—these and the many other aspects of an Air Force career will be a part of the retired officer's personality and habits. He should be an interesting, dependable, and pleasant, as well as capable, associate in any business.

Once the supplemental income aspects of his retirement are cared for, the new civilian will want to live as civilians live. There is nothing a military man wants more, particularly one with a family, than to live in his own home and plant flowers and sow a lawn and know he will be there to see them grow. He loves the flying and the travel and the variety of an Air Force career—wouldn't have stayed in if he didn't—but he'll be ready to settle down. He will become a home owner and yard putterer. He will attend and support a church—the same one every Sunday. He will vote in local elections, possibly for the first time, and will probably take an active part in local politics, PTA, civic drives, community-betterment projects, local charities. For the things he has missed by being in service he'll now have time and a reason. The retired officer will make a good citizen at the community level just as he has at the national level.

The early-retiring officer, successful though he may now be professionally and socially, can't expect to change suits and carry on as before. Some adjustment will be necessary: his income probably will be less until he is established and proves himself in a new field; his acceptance in the community will depend upon his attitude and actions, not his rank and position; his social position must be deserved, not assumed. For some, all this may come as a blow and the transition to civilian will be painful and disappointing. For most, however, the same adaptability which saw them through two wars, occupation tours, duty in all parts of the world in good spots and bad, and the many and varied job assignments in a modern air force will make retirement, however premature, just another challenge to meet.

Communities and employers who choose or are chosen by these retiring officers stand to profit from the Air Force's oversupply of leaders. Any business man should welcome associates or employees of this caliber, willing to learn and grow with yet another progressive organization. Communities in all parts of the country need and will welcome responsible home owners, citizens who will take an active part in civic affairs, who place "settling down" above all other desires. The officers, their families, and the communities who receive them will play a part in the latest aftermath of World War II. It can be rewarding and satisfying for all concerned.—END

ABOUT THE AUTHOR

Now on the faculty of the Command & Staff School, Maxwell AFB, Colonel Breeze has sixteen years of service in the Air Force, mostly as a weather reconnaissance navigator. He served in the CBI in World War II, was stationed in Alaska in 1947-48 and in Hawaii from 1951 to 1954. Born in Durham, N. C., forty years ago, he was in the US civil service before his enlistment in the Air Force. Married and the father of three, his eventual hope is, as he puts it, "to retire to Orlando, Fla., and see if an old navigator can sell real estate."

Here's a short, happy recipe
for a short, happy, active-duty tour . . .
smoothing your path and everyone else's

Two Weeks and a Day

By Capt. Willis E. Lorey

I DOUBT if there is a correlation, but now that the trees are turning green, Air Force Reservists will start to appear once again for their annual fifteen-day tours. Judging from the past, it seems to me that some of the greener ones could use some practical advice on how to pull their tours.

In case someone in the back row is muttering, "What gives him the right to preach?", let me say that I have had the pleasure, dubious sometimes, of supervising and rating seven Reserve officers. These gentlemen ranked from light colonel to second lieutenant; civilian positions ranged from the Chase Manhattan Bank to a country general store; military background knowledge varied from World War II and Korean active-duty experience to strictly Reserve meeting background. This, I think, gives me a broad enough base from which to make my observations.

It is the smart thing for a job-seeker to become familiar with the history, products, and personnel in the prospective industry or company with which he seeks employment. Isn't it also then the wisest course for the incoming Reservist to expend some time and effort *beforehand* to become knowledgeable about the Air Force command to which he will be assigned, the mission and weapon system or tools to accomplish that mission, and the major commanders?

It would be desirable, of course, if assigned at wing level to know all these facts, but it is often difficult. However, merely knowing the command will smooth your path. The information regarding mission is available from Air Force regulations and manuals, particularly the 1-2, 1-3 series. I regard it as mandatory that all should have read AFM 1-2, "USAF Basic Doctrine," which AIR FORCE Magazine reviewed in its January 1956 issue *(page 68)* calling it, "The most authoritative definition of the Air Force job."

The command's weapon systems are generally common knowledge (more specific information will come during your tour if you need to know), and organization and personnel charts can be dug out of back issues of AIR FORCE. Minor changes in personnel may have occurred, but those are also reported, and your Reserve unit should be on top of such matters.

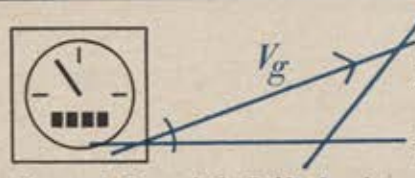
Why is this acquisition of background knowledge important before you ever leave your Reserve unit? Because the officer you will work with is extremely well informed about his command and unit, and without being coy let's realize that *what you are there to learn in two weeks is his livelihood.*

Now that you are ready to report, do you know whether the summer or winter uniform is authorized? Is it in good condition and newly pressed? Are your shoes regulation and shined, is the tie new or frayed, and is your head cover (the crush is out of fashion this season) the proper shape? A good first impression never hurt anyone—trite perhaps, but certainly still true. It is hoped that the Reservist will have the good sense to repair to his assigned station one day in advance so as to secure billets and learn the general physical layout of the base before he officially presents himself for duty. And this "Reporting for duty, sir" should be at the beginning of duty day, not at 0900 or when you think everyone should be all set for your appearance.

Generally speaking, you first report

(Continued on page 98)

You'll be out of fashion with the long-passé fifty-mission crush.



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ENGINEERS – GPL achievements have opened up some unusual research and development opportunities. Send resumé to Personnel Manager.

to the administrative section of the housekeeping unit of the base for routine clearing in, and within the hour you will be meeting the officers for whom you will work for the next two weeks. Since they are aware of your reporting in, and have a general idea of your qualifications, it is best to let them do the talking. If they have any questions regarding your background you will certainly respond, but it doesn't leave a good first taste if you immediately make it clear that your weekly salary is triple what they make, even if it is true.

It may happen that you will be assigned to work under an officer whom you outrank by two or three grades. It does happen. This may be difficult for you, but remember that he is also working under a strain in trying to train someone who is senior to him, perhaps both in rank and age. One word of advice. Just as you seldom can tell a person's religion by looking, it is also hard to know another military man's experience unless he is wearing his ribbons. And ribbons on the everyday work uniform are going the way of the crushed hat. So it really isn't advisable to unload your vast World War II or Korean experiences on that junior officer. Chances are that either he has some war time himself, or that those techniques are as obsolete as your method of trying to gain prestige. Remember, *you're* there to learn—not to teach.

Try to fit into the program that is outlined for you with as little trouble as possible. The daily job must go on and you must adjust yourself to the routine, rather than vice versa. If you are assigned a project it is usually to fill some definite need and to have criteria by which your performance may be judged. How you tackle this is up to you, but an excellent guide is the Reserve Officer Training Performance Report. As you work on your project ask yourself these questions: Do I make an all-out effort in everything I do far beyond what is expected or required? Am I successful in working with others, and do I actively promote harmony? Have I established a goal and am I effectively grooming myself for attainment? Will I be a success in any undertaking? And so on.

If your background is such, or the section you're assigned to is unable for one reason or another to assign you a project, chances are that you will be given the guided tour treatment. In this, an all-out effort is made to show you the inner workings of the base and to explain the duties of many other sections. This usually means that various personnel will devote their time to serve as guides or monitors. Comments on their being away from work compared with your own grind back home are in poor taste. Perhaps they are giving up valuable time to give you the guest treatment, or perhaps they really don't work as hard as you. Either way, an insult to one's host is a sure way to be stricken from the guest list.

It's the rare Reservist who fails or deliberately ignores the everyday working or living procedures of his section or the base. Taking long breaks from office hours to canvass the base exchange may be all right the first day but not after that. The open mess is a social outlet, not a low-rate gin mill in which to booze it up or to get a year's stock for all your friends.

The Officers Club is no lush lounge. Enjoy it like a gentleman.

Reminiscing about the good old days is fine but not to the extent that you interfere with the work and become a bore. Casual conversation about your civilian position is fine, but bragging about how fine you have it, and how only dopes stay in the service, goes over like the proverbial lead balloon. In short, remember that *you* are on exhibit and if you don't like the military, well then, don't apply for an annual tour.

Lest this give the Reservist the idea that active-duty personnel are a group of soreheads, let me hasten to correct you. We are in the service because we like it and feel that there is a job to be done. If you come in for a fifteen-day refresher course, then you must like it and want to work too. It's as simple as that.—END

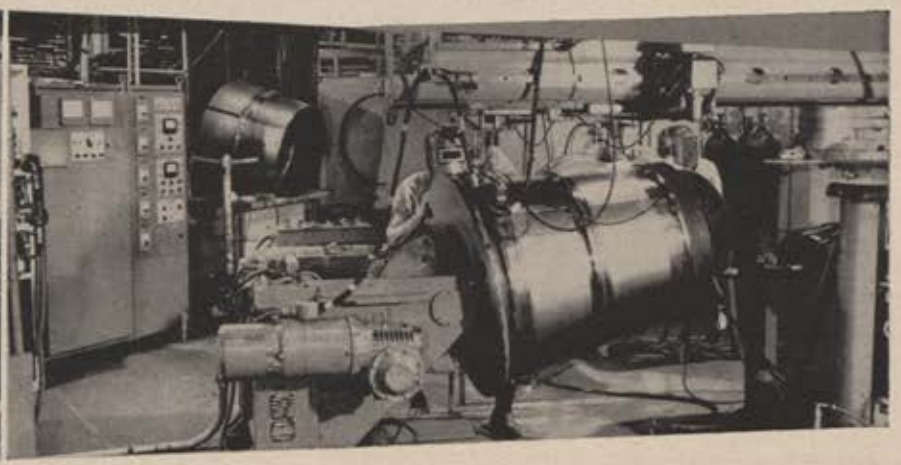
Other chaps fought in the war too. Don't overdo the ribbons.

ABOUT THE AUTHOR

A veteran of the Marines in World War II with two years in the Pacific and now in his eighth year with the Air Force, author Lorey knows whereof he speaks in this kindly guide to the Reservist. Captain Lorey was born in 1926 in Michigan, and attended Missouri State College, where he received his B.S. in education in 1950. While at Missouri he served consecutively in the National Guard and Naval Reserve. He enlisted in the Air Force after graduation, won his commission in OCS, is now with Headquarters TAC.

Temco | AIRCRAFT DALLAS

..TITANIUM and TOMORROW



At Temco titanium is keeping its promises to the aircraft industry. No longer the intransigent metal, titanium in precision assemblies has become routine here. Through the development of Temco's Ti-Brite process, the tough titanium scale which once limited the material's usefulness is electrolytically removed without etching or disturbing the most precise dimensions.

And at Temco a successful process for chrome-plating titanium may be the major break-through in the feasibility study for extending its temperature resistance beyond the 800-1000°F range. Forming, spot welding, precision machining are everyday operations. Temco's proven capabilities in precision automatic fusion welding have proved especially effective in the assembly of titanium parts. A case in point: the front compressor casings of Pratt & Whitney's J-57 engine, produced at Temco.

Quality and reliability of assemblies produced at Temco are assured by the extensive facilities of the Quality Control Department and Metallurgical Laboratory. These include the newest non-destructive spectographic and large X-ray equipment.

Capabilities in advanced metallurgy . . in titanium, aluminum, austenitic steel, stainless steel . . are typical of Temco progress. And now research and development capabilities are challenging the rare earths . . berylium, columbium, tantalum, molybdenum . . for tomorrow's needs. As the aircraft industry grows, so do Temco's capabilities to design, tool and produce for it. **Whether your need is for a component, a subsystem or a complete system . . . an inspection of Temco will be informative and profitable.**

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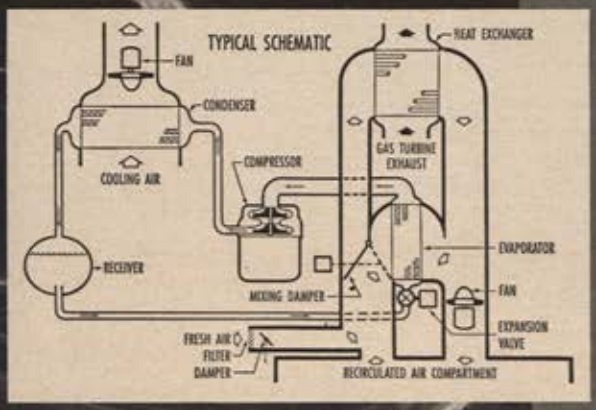

The mobility problem in cooling electronic equipment in vans and for missile pre-launching has been answered by new AiResearch Freon air conditioning units. *One-fourth the weight and one-third the size* of conventional equipment, these lightweight, air-transportable units utilize highly efficient AiResearch Freon components (see diagram) originally developed for commercial aircraft applications.

Heat source for the circuit can be either electrical, or exhaust gas from an AiResearch gas turbine. When the gas turbine assembly includes an alternator, it supplies *400 cycle power to run both the refrigeration unit and all electronic gear in the van.*

Easily operated manually or automatically, this compact air conditioning unit provides from 5 to 12 tons cooling capacity and up to 85,000 BTU's per hour heating capacity. It operates on 400 cycles, 208 volts. The unit shown stands 54" high, 52" wide and 27" deep, with a charged weight of only 452 lbs.! Your inquiries are invited.

SPECIFICATIONS

Performance Data:

Typical operation—cooling

Refrigerant	Freon 12
Evaporator tonnage	7.5
Ambient temperature	100F
Condenser air flow	5000 cfm
Condensing temperature	131F
Evaporator air flow	1230 cfm
External distribution ducting pressure drop	2 in H_2O
Evaporating temperature	48F
Electrical power	26KVA

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The READY ROOM

RESERVE AND AIR GUARD NEWS

Although strong support is being given the **Air National Guard's plan to man Bomarc missile detachments** (*see* "Ready Room," *December* '57), the USAF Operations Office says such planning is "several years" away.

Not so, insist the Air Guard people. A special **study by ARDC last July** concluded that the Bomarc weapon system is **well suited to the ANG Technician Program.** The ANG insists that the **anticipated lead time** for operating a Bomarc detachment by personnel already in a Guard unit is **about nine months.** The lead time estimated for establishment of new units is **twelve to fourteen months.**

The Air Guard's Air Technicians comprise a large reservoir of **high technical skills** available for conversion to the requirements of Bomarc detachments. ARDC's survey covered the relative cost of an ANG Air Technician detachment with one manned by Regular Air Force personnel. It is estimated that a **full-time** AC&W Air Technician detachment would cost **one-third** that of a similar unit of the active establishment.

ARDC reported that the ANG is capable of **manning the first ten planned Bomarc detachments** studied either by **converting existing units** or by **establishing new units.** The ANG has existing units in close proximity to almost all the first fifteen USAF programmed Bomarc site locations.

The ANG plan originally received the **Stone Committee's recommendation** "that the Air Reserve Forces could contribute to the mission of the Air Force to a substantial degree in the operation of the Bomarc weapon system with a saving in both personnel and money."

Since the Stone Committee was established late in 1956 by the Chief of Staff, USAF, "to **make recommendations** as to the **utmost long-range utilization of the reserve components,**" the ANG planners feel that USAF Operations is **not adopting a realistic approach**—particularly when the plan can be made operational within a comparatively short period.

° ° °

The general issue of **ANG activity** was covered by **Maj. Gen. Winston P. Wilson** in a recent speech to the second annual nationwide **Air National Guard Commander's Conference** in Houston, Tex. General Wilson, Chief of the Air Force Division, National Guard Bureau, said that Air Guard **operational efficiency** will be used as the sole measure for **reequipping Air Guard units with newer, more modern weapons.**

Pointing out that North American **F-100 Super Sabres** are already being introduced into the Air Guard's aircraft inventory, and that **other Century series fighters are programmed** for the future, he told the 400 delegates attending the meeting that "the **increasing costs** of this equipment, coupled with **stringent fund limitations** and **manpower ceilings,** has compelled a **serious study** of the Air Guard's force structure."

"We've simply got to accomplish our over-all program with the **money available** to us or **reduce our strength** to the point that we can do so," General Wilson asserted.

He also pointed out that "when considering the future weapons scheduled to be employed by the services, and considering the increasing 'kill capability' of a single weapon, it is apparent that **requirements become an ever-changing factor.** . . . It is only fair to state that those individuals and [ANG] units who might not maintain the pace are **subject to continual evaluation** in order to determine **their contributions to our effectiveness.**"

° ° °

The **Air Force Section V Committee** recently recommended that the **Secretary of the Air Force** support the enactment of S-3240, a bill providing **amendments to ROPA.** The Committee listed **seven provisions** originally developed by a ROPA *ad hoc* committee, and approved by the Section V Committee in 1956. These seven provisions are:

(1) USP&FSs may be **retained until age sixty;** (2) removal of the **"pusher" clause;** (3) removal of **freeze on va-**

(Continued on following page)

Maj. Gen. Harry Crutcher (center), Chief of Staff of the Texas Air National Guard and in private life a Dallas businessman, played host to a group of twenty-seven Dallas civic and business leaders on visit to NORAD headquarters, Colorado Springs, Colo., in April. Here he and Frank H. Heller, Dallas regional director of Remington Rand, are greeted by Maj. Gen. Marshall Carter, NORAD Chief of Staff.

Massachusetts rtate trooper Karl P. Essigmann (center), a tech sergeant in 9230th Air Reserve Squadron, Cambridge, Mass., has been named "State Trooper of the Month" for his single-handed capture of three armed men wanted by the FBI. Here he's shown with members of the Reserve Squadron, from left: T/Sgt. Paul Monday; Lt. Col. Harold B. Willis, Jr.; Maj. Louis Sinofsky; Capt. John McCarthy.

cancy promotions of ANG and AFR units and mobilization designee positions; (4) retention in units of all officers for **fourteen years** or to the **grade of major,** whichever is sooner; (5) retention in units of **professional types** (MDs, JAGs, Chaplains, etc.) for **twenty-one years** or to the grade of **lieutenant colonel,** whichever is sooner; (6) retention of **ANG and AFR technicians to age sixty;** and (7) **removal of freeze** on appointment of **Reserve officers** to fill mobilization requirements on active-duty positions.

AFA's Air Force Reserve and Air National Guard Councils recently recommended to the **AFA Board of Directors** that **AFA support S-3240.** The Board **approved this action** at its meeting on March 1 in Washington, D.C.

° ° °

In line with **Air Force economy measures,** approximately **8,600 officer** and **4,100 airman Ready Reservists** aligned in Part III positions will **no longer receive inactive-duty drill pay,** effective June 16.

These mobilization assignees may retain their assignments and will **continue to be eligible** for active-duty tours for training in a pay status (Training Category B, Pay Group D).

This action is being taken in order to allow the highest priority elements of the Air Reserve program to continue **planned growth** within resource limitations. Reservists can affiliate with a **higher priority program,** if one is available in their geographical area.

There will be a number of vacancies available for Reservists who seek positions with paid inactive-duty training. They can apply for: (1) a **Category "A" Unit;** or (2) for a **Part I vacancy** at any base within reasonable distance.

There is a third alternative, whereby a Reservist can apply for a **Part II position** at the same or nearby Air Reserve Center where he has been training. However, a specific vacancy must exist by **grade** and **Air Force specialty** before application is submitted.

Air Reservists affected by elimination of drill pay action are those in **General Reserve War Requirement for Individuals.** This (Part III) is the pool of replacements needed in event of mobilization. These individuals are **assigned to and trained by CONAC** against anticipated skill and grade needs. They are urged to continue with their present AF Reserve program.

The Air Force stressed that no **Reservist affected by this policy will be deprived** of a chance to participate in a non-pay, inactive-duty training and paid, active-duty for training in his Ready Reserve position. Nor will any Reservist **lose the opportunity** to gain points for promotion and retirement.

° ° °

Operation Swift Lift, biggest airlift ever undertaken by the Air Force Reserve, marked its **first anniversary** in April.

Since April 1957, AFRes troop carrier crews have provided airlift assistance to the active-duty Air Force throughout the continental United States. Air Reserve troop carriers have ferried military personnel and cargo for **USAF's Ninth and Twelfth Air Forces,** hauled aircraft engines for the Civil Air Patrol and AFROTC.

To date, Air Reserve troop carrier crews have completed over **500 airlift missions,** or approximately **1,000 individual sorties** for the AF. Some **7,500 passengers** have been flown, and **about 5,000,000 cargo pounds** have been airlifted, some **3,000,000 ton miles flown,** and nearly **9,000,000 passenger miles** traveled.

Currently using twenty-five troop carrier transports—seventeen **Fairchild C-119 Flying Boxcars** and eight **Curtiss C-46 Commandos**—Air Reservists have logged approximately **14,000 hours** flying Swift Lift missions.

° ° °

The **Air Guard's six weeks' home station training program** must be **exclusive** of the annual field training period and travel time in returning to the home station from the ANG Jet Instrument School, the **National Guard Bureau** has ruled.

If pilot trainees are engaged in home station training at the time of field training, their tours are to be **terminated by appropriate orders** until the unit completes field training. When the unit winds up this field training the **remaining portion** of the six weeks' advance training tour **may be resumed.**

° ° °

June 30 is the deadline for Reserve officers facing **overage forceouts** to **enlist in the Reserve** of the Air Force.

Up until the coming forceout date, Air Force policy has permitted **Reserve enlistments** by **Reserve officers not on extended active duty** who were separated for age before completing twenty years' service for retirement benefits. A recent *ad hoc* committee appointed by the Secretary of Defense recommended that the Department of Defense cease this practice.

Since the Air Force had been allowing such Reserve enlistments, the committee recommended a **phasing-out period.**

The Department of Defense provided that June 30 would be the final deadline for such enlistments by Reserve officers not on EAD who wish to finish twenty years' service.

° ° °

The **National Guard Bureau** has recommended that distinguished **aviation cadet graduates,** training under the ANG quota, **be released** from their Air Guard service agreement, if they **desire to apply for appointment to the Regular Air Force.**

Administrative arrangements have been made with ATC to notify the NGB when a trainee is to be designated a **distinguished graduate.** This generally occurs about forty-five days prior to graduation from basic flying school.

° ° °

All Regular and Reserve **second lieutenants** completing **three years of promotion list service** during October, November, and December will be considered for **permanent promotion** July 1.

Review boards from now on will convene during the first week of each quarter to consider officers for promotion **three to six months in advance** of the date they complete their three years' promotion service.

Promotion service date of a Reserve second lieutenant is normally the date of a Reserve appointment acceptance. An **exception is made** for those who, after receiving appointment, managed a **delay of entry to active duty** and thereby were placed on the inactive status list.

° ° °

Gen. O. P. Weyland, TAC commander, speaking at a civic luncheon in **Akron, Ohio,** recently, stressed the **importance of the Reserve Forces.**

"The **majority of the people** who make up [the Reserve Forces] are **exceptionally well trained** and have had **considerable duty in the Regular establishment,**" said General Weyland. "Many of the people who make up these units fought under my command in two wars. In many cases the skill levels represented in these units is actually higher than it is currently possible to maintain in the Regular Air Force with its high turnover rate."

—By the Staff

FORMER SERVICEMEN

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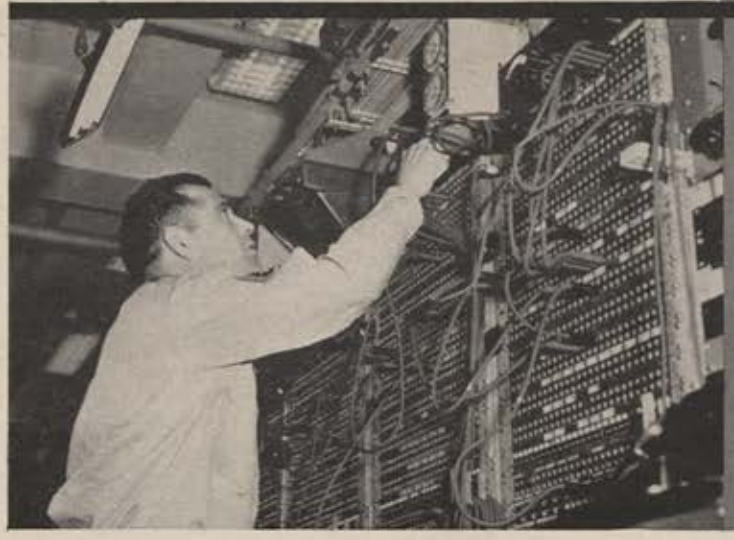

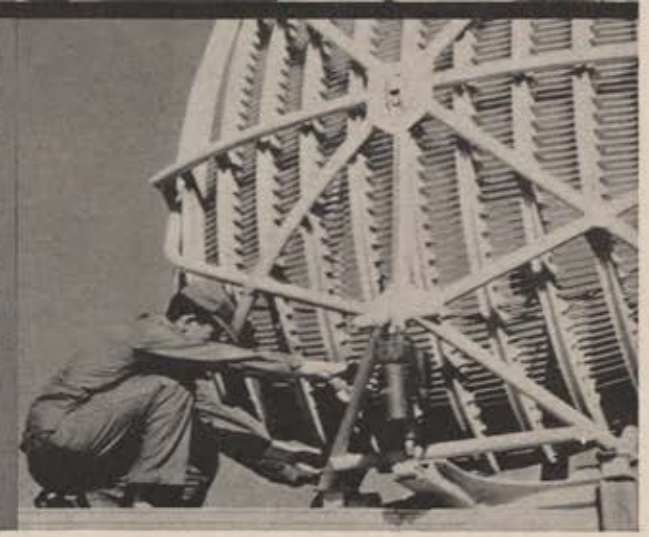

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Tech Talk

The **Fairchild Engine & Airplane Corp.** has announced that America's first twin-propjet transport, the **Fairchild F-27,** has successfully completed its first flight. The F-27, being built in this country **under license** from the Fokker Co., of the Netherlands *(see cut),* is powered by two **Rolls-Royce Dart engines.** It has a cruising speed of approximately **300 mph** and a range of more than **1,600 miles,** Fairchild claims. Designed for **short-to-medium range operations,** the F-27 is **air-conditioned** and **completely pressurized** and is equipped with **weather-searching radar.** The propjet can accommodate **forty passengers.** Fairchild is now in **volume production** on the transport, with the first delivery scheduled for the latter part of this month.

The domestic version of the sleek **new Douglas DC-8 jetliner** is in the first stages of ground testing following its first public showing *(see cut).* The jetliner was turned over to the **Douglas Testing Division** for ground tests and taxi trials in preparation for its initial flight. Douglas plans to use a total of **nine DC-8s** in an accelerated flight-test program leading to a **CAA certificate of airworthiness.**

The **140-foot, sweptwing transport** will cruise at **590 mph,** powered by **four JT3 turbojet engines,** commercial designation of the **Pratt & Whitney J-57.** Later domestic versions and the intercontinental model will use either the **P&W J-75 (JT4)** or the **Rolls-Royce Conway.** Domestic versions, expected to go into service next year, will be able to span the US in **less than five hours** on a regular schedule. From **118 to 176 passengers** may be accommodated in various arrangements of the flexible interior. Each transport costs about **$5 million.** Douglas had orders for **138 of the jetliners** the day of the roll-out.

The DC-8's jet engines will be equipped with **sound suppressors,** designed by Douglas, to **muffle engine noise.** Coupled with the sound suppressors will be **"thrust brakes"** to reduce ground roll after landing. These brakes may also be used in flight as a brake to reduce flight speed quickly. The main landing gear will caster to permit ground movement in smaller areas. Maximum range of the domestic version of the DC-8 is **3,900 statute miles.**

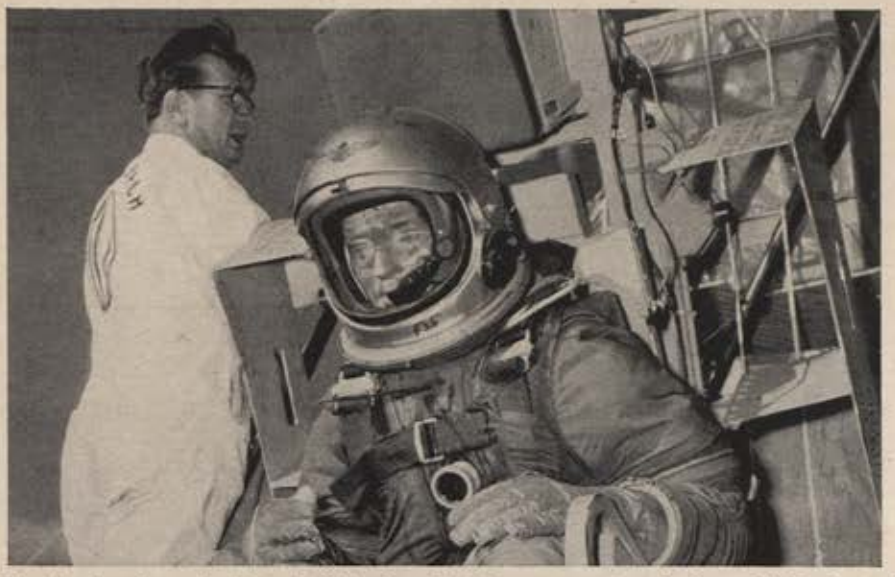
The **General Electric Co.** is testing

(Continued on following page)

First flight photograph of Convair's F-106B two-place, all-weather jet interceptor, shows fighter retracting its landing gear after takeoff from Edwards AFB on its maiden test flight. The F-106B is externally identical to its sister F-106A except for the second seat and the longer canopy. The flight was supersonic.

Fairchild F-27, new forty-passenger propjet airliner photographed on its first flight. Large windows and high wing give passengers a good view in the air.

Roll-out of the first Douglas DC-8 jetliner. Eventually delivered at the rate of six per month, DC-8s will be winging their way over the air lanes in 1959.



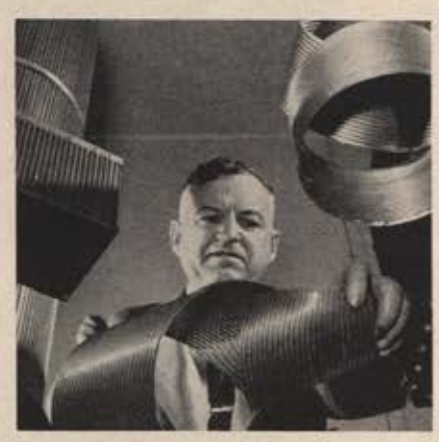
North American Aviation's Columbus Division uses giant helium-filled plastic balloons (right) to lift ejection seats to 70,000 feet for high-level escape system tests. Three instrumented seats with dummies are borne aloft simultaneously.

an **aft-fan component** for its latest production jet engines. The fan **improves cruise fuel economy** by about **ten percent** and **increases takeoff thrust** about **thirty-five percent.** It does this by adding a **secondary airflow** to the **jet exhaust** and **slowing it down.** Aft-fan engines are being offered in **two versions**—for military and commercial applications. It gives turbojet engines ideal efficiency in the **Mach .8 to Mach .9** speed range, the range that will be used most by military tankers, transports, and commercial jetliners for many years to come.

The aft-fan component contains a **single-stage fan,** part compressor and part turbine. It is added to the rear of the basic gas generator in the exhaust section. The **inner portion of the blade** (turbine) is driven by **exhaust gases,** while the **outer portion** (fan) **compresses bypass air ducted in from around the outside of the basic engine.** Thus it is a **free fan,** not mechanically connected to the main engine rotor. The fan handles substantially **more air than the basic engine,** and at a lower velocity.

The two airflows are **separately exhausted** behind the fan to produce a **higher mass airflow** at a lower jet velocity. The increase in mass airflow and decrease in jet velocity give the **engine ideal efficiency in the speed range between propellers and pure jets**—about 500 to 600 mph—and **increase takeoff thrust.**

Ryan Aeronautical Co. has been awarded first prize in a nationwide product-design competition for its development of **"MiniWate,"** a new method of **fabricating paper-thin,**



Ryan Aeronautical Co. developed "MiniWate" to fabricate paper-thin steel sheets into strong structures for supersonic planes and boost-gliders.

high-strength steel alloy into strong structures. These structures can **resist supersonic friction** while maintaining **extreme lightweight characteristics** required by vehicles in speed ranges up to the space travel category.

"MiniWate" is Ryan's name for the combination of corrugated and flat skins of thin gauge steel alloy *(see cut)* adaptable for immediate use in such structures as **jet engine tailpipes** and **skins for supersonic aircraft and missiles.** A potential use for "MiniWate" is foreseen for **hypersonic rocket gliders,** capable of traveling around the world nonstop after "slingshot launching" from a rocket sled on the ground.

High-altitude ejection seat tests, to determine the best means of overcoming the hazards involved in **bailing out of aircraft at 70,000 feet,** have been conducted over California's Imperial Valley by engineers from **North American Aviation's Columbus Division.** These tests involve three **dummies** strapped in three aircraft ejection seats *(see cut)* and borne aloft simultaneously by a giant **helium-filled balloon.** The seats, developed at North American's Columbus plant, are equipped with **special fins and drogues** designed to **control the fall** and to **reduce the hazard of excessive spinning** and tumbling.

One seat, during the test, was ejected from the balloon at an altitude of **65,000 feet.** The other two seats were ejected after reaching an altitude of **70,000 feet. Telemetering devices** inside each dummy recorded the rate of descent. Cameras in the dummies and attached to the seat **photographed the action of the fall.** The balloon, made of plastic, measures nearly **300 feet from the top to the end of the trailing antennae.**

To be launched **with the next Explorer satellite** is the least expensive and most easily trackable American device yet planned—**NACA's** twelve-foot sub-satellite, a balloon treated with about **$12 worth of metal foil** similar to kitchen foil. The foil, produced by **Reynolds Metals,** will make the balloon clearly visible. After the Explorer reaches orbit, the **balloon will be detached and inflated by a bottle of nitrogen.** Once the sub-satellite is rounded, the **nitrogen will be allowed to escape,** and the sphere will **retain its shape** because of the relative lack of atmospheric pressure. The device will be used to study drag and air particle density.

—Bob Strobell

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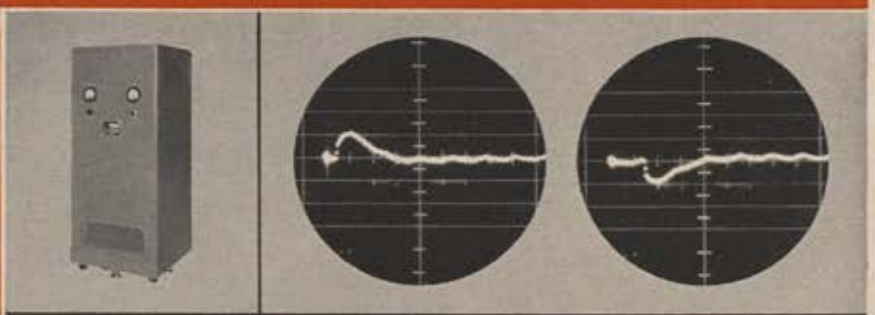
DELIVERY—A contract from Douglas Aircraft for "Thor" test equipment was awarded in March 1956. A total of 100 units, comprising 30 different units, was delivered before deadline in November. On-time delivery at its best... delivery *beyond the expected.*



This transistorized MAGAMP power supply delivers a 27V to 42V output at 0 to 300 amperes, *regulated at a load up to several hundred feet away.*

The MAGAMP has a surge capacity of 400% overload for 2 seconds. Regulation at the load is 1% or better. Recovery time is less than 50 milliseconds. Overshoot and undershoot are less than 25%, with a 30% change in load. (Scale in above photos: 5V/CM and 10MS/CM.)

PACKARD BELL ELECTRONICS
Missile Equipment Section
Technical Products Division
12333 W. Olympic Blvd.
Los Angeles 64, Calif. - BRadshaw 2-2171

airman's bookshelf

There is serious controversy among scientists over the advisability of continued nuclear testing. Some believe more testing will raise radioactivity in the atmosphere beyond the danger level, with dire consequences for present and future generations. Others, notably Dr. Edward Teller, say that the dangers are highly overrated.

In a significant volume, *Our Nuclear Future,* coauthored with Dr. Albert L. Latter, a RAND Corporation physicist (Criterion Books, Inc., $3.50), Dr. Teller pleads that continued testing is necessary to complete and perfect the "clean bomb." If packaged back into kiloton size, the clean bomb, he argues, would permit "humane" nuclear warfare. Too much progress has been made on this to date to abandon the program, he warns.

A ban on nuclear tests is unworkable. It is not the solution to the nuclear dilemma, Dr. Teller maintains. Means could be devised to conduct undetectable nuclear tests, and, besides, the Soviets could not be trusted to honor any ban agreement anyway, Dr. Teller says.

The book includes Dr. Teller's thoughts on war, national policy, peaceful, nonmilitary uses of atomic energy and disarmament. It is written for the layman and contains, perhaps, the best nontechnical analysis of the radiation problem to be found. *Our Nuclear Future* is a strong argument for the AEC's nuclear program and a book deserving of maximum readership.

• • •

On the same subject, with an opposite view of radioactive fallout, is *The Voyage of the Lucky Dragon,* by Dr. Ralph E. Lapp (Harper & Brothers, $3.50). Dr. Lapp, physicist and nuclear scientist, dramatically tells of the Japanese fishermen caught in the fallout of the gigantic Bikini U-bomb (fission-fusion-fission type) explosion of March 1954. The fishing boat, *Daigo Fukuryu Maru* (Lucky Dragon No. 5), was cruising a short eighty-five miles east of the Bikini ground center when the bomb—equivalent to fifteen million tons of TNT—fireballed skyward in spectacular holocaust. On board were twenty-three fishermen—one subsequently died.

Two tremendous claps of thunder rocked the boat, and two hours later a rain of white dust fell on the luckless vessel. Lapp follows the story of the boat and the crew and the radioactive fish innocently carried back and sold on Japanese market stands. He visited Japan for first-hand information.

Dr. Lapp reconstructs the AEC reaction and the US handling of the case which strained Japanese-American relations. He is critical of the AEC's failure to enlarge the blast-danger area for fear of a tip-off on the size and kind of superbomb to be fired. Dr. Lapp does not discuss the problem of continuation of nuclear testing. He merely provides a thought-provoking record of a nasty international incident caused by nuclear test and leaves an inference easily discernible.

• • •

Few recent air books have had rougher "coming into being" than Lloyd Mallan's *A Day in the Life of a Supersonic Project Officer* (David McKay Co., Inc., $3.95).

Try this sometime: follow an overactive Air Force test pilot-scientist through a typical eighteen-hour workday; blend and relate the minute-by-minute story of this day into a descriptive, interpretative account of a vast sprawling flight test center with thousands of supporting specialists and acres of complex scientific test equipment; recreate every possible aspect of ground and flight combat testing of a temperamental, hot, supersonic jet aircraft undergoing AF weapon acceptance; translate the technical jargon of scientific flight operations; research in an area stubbled with security. Mix and produce a clear, authentic, highly readable and well illustrated account.

The star of Mallan's story is Maj. Robert T. "Pappy" Goetz, Project Officer for Operation Sun Dial—the combat evaluation of the Convair F-102A "Delta Dagger." The place is the Air Proving Ground Center, Eglin AFB, Fla. Mallan spent weeks there researching the test cycle program. As Project Officer, Goetz supervises the marriage of the F-102 to its armament—the Hughes Falcon air-to-air missile—and personally takes it through weapon acceptability tests, a rigid program every Air Force aerial weapon must pass.

Mallan's book is a worthwhile coverage of the men and the system that has given the Air Force a trademark of respect and strength through the world. Maj. Gen. Robert Burns, APGC Commander, provides a foreword.

• • •

Martin Caidin's latest missile exposé, *Countdown for Tomorrow* (E. P. Dutton & Co., Inc., $4.95)—designed to rock Congress and public opinion—missed its target by two months. Had it appeared at the zenith of the American consternation over Soviet missile and satellite accomplishment, it might have been a shocker. By March 10, *Countdown's* publication date, the dust had settled, the stir had subsided, the US Explorer I was whirling in orbit, and reason again prevailed. Our achievements and state of the art looked better.

On the record, however, there had been mistakes in US missile and satellite programs, faulty judgments, erroneous decisions, wasted time, improper rocket, satellite, and missile R&D emphasis in view of the known Soviet programs, and lack of foresight, vision, and imagination in certain top civilian and military circles where such vision was most needed. This is the grist for Caidin's mill as he narrates a popular history of American missile development and the missile programs of all the services. He reviews, interprets, and critically evaluates plans, policies, and actions.

The last two chapters detail the Air Force ballistic missile program. Caidin believes the AF has led the world's military powers in research, development, test, and operation of conventional and jet aircraft—giving the US air superiority and providing the only deterrent to World War III. But he claims the Air Force has been far less successful in the ballistic missile field, because of budgetary "on-again-off-again" approaches after World War II with respect to missile development.

The Air Force fares better under Caidin's caustic pen than do the other services. Biggest targets are the Department of Defense and Administration leadership. The book is a mine of data, heavily veined with opinion. While *Countdown* is far from definitive or completely objective, the layman will find it interesting, informative, and extremely descriptive.

• • •

On September 18, 1908, Lt. Thomas Selfridge, US Army, became aviation's first passenger fatality when the Wright Flyer crumpled onto the parade grounds at Fort Myer, Va. Scanning aviation from that day to

(Continued on page 111)

Vought Vocabulary

dy·nam′ic: *a manned weapon for space-edge duty designed in the image of a champion*

With Chance Vought's new F8U-2 *Crusader*, America's defense strength rockets to the threshold of space. This jet fighter has the speed, range and staying power to master the upper atmosphere. A manned aircraft, its pilot brings human intelligence to an advanced weapon system whose capabilities outstrip those of ordinary jet fighters. At his command, this lethal weapon can hide and seek . . . strike and strike again.

On its first flight, the F8U-2 easily beat the fastest official speed of the record-breaking F8U-1 *Crusader*. Powered by the new Pratt & Whitney J-57-P16 engine, it climbed to heights reached a few years ago only by rocket-powered research craft. It carries advanced fire-control and radar systems, and awesome armament: 20 mm cannon, a retractable pack of 32 2.75-inch rockets, heat-seeking Sidewinder missiles.

The dynamic design of this new carrier-based fighter is a *proven* one . . . incorporating the finest features of the celebrated F8U-1 *Crusader*, already giving Navy pilots unmatched air/sea strength.

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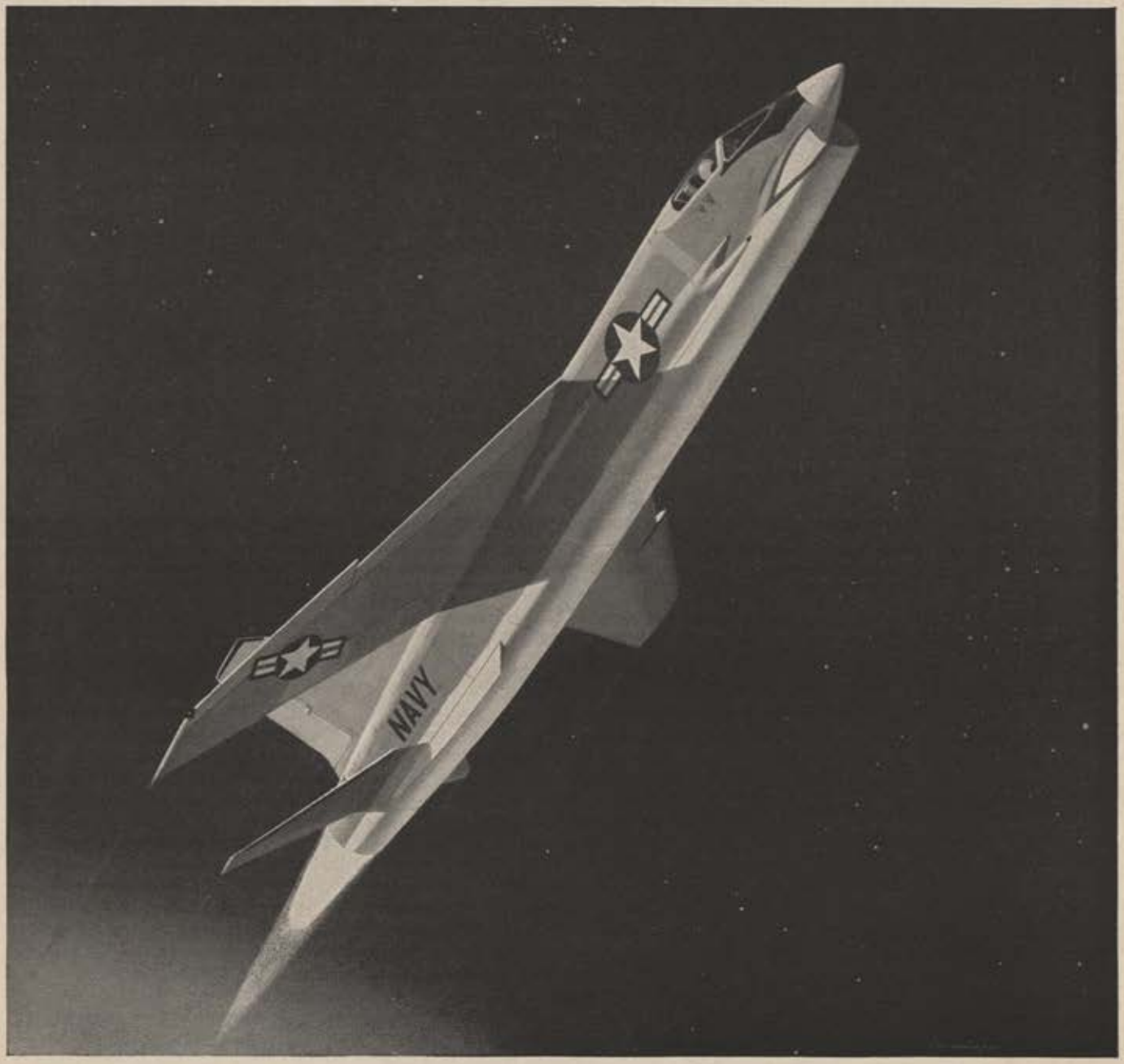
INCORPORATED · DALLAS, TEXAS



SPACE MAN

Thiokol is active in several areas of vital outer space research. Its contributions range from supplying the plasticizer used in making the pressurized anti-G suits worn by supersonic pilots . . . to developing solid propellant rocket engines for high-altitude test missiles. For example, Thiokol engines powered Operation Farside and X-17, providing essential data on atmospheric, cosmic and re-entry conditions.

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the present, Clayton and Katherine Knight have compiled an intriguing study in *Plane Crash: The Mysteries of Major Air Disasters and How They Were Solved* (Greenberg, $4.50). The book opens with a reconstruction of the 1957 Riker's Island Northeast Airlines crash and official probe, and follows with chapters on the "planted bomb" cases, unsolved crashes, midair collisions, mechanical failures, fire in flight, human error, the Comet cases, and strange accidents.

The Knights suggest three main, general causes for air tragedy: pilot error, structural or design failure, and weather. They reconstruct each disaster from evidence obtained in official investigations and survivor interviews.

While air fatality today is now among the lowest in all categories of transportation—one fatality per 100 million miles as compared, for example, to 2½ for autos—each year brings an increase in air traffic and a heavier responsibility for improvement of flight safety measures. *Plane Crash* points up the absolute need for a serious national effort to cope with this problem *now* and to project plans a decade ahead based on a realistic appraisal of commercial jet flight.

° ° °

Cloud Study: A Pictorial Guide, by F. H. Ludlam and R. S. Scorer (The Macmillan Co., $2.95) is a small, authoritative photo-narrative study of cloud formations. Seventy-four superb pictures in black and white and color are included, illustrating atmospheric variations and extremely odd cloud phenomena. Introductory narrative explains how clouds are formed. Detailed captions provide technical and meteorological data in simple, clear phrase.

° ° °

Civil, military, student, and would-be pilots will be interested in the new 1958 edition of *Civil Air Regulations and Flight Standards for Pilots* (Aero Publishers, Inc., $2.25). The nineteenth edition of this pilot's manual covers government requirements, air laws, flight procedures and flight rules, radio-telephone use, airport traffic control, requirements for pilot's certificates, search and rescue services available to pilots, Air Defense rules and requirements, digested CAA manuals on government regulations, weather map instructions, and a study guide and sample written examination for the private pilot license.

° ° °

In the paper-back corner:

Space Satellites, by Lloyd Mallan (Fawcett Publications, Inc., 75¢), a comprehensive coverage of Earth satellite programs and the launching and operation of ESVs. Discusses the future race for space conquest and the benefits that humanity will derive from satellites and spaceflight.

Satellite, by Erik Bergaust and William Beller (Bantam Books, Inc., 35¢). Lively account of man's first step into outer space—of the research, development, and testing of satellite vehicles and a popular treatment of the science of astronautics.

Patrol, by Fred Majdalany (Ballantine Books, Inc., 35¢). A story of the desert war, North Africa—1943.

Escape from Colditz, by P. R. Reid (Berkley Publishing Corp., 35¢). Absorbing true story of escape from "escape-proof" German POW bastion in World War II.

Battle for Leyte Gulf, by G. Vann Woodward (Ballantine Books, Inc., 35¢). A detailed historical account of this World War II naval battle.

The Last Days of Hitler, by H. R. Trevor-Roper (Berkley Publishing Corp., 50¢). The story of the final collapse of Nazi Germany and the last hours of its leaders.

—MAJ. JAMES F. SUNDERMAN

AFA NEWS

SQUADRON OF THE MONTH

Greater Miami, Fla., Squadron, Cited for

its contributions to better community understanding of the role of the turboprop in commercial aviation, through its sponsorship of the Third Annual Florida Jet Age Conference.

Miami's fine Squadron, in cooperation with the **Florida Wing,** held its **third annual Jet Age Conference** at the Biscayne Terrace Hotel in Miami on April 25, stressing the **impact of turboprop aircraft** on the community as they are phased into the schedules of the nation's airlines. A large audience, including representatives of just about all aviation-minded groups in the South Florida area, listened to the presentations.

Alex Morphonios, AFA's Regional Vice President; **Alan Cross,** a National Director; and **Ted Koschler,** Florida Wing Commander, were instrumental in lining up and presenting the program.

After the Conference, an awards banquet recognized the efforts of aviation leaders in the area. **Morphonios, named Florida's "Man of the Year"** in aviation, received a plaque from the Wing.

Following the presentation of the awards, **Col. Carlo Tosti,** Information Services Officer for the Air Research and Development Command, presented the **Air Force R&D story** in slides and movies.

AFA's President, Peter J. Schenk, has been one of the busiest men in—and out of—Washington the past few months. As **Defense Consultant for General Electric,** he has been running a really tight schedule, including much Association work. In the past thirty days, for instance, he has traveled **over 10,000 miles,** and has visited some **thirty-five cities** on AFA duties alone. The list of communities includes such widely scattered cities as **Lincoln, Neb., San Francisco, Los Angeles, Salt Lake City,** and **Montgomery, Ala.,** among others.

The **Lincoln meeting** was arranged by the fine AFA Squadron there, headed by **Walter I. Black.** This unit holds promise of becoming one of the top Squadrons in the country, blessed with excellent leadership and outstanding interest on the part of both the membership and the nonmembers in the community. Mr. Schenk was introduced in Lincoln by **Brig. Gen. Perry Hoisington,** SAC Wing Commander, at a dinner spon-

(Continued on following page)

Jack Schrader, right, new Commander of the Pittsburgh Squadron, accepts the gavel from outgoing Commander Lee S. Smith, during installation at Penn-Sheraton Hotel. Other Air Force Association officials present include Bob Carr, Pennsylvania Wing Commander, and Carl J. Long, a National Director.

Santa Monica installation brought together AFA Director Gwynn Robinson; actor Gene Raymond, who acted as master of ceremonies; USAF Academy Superintendent Maj. Gen. James Briggs, evening's guest speaker; AFA Past President Art Kelly; Sqdn. Cmdr. Tom McKnight; and Regional Vice President Curt Christensen.

In a classic example of AFA fringe benefits, Cleveland Squadron Commander Willard Dougherty and Squadron public relations chief Bob Leonelli persuaded Jane Russell to come out from Hollywood to help with the screening of the first candidates for the title of "Miss Airpower of Cleveland." Winner of the contest will attend both the Ohio Wing Convention and AFA's national Convention in Dallas, in addition to receiving a complete new wardrobe and other gifts.

sored by the Squadron. More than 750 Air Force Association members and their guests attended.

Arthur C. Storz, AFA's National Director from **Omaha** and AFA "Man of the Year" in 1955, has demonstrated his interest in airpower many times in the past years. A recent example of his interest was the announcement made at the last meeting of the Board of Directors, that the Nebraska AFA Wing would make a **donation of $1,000 to the Air Education Foundation,** AFA's affiliate. This money was earned by the Wing in the membership refund program, under Storz's capable direction. The fund is to be used for **Workshop scholarships for Nebraska teachers,** at the University of Nebraska at Lincoln. Similar grants are planned for both **Creighton University and the University of Omaha.**

In April, after learning that a group of **St. Louis businessmen** was to tour Offutt AFB, SAC Headquarters, Storz immediately organized a dinner for them, and invited SAC top personnel and a number of influential Omaha community leaders, including AFA people. As host, Storz invited the St. Louis folks to join in **developing AFA's membership,** and outlined the method he uses in Omaha each year to sign up **some two thousand members.** We don't know what the outcome will be, but if any of his enthusiasm and dedication to hard work rubs off, we can assume that the St. Louis membership will be a great deal larger very soon.

Greeting Gordon George, center, of General Electric Co., speaker at San Francisco Squadron's April meeting, are AFA Director Charles Morgan, Wing Cmdr. Harvey McKay, Aviation Writers' George Rhodes, and Sqdn. Cmdr. Tom Barbour.

The week of April 2-9 was proclaimed **"Hap Arnold Week" in San Francisco by Mayor George Christopher,** in honor of the late Gen. H. H. Arnold, whose name graces the **Arnold Air Society,** youth affiliate of AFA. The Society held its **ninth Annual National Conclave** at the Sheraton-Palace Hotel there April 2-6, and guest of honor was **Eleanor Arnold,** the general's widow.

J. Chesley Stewart of St. Louis, AFA's Midwest Regional Vice President, who died suddenly in New York April 29.

Guest speakers at the Arnold Conclave included **Lt. Gen. Dean Strother,** Commander, Air University; **Brig. Gen. Robert L. Scott,** USAF (Ret.); **Thomas G. Lanphier,** Convair Vice President and AFA Director; **Lt. Gen. William E. Hall,** CONAC Commander; AFA President **Peter J. Schenk;** Maj. Gen. **Henry R. Spicer,** Commander, Air Training Command; **Dr. Frank E. Sorenson,** University of Nebraska; **Maj. Gen. Arno H. Luehman,** Director of Information Services, Hqs. USAF; **Maj. Gen. James E. Briggs,** USAF Academy Superintendent; **Krafft A. Ehricke,** of Convair Astronautics Division; and **Lt. Col. David G. Simons,** USAF doctor who last year set a manned balloon record of 102,000 feet.

Cadet Edward L. Heinz was Conclave Chairman, and the work of his Arnold Air Society Squadron at the University of California drew praise from all. At the conclusion of the Conclave, Heinz was unanimously elected National Commander of the Society, succeeding **John E. Boehm** of Manhattan College, New York. As

(Continued on page 117)

Guiding a missile, or speeding flight and flight environmental data back to control and tracking centers, is too much of a job for conventional communication systems. Supersonic speeds call for lightning fast data communications, coupled with the utmost reliability.

Capitalizing on the ease of converting messages into digital form, Motorola scientists and engineers have developed a number of Data Link Communications Systems suitable for piloted aircraft, as well as missiles.

NERVE CENTER FOR DATA LINK SYSTEMS

With Data Link Systems, messages that have been translated into on-off pulses can be transmitted by any of the common modulation schemes with a suitable carrier. The transmitter can be air-borne, ship-borne, or land-based. Received messages are amplified, decoded, and transformed into a form suitable for display, or stored for some future time, or used for direct control through auto pilots, for example.

One of the Data Link Systems designed at Motorola utilizes an all-transistor converter-coupler, packaged in modular form. The total system consists of eight modules, each approximately 4" x 8" x 1½". The fully transistorized circuitry is of the highly reliable diode-matrix type logical circuitry used in many digital computers. The switch type transistors employed are a product of the Motorola Semi-Conductor Division. Indicative of the stringent testing program to which the transistors are subjected is a 1000-hour life test at 85° C.

For another Data Link program, Motorola has designed a system featuring resolver-type outputs. A single time-shared servo amplifier positions anyone of the five resolvers in accordance with commands from the ground transmitter.

These two Motorola Data Link Systems aimed at solving one of the important communication problems of the missile age are examples of the complex programs conducted by Motorola for varied military needs.

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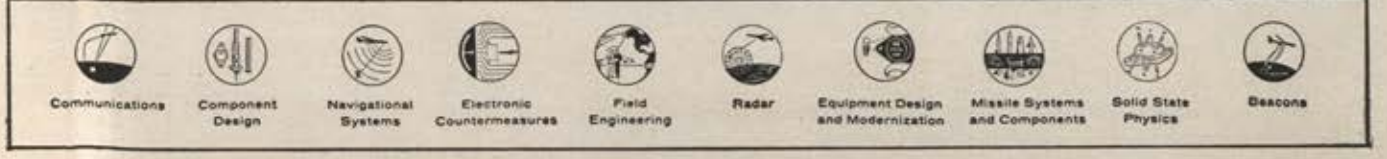

National Commander, AAS, Heinz also automatically assumes an **ex-officio** seat on AFA's Board of Directors.

CROSS COUNTRY . . . The San Francisco Squadron has a new format for its monthly bulletin. Now called **"Satellite,"** it has a very attractive masthead combining the AFA insignia, planets, stars, and airplanes. It was the first of the good bulletins, and remains one of the best. . . . The **Mobile, Ala., Squadron** recently purchased memberships in the **National Aviation Education Council** for five area schools, and made presentations of materials and books to the principals of the NAEC libraries. . . . Members of the **Laurence G. Hanscom Squadron, Mass.,** were recently treated to a conducted tour of the Volscan electronic aircraft control system project at the AF's Cambridge Research Center. Laboratory Chief **Ben Greene** headed the team that briefed the group on the unclassified details of this program, which it is hoped will provide better control of planes on the nation's airways. . . . The **San Diego and Dallas Squadrons** are continuing their programs designed to **educate the community leaders** in the work of the Air Force. Dallas hosted a group on a trip to **Offutt AFB, SAC Headquarters,** while the **San Diego Squadron,** under the leadership of **Jim Snapp and Frank Brazda,** took a large group to the **Flight Test Center at Edwards AFB.** . . . **Three new AFA Squadrons** are welcomed to the rolls, all chartered in April. They are: **Chico, Calif.,** where the Commander is **Sankey M. Hall, Jr.; Montgomery, Ala.,** headed by **Dr. Eugene M. Emme;** and **Teterboro, N. J.,** led by **John F. Russo. Cincinnati, Ohio,** has reactivated its unit. **Henry Peterson** is Commander.

—Gus Duda.

Arnold Air Society Cadets Gregory Anderson and Neal Sorenson, University of Utah, welcome Utah's Gov. George D. Clyde as an honorable member of the AAS.

Make Your Reservations Now for AFA's 1958 Convention in Dallas

Seven air-conditioned hotels have set aside rooms and suites for the Air Force Association's 1958 Covention and Airpower Panorama in Dallas, Texas, September 25-28. The Headquarters Hotels are:

AFA Members ..... Adolphus
Reserve & Guard ..... Baker
Industry ..... Statler Hilton

All suites at the Statler, Adolphus, and Baker Hotels have been taken. Each of these hotels has attractive one-room parlors, display rooms, and small banquet rooms which are ideal for entertainment purposes in lieu of suites.

Major Convention events will be held in the new Auditorium; AFA business sessions at the Adolphus Hotel; Reserve Forces Seminar at the Baker.

The Dallas Hotel Association operates AFA's Housing Office. All requests for rooms *must* be sent to the following address:

AFA Housing Office

1101 Commerce Street
Dallas 2, Texas

HOTELS	SINGLE ROOMS	DOUBLE ROOMS	TWIN ROOMS	SUITES
ADOLPHUS	SOLD OUT	$9.00–14.00	SOLD OUT	SOLD OUT
BAKER	SOLD OUT	7.00–12.00	SOLD OUT	ONE-ROOM PARLOR SUITES
DALLAS	5.00– 7.00	8.00–10.00	8.00–12.50	$16.00–24.00
SOUTHLAND	4.50– 7.50	5.50– 8.50	6.50–10.50	16.50–17.50
STATLER HILTON	SOLD OUT	SOLD OUT	SOLD OUT	SOLD OUT
TRAVIS	5.00– 7.00	8.00– 9.00	8.00– 9.00	15.00
WHITE-PLAZA	4.50– 8.50	6.00–10.00	6.00–12.00	15.00–27.00

HOTEL ROOM RESERVATION FORM
AIR FORCE ASSOCIATION CONVENTION

DATE_____

NAME_____

ADDRESS_____

CITY & STATE_____

HOTEL_____ (First Choice) _____ (Second Choice)

_____ (Type Room) ( ) Low ( ) Average ( ) High (Desired Rate)

OTHERS IN ROOM_____

ARRIVAL DATE & HOUR_____

DEPARTURE DATE_____

INDEX TO ADVERTISERS

HOW AMERICAN'S FAMILY HALF-FARE PLAN MAKES GROUP TRAVEL EASY

Family Half-Fare rates are in effect on American Airlines from 12:01 noon Mondays to 12:01 noon Thursday.

During this period any person purchasing a full fare ticket can take along his or her spouse and their children for half fare.

American originated the Family Half-Fare Plan to make group travel easier for everyone. For instance, on a coast-to-coast trip for a family of four, the savings on Family Half-Fares may amount to hundreds of dollars.

American's easy credit terms also enable travelers to start a trip with only a small down payment and pay off the balance in convenient monthly installments.

AA AMERICAN AIRLINES

America's Leading Airline

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FROM AFA's FLIGHT PAY PROTECTION

- *twelve months' protection for groundings due to disease or accident...*
- *twenty-four months' protection for groundings due to aviation accident...*
- *FOR ONLY* **2%** *OF your annual flight pay.*

Here's How the Plan Works

ANY person on full-time active duty who receives incentive pay for flying can qualify—provided that he is, or becomes, an AFA member.

When you sign up for protection you pay a premium of two percent (2/100) of your annual flight pay, figured at the current rate. For example, if your current flight pay amounts to $1,800 a year, you pay only $36 for flight pay protection. (To get your current rate of flight pay, multiply your present monthly flight pay by twelve.)

Protection against loss of flight pay due to grounding as a result of accident goes into effect on the last day of the month in which you apply for protection and pay your first premium.

Protection against loss of flight pay for grounding due to disease goes into effect thirty days after the last day of the month in which you apply for protection and pay your first premium.

There's a waiting period before payments start—ninety days for groundings due to disease or non-aviation accidents, 180 days for groundings due to aviation accidents—because unless your grounding exceeds these limits you can collect back flight pay from the government by putting in the required flight time.

But if your grounding exceeds these limits, the AFA plan not only thereafter provides regular indemnities for lost flight pay, *but indemnifies you for lost flight pay retroactively,* covering the ninety-day or 180-day waiting period in the first payment, at the rate reported on your insurance certificate. *For example, one colonel, grounded, got $1,225 indemnity for lost flight pay in his first check.*

Of course, this coverage does not apply in case of war, declared or undeclared, or hostile action, civil war, invasion, or the resulting civil commotion or riots. There are also other exclusions, which may never apply to you, but you are entitled to know them. They are as follows:

The plan does not cover persons whose primary duty is parachute jumping.

The plan does not cover losses due to a criminal act of the AFA member, or resulting from bodily injury occurring while in a state of insanity (temporary or otherwise); or from mental or nervous disorders; or from officially certified "fear of flight"; or caused by intentional self-injury, attempted suicide, criminal assault committed by the member, or fighting, except in self-defense; or from failure to meet flying proficiency standards unless caused by or aggravated by or attributed to disease or accident; or accidents caused while riding or driving in any kind of race; or by alcohol, drugs, venereal disease, arrest or confinement; or by willful violation of flying regulations resulting in suspension from flying as a punitive measure; or sentence to dismissal from the service by a general court-martial; submitted resignation for the good of the service; or suspension from flying for administrative reasons not due to accident or disease; or voluntary suspension.

The plan does not cover losses to any member resulting from a disease

need it

PLAN

- *Your indemnity for just one grounding of ninety days or more will pay for ten years' protection under the AFA plan . . . and lump-sum payment of three months' indemnities gives you money when you need it most.*

or disability pre-existing the effective date of coverage, or a recurrence of such disease or disability, whether or not a waiver has been authorized by appropriate medical authority in accordance with regulations or directives of the service concerned. Loss of life shall not be deemed as a loss for purposes of this plan.

In the event you receive the total limit of twenty-four (24) months' indemnity for loss of flight pay due to aviation accident, or twelve (12) months' indemnity for loss of flight pay due to accident other than aviation accident or to disease, your coverage is automatically terminated. You may thereafter reapply for insurance coverage in the same manner as a new member. Coverage, and the payment of indemnities, also end with the termination of membership in AFA, or with resignation, retirement, or pensioning from the service, or at age sixty.

The insurance is renewable at the option of the Aetna Insurance Co.

Policy Form No. 1-620-3A.

AIR FORCE ASSOCIATION 6-58
FLIGHT PAY PROTECTION PLAN

Underwritten by AETNA INSURANCE COMPANY
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SEND REMITTANCE TO AIR FORCE ASSOCIATION, MILLS BLDG., WASHINGTON 6, D. C.

(Please Print) Rank Name

Serial Number Years Service for Pay Purposes

Mailing Address

Amount of Annual Flight Pay

I certify I am currently on flying status and entitled to receive incentive pay, and that to the best of my knowledge I am in good health, and that no action is pending to remove me from flying status for failure to meet physical standards. I authorize AFA, or AFA representatives, to examine all medical records pertinent to any claim I may submit.

Signature of Applicant Date

☐ I want to join AFA, $6 dues enclosed.

Application must be accompanied by check or money order for annual premium. The annual premium charge is two percent of ANNUAL flight pay.

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ONE government bill of lading *rushes* your shipment from pick-up to destination by Scheduled Airlines Air Freight! Unlike most cargo methods, Scheduled Airlines Air Freight requires no separate bills of lading as do surface or water carriers. Your shipment may even be stopped in transit for partial loading or unloading. Just one single GBL covers the routes of as many airlines as needed.

Speedy Scheduled Airlines Air Freight offers you savings in storage, insurance and crating costs plus less damage and pilferage enroute. And, of course, your savings in time are measured in *days . . . sometimes weeks!* Often you'll find reliable Scheduled Airlines Air Freight actually costs you LESS than time-consuming surface methods.

For Example: A 200 lb. shipment of electronic equipment from Dallas to Philadelphia—

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. (Pickup and delivery included in each case.)

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A Look into
SAC's FUTURE

By Gen. Thomas S. Power
COMMANDER IN CHIEF, STRATEGIC AIR COMMAND

The future of the Strategic Air Command, in the face of tomorrow's technology, is a vital story for all Americans. General Power explores it in the following excerpt from the Airpower Book Club's new selection, The USAF Report on the Ballistic Missile, *to be published by Doubleday next month. The material below is taken from the chapter entitled "Employment of the Ballistic Missile," by General Power. For details on this book, see the ad on page 125. A veteran airman, General Power headed the Air Research and Development Command before succeeding Gen. Curtis LeMay as Commander of the Strategic Air Command.*

THERE is little doubt that future developments will bring about rapid improvements in accuracy, yield, range, automaticity, maintainability, and similar areas in which early ballistic missiles are deficient. Technological advances will also engender spectacular improvements in some of those areas which constitute inherent rather than initial weaknesses of current missile designs.

One of the most far-reaching improvements, as far as operational employment is concerned, would be the conversion from liquid to dependable and stable solid rocket fuels. Use of solid propellants would greatly facilitate maintenance and logistics problems, enhance movability, permit more extensive dispersal and hardening, reduce requirements for skilled technicians, and allow for greater automaticity. The relative simplicity of solid-fuel powerplants would increase reliability and improve reaction capability. Moreover, it is anticipated that over-all cost of procuring and maintaining solid-fuel missiles will be considerably below that for the liquid-fuel type. For all these reasons solid-fuel powerplants will undoubtedly find increasing use in future generations of ballistic missiles.

Another improvement which appears technically feasible concerns means for permitting a missile to deviate from its normal ballistic trajectory. Once perfected, such a means would add immeasurably to protection against antimissile defenses which, at present, can be based on the fact that after a ballistic missile has been detected its trajectory can be predicted expeditiously and accurately.

A profound impact on SAC's future operations would also result from the development of an operational Strategic Reconnaissance Satellite (SRS). Such a satellite would minimize one of the principal inherent weaknesses of unmanned weapon systems—their inability to report whether and to what extent they have performed their assigned mission. The Strategic Reconnaissance Satellite would also assist in accurately locating targets, facilitate missile guidance, and, possibly, provide countermeasures against missile defenses. Moreover, it would permit early detection of hostile missiles and thereby enhance both SAC's alert posture and missile defense.

Obviously the Soviets would use satellites for similar purposes. This may create the need for developing antisatellite defenses. Thus the Air Force may have to extend its operations ever deeper into space, with the prospect of actual space warfare in the more distant future.

Nontechnical aspects of the future include those for growing cooperation with the other services and the military establishments of our allies in coordinating the assignment of ballistic-missile targets. The increasing availability of ballistic missiles, their tremendous scope of ranges, and their potential adaptability to mobile launching platforms on land, at sea, and in the air will eventually make the entire Soviet target system accessible to many organizations other than SAC. With adequate assignment of responsibilities and centralized control, the combined missile capability of the Free World could represent a tremendous asset to its deterrent posture.

Consideration of Soviet Missile Capability

In the employment of ballistic missiles the Soviets must cope with problems and deficiencies similar to those affecting our own initial operational capability. The question whether or not the Soviets are currently ahead of us in their missile technology is rather academic. They would not launch an all-out missile attack unless and until they have enough operational missiles to ensure the immediate and complete success of such an attack by neutralizing our retaliatory forces. Indications are that the Soviets have not yet reached that capability. By the time they have accumulated what they would consider an adequate stockpile of

(Continued on following page)

SAC'S FUTURE — CONTINUED

ballistic missiles, our own stockpile can, with proper effort, have grown sufficiently to offset any technological advantages they might possess at present.

There are, however, some factors in missile employment which represent exclusive advantages to the Soviets. They have more accurate and detailed information concerning the location and nature of strategic targets in this country. Also these targets are more concentrated, with many major target areas within easy reach of submarine-launched missiles. As the potential aggressor they can select the most suitable time and circumstances for a surprise attack. Thus they can cause severe damage even if our subsequent retaliatory action led to their ultimate defeat.

But while successful attacks on large, highly concentrated target areas can be undertaken with relatively poor missile accuracies, much better accuracies are required to seriously weaken SAC's combat capability, even with a large number of missiles. The Soviets recognize the mixed bomber-missile force as mandatory to achieve flexibility in the choice of weapon systems for a variety of missions.

There are two approaches the Soviets could and undoubtedly would use in trying to neutralize SAC's strike forces and thereby prevent unacceptable retaliation. The first approach would entail a surprise attack with both missiles and manned bombers, in which the missiles would be employed principally against area targets while the bombers would concentrate on SAC installations.

The success of such a surprise attack appears rather doubtful, at least at the present time. It is extremely difficult to time the attack in such a manner as to ensure the simultaneous arrival of all elements, manned and unmanned, and thereby to achieve a complete surprise. A small aggressive force would find it easier to delay detection but would not suffice to prevent retaliation, and the bigger the aggressive force, the less chance there is for a sneak attack. Radars have now been developed which can detect an ICBM at very great distances. Eventually they should be able to provide the minimum warning SAC will need to launch its manned alert forces before they could be hit on the ground. The previously mentioned hardening and deployment of missile sites will further enhance the survival of a missile capability adequate to retaliate effectively.

The Soviets' second approach in preventing decisive retaliation rests with continued improvements of their air defenses, especially against manned bombers. But as defenses become more sophisticated, they must rely increasingly on electronics, which, in turn, can be combated with electronics, generating a vicious spiral of countermeasures and counter-countermeasures of mounting complexity.

Future advances in missile technology and the techniques of missile employment will, of course, increase the Soviets' offensive capability and, therefore, the threat to us. However, as long as we grow with the threat and succeed in preserving our deterrent margin, we can at least maintain what is sometimes referred to as a "nuclear stalemate."

The concept of the nuclear stalemate seems to have a derogatory connotation which is not justified. As long as the Soviets threaten aggression, we must make every effort to prevent it, because in a nuclear war there are no winners, only different degrees of losers. The nuclear stalemate is preferable to open warfare even if we should eventually win the war, for we could win only at tremendous cost to ourselves. Therefore we must endeavor to maintain the critical balance in the hope that the fundamental issues can be resolved by future international and political developments which will, once and for all, end the threat to our security.—END

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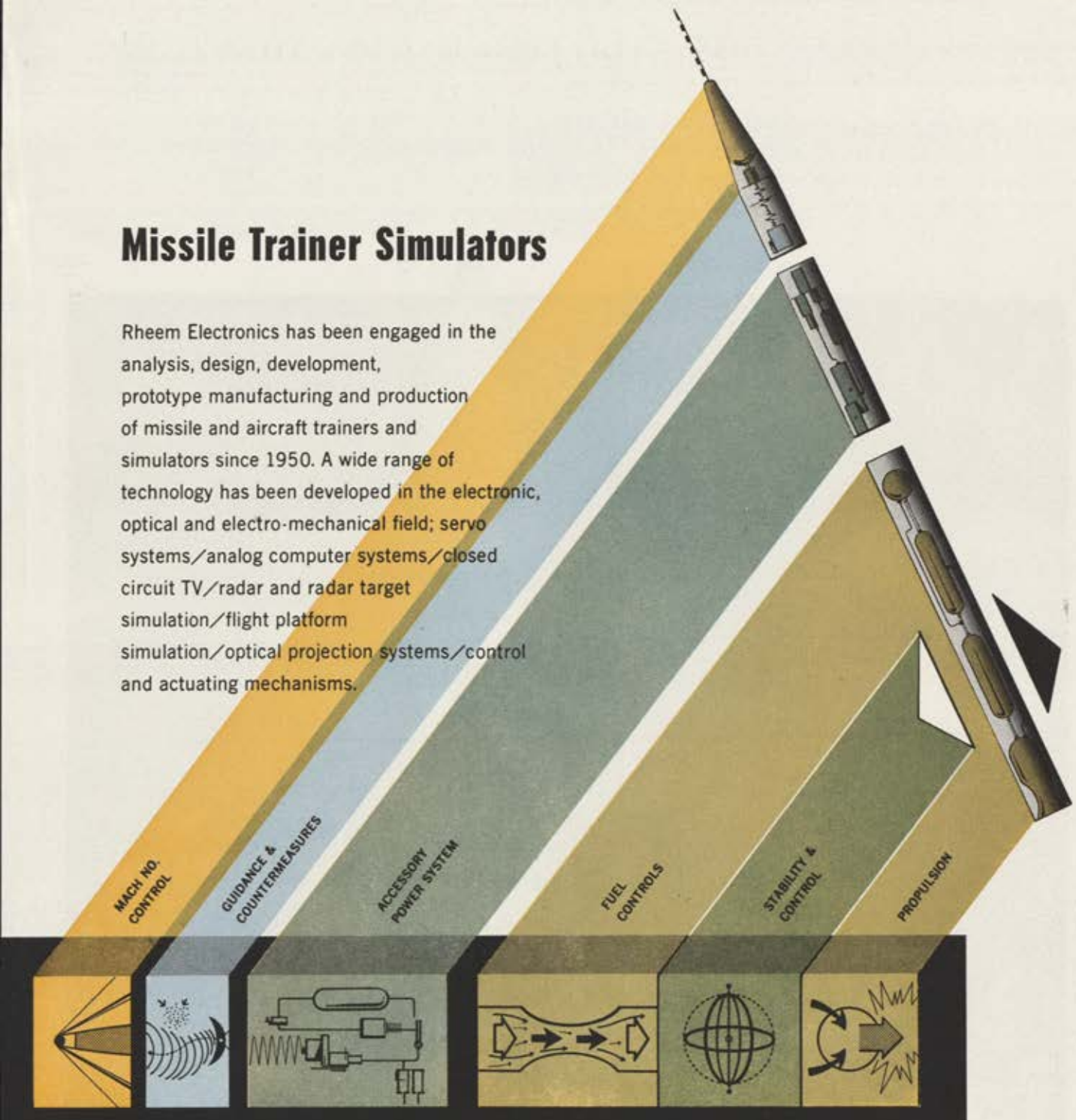

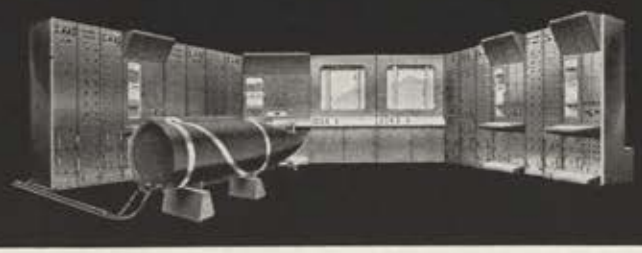

The test console depicts a typical simulation device utilized for the "dry run" of a missile and its components; significant advances have been made in the art of simulation to train personnel in missile operations.

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