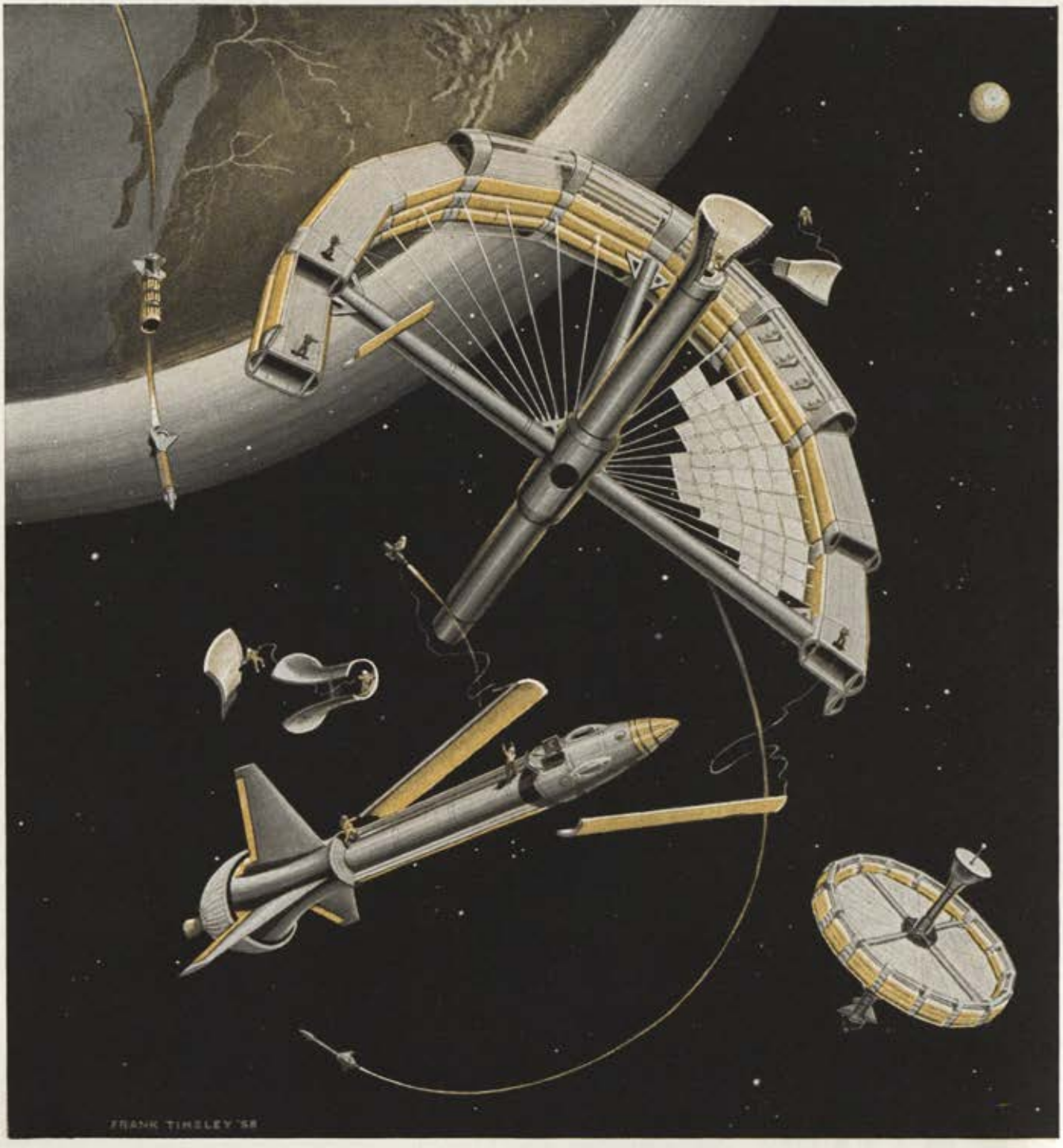
MAY 1959 / 50c

# AIR FORCE

The Magazine of Aerospace Power / Published by the Air Force Association

## THE B-36 STORY

## TRAIL BLAZER FOR A CONCEPT




STEPS IN THE RACE TO OUTER SPACE

# *Assembling a station in space*

This imaginative but technically accurate illustration shows a permanent satellite (center) being constructed in orbit around the earth. It generates its own heat and electricity from solar rays. Basic vegetation (such as algae) for oxygen as well as protein-rich foods are grown in hydroponic tubes in upper level "greenhouses."

New vistas in astronomy will be opened up by such a space station, because of perfect conditions for photography and spectroscopy. It will also provide unique conditions for advanced research in physics, electronics, weather prediction, etc. Three such stations, properly placed, could blanket the entire world with nearly perfect TV transmission.

Atomic rocket vehicles with prefabricated skin layers (lower center) provide building materials for the station, then return (bottom) to earth. Similar craft will service an established station (lower right), docking by electromagnetic pull in lower section of station's axis.

* * *

Inertial navigation systems will play an increasing role in the exploration of outer space. ***ARMA*** is actively supporting the Air Force's program in long range missiles and is in the vanguard of the race to outer space. ***ARMA*** . . . Garden City, New York. A Division of American Bosch Arma Corporation.

**AMERICAN BOSCH ARMA CORPORATION**


# Each new BOMARC missile base will protect thousands of square miles

This is a section of the Hurlburt Field installation at Eglin Air Force Base, Florida, for the supersonic BOMARC area-defense missile. Other bases are now nearing completion.

The BOMARC missile, in volume production for the U. S. Air Force, is the most advanced defense missile in the nation. It flies farther, reacts faster, has greater tactical flexibility and a higher "kill rate" per dollar against attacking aircraft than any other defense missile.

The BOMARC's long reach—200 to 250 miles—enables each BOMARC base to provide interceptor cover over thousands of square miles. The result is economy, *and* more effective defense. BOMARC's longer range enables it to destroy attack forces—either aircraft or airborne missiles—long before they can reach U. S. borders.

BOMARC is backed by more than 13 years of Boeing experience in the missile field. Throughout an exhaustive test program, the BOMARC missile, as well as its guidance, propulsion, support and other subsystems, has demonstrated outstanding performance and reliability. BOMARCs have intercepted bombers, jet fighters and supersonic missiles. They have been successfully fired and controlled in salvo. Single BOMARCs can destroy multiple targets. BOMARC, moreover, can be developed to cope with intercontinental ballistic missiles.

BOMARCs are designed to operate integrally with SAGE, the joint American-Canadian air-defense detection and control system. The BOMARC system has been chosen by the Canadian Government as an integral part of its air defense.

**BOEING BOMARC**

*Progress in Space Technology*

# How General Electric delivered first U.S. operational re-entry vehicle

**General Electric Missile and Space Vehicle Department helped USAF Ballistic Missile Division solve re-entry problem . . . speed Thor operational readiness.**

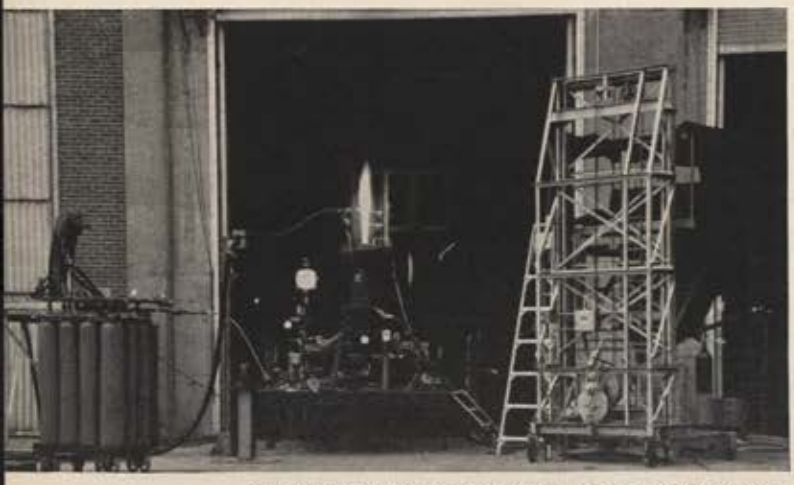
**CAPABILITIES DEVELOPED RAPIDLY**—Early in 1955, General Electric's Missile and Space Vehicle Department began research and development work on the vitally important re-entry phase of the USAF ballistic missile program. A skilled core of G-E scientists with hypersonic and missile technology experience were pulled together from all parts of the Company. Special research tools were developed and put into use at MSVD's new Aerosciences Laboratory. Advanced shock tunnels reproduced high Mach air flows—10,000 to 25,000° F plasma jets simulated extreme re-entry heats. With such new tools, G.E. gained vital knowledge of the re-entry environment.

**FLIGHT TEST PROVED DESIGN**—MSVD engineers were convinced that the heat-sink type re-entry vehicle offered the best approach to providing the Air Force with an *operational* weapon at the *earliest possible date*. Later, flight tests proved the soundness of the General Electric approach. On schedule, only 30 months after research and development began, the Air Force launched the free world's first operational re-entry vehicle on Thor.

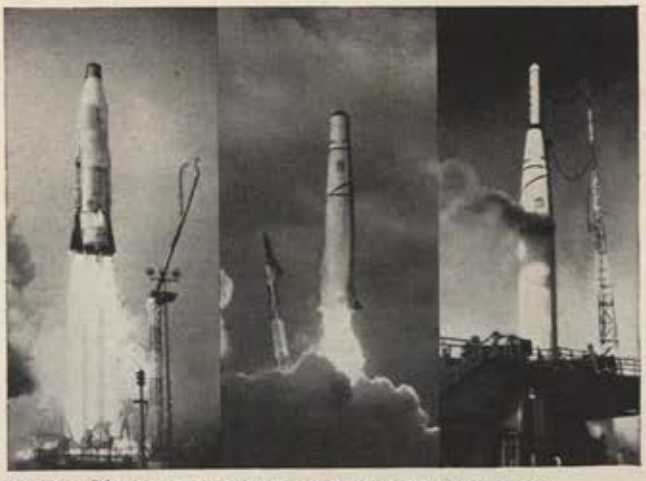
Missile and Space Vehicle Department engineers were also able to make important advances on other fronts associated with the re-entry challenge. Complex re-entry vehicle ground support equipment was developed; rocket-sled tests aided in solving fuzing problems. It was also necessary to build one of the country's most advanced data processing and computation centers to keep pace with the need for rapid processing of Air Force re-entry data.

**PRODUCTION ON SCHEDULE**—To prepare for Thor missile re-entry vehicle production, General Electric acquired and developed special manufacturing facilities and techniques. Proof of the smooth, rapid transition from research and development to production is the fact that Thor re-entry vehicles have passed *all operational qualification tests* and are being delivered on schedule to the Air Force for air lift to key overseas bases.

**ADVANCED NOSE CONE DEVELOPMENT**—Meanwhile, development continues on more advanced re-entry vehicles. Last year, one such G-E re-entry vehicle, the Thor-Able, successfully re-entered at an ICBM range of over 5500 nautical miles. With more than four years of success as an associate contractor on the Atlas, Thor and other programs, *General Electric is the leader in re-entry vehicle development and production experience.* This proven competence will continue to grow as MSVD applies its re-entry experience to the expanding list of new missile and space projects. *Missile and Space Vehicle Department of the Defense Electronics Division.* 224-50



**NATION'S LARGEST PLASMA JET PLAYS KEY ROLE in providing information leading to the solution of the re-entry problem. Plasma Air Arc and many other re-entry research tools were developed by MSVD Aerosciences Laboratory scientists.**



**OVER 1½ YEARS OF FLIGHT TEST EXPERIENCE on Atlas, Thor and Thor-Able missiles has been gained by General Electric covering both heat-sink and ablating types of re-entry vehicles for the USAF. These three ballistic missiles are pictured above.**

**A GENERAL ELECTRIC RE-ENTRY VEHICLE is mated to a Thor Missile in the first SAC operational test flight exercise from Vandenberg Air Force Base.**

*Official U.S. Air Force photograph*

**RE-ENTRY VEHICLES ARE ASSEMBLED at MSVD facilities in Burlington, Vt., for both THOR and ATLAS ballistic missiles.**

**These Free Booklets Describe MSVD Ballistic Missile Re-entry Vehicle Work.**

Indicate the brochures that you would like to have and send to: Section C224-50, General Electric Co., Schenectady, New York.

| | |
|---|---|
| **Capabilities of G.E.'s Missile and Space Vehicle Department** | **GEA-6904A** |
| **Space Technology Progress** | **GEA-6876** |
| **Heat Sink Nose Cone** | **PIB-2** |
| **Design and Fabrication of Re-entry Vehicles** | **GER-1583** |
| **Heat Protection of Re-entry Vehicles** | **GER-1582** |

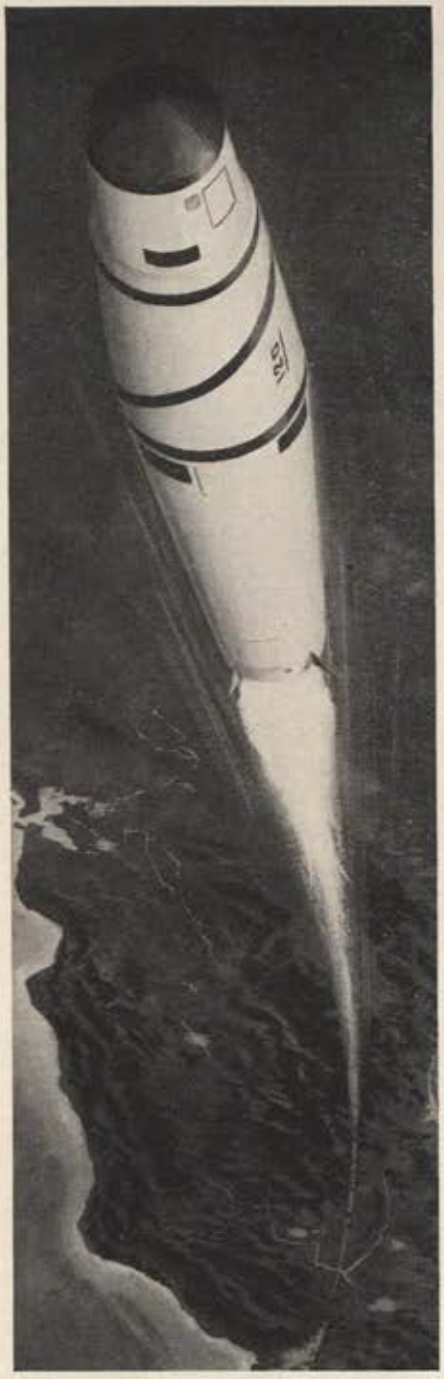
*Progress Is Our Most Important Product*

**GENERAL ELECTRIC**

SAC INTERMEDIATE RANGE BALLISTIC MISSILE

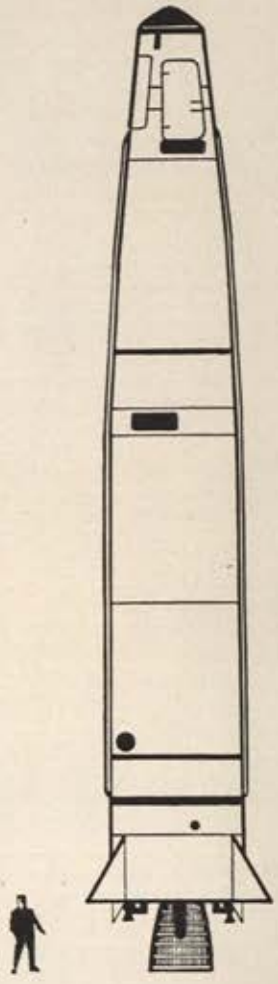
## The man:

. . . a launch-control specialist in a *Thor* SAC squadron. His instruments report each automatic step in the launching procedure of the big IRBM. U.S. Air Force and Royal Air Force missilemen are receiving *Thor* training side-by-side . . . have readied and fired these missiles within a 20-minute count-down.



## The missions:

. . . are many—because of the Douglas *Thor's* versatility. As a highly mobile weapon with atomic capability, it sternly warns potential enemies against aggression. As a powerful and reliable booster, it is playing a leading role in our exploration of outer space with satellites and probes.



## The missile:

. . . can destroy targets as far as 1500 miles away within minutes after hostile action is detected. Douglas *Thor* missiles were the first intermediate range ballistic missiles to be deployed overseas. The United Kingdom has announced the delivery of the first *Thors*, for operation by Royal Air Force personnel.

*Depend on* **DOUGLAS**

*The Nation's Partner in Defense*

# AIR FORCE

THE MAGAZINE OF AEROSPACE POWER

*Volume 42, Number 5 • May 1959*





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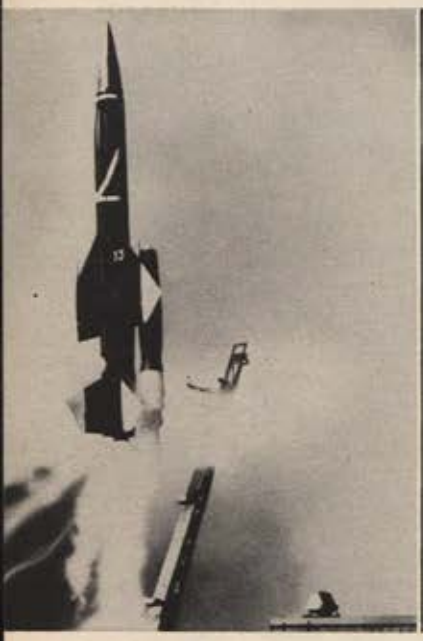
## FEATURES



## DEPARTMENTS

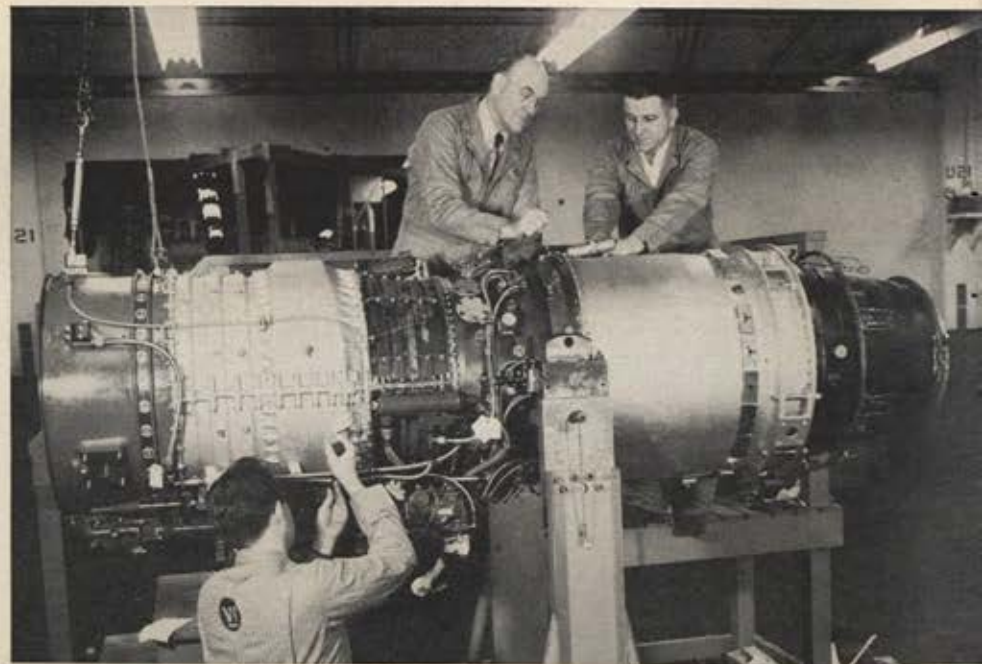
## CAPABILITIES FOR DEFENSE

# 10,904 graduate engineers and scientists with over 133,000 years of experience perform vital tasks at Westinghouse



**MISSILE GUIDANCE SYSTEMS.** Both ground guidance and terminal guidance systems are designed, developed and produced at Westinghouse. More advanced guidance systems are now being developed to replace those in production and in actual operation. The latest techniques in radar, infrared, and data processing and display are being applied to all phases of missile guidance by Westinghouse engineers with many years of experience in this field. ***Air Arm and Electronics Divisions***

**AIRBORNE ELECTRONIC SYSTEMS** for weapons control, terrain avoidance, bombing and navigation, antisubmarine warfare, missile guidance, bomber defense and other applications are designed and manufactured by Westinghouse. Aero 13 Armament Control System, shown above, for the Navy's F4D Douglas Skyray fleet interceptor, is a recent example. ***Air Arm Division***



**PROPULSION.** From the design of America's first turbojet engine in 1941—by 14 pioneering engineers at Westinghouse—to present-day engines for high-speed aircraft, Westinghouse has kept pace with the aviation industry's constant demand for increases in engine power and efficiency. Current applications include the use of new metals and advanced design features to attain maximum thrust-to-weight ratio, higher speed and higher altitude performance. Jet propulsion engineering reached a new high when a recently developed Westinghouse engine met design goals just 11½ months after these goals were set. ***Aviation Gas Turbine Division***

**EXPERIENCED FIELD ENGINEERS** are an important adjunct to Westinghouse engineering capabilities. Located at key locations abroad, in this country, and afloat—wherever Westinghouse equipment is in use—these field engineers supply the experience and information needed to fully utilize new equipment, help indoctrinate new personnel, and provide technical liaison with the manufacturing plants of the Defense Products Group.

**HUMAN ENGINEERING**—mating man and the machine—is important in electronic equipment design. Continuing scientific study and research at Westinghouse facilitate advantageous application of this concept—from missile analysis to maintenance design—in developing better avionic systems. ***Air Arm Division***

**UNDERWATER IRBM LAUNCHER** for the submarine-based Polaris missile, shown here during early test launching with dummy missile, was designed and built by Westinghouse. Design features developed for this system appear applicable for use in other solid fueled missile launching systems.


**AIRCRAFT ELECTRICAL SYSTEMS.** From Jenny to jet, Westinghouse has been producing aircraft electrical equipment representing the day's most advanced state-of-the-art. Systems for today's finest aircraft—including the Boeing 707 jetliner, Convair B-58 bomber, and North American A3J-1 twin-jet fighter—are Westinghouse designed and developed. These systems include the entire a-c power system, control and protective devices, and feature the world's first brushless generator . . . result of pioneering experience dating back to the first airborne, strut-mounted a-c generator built by Westinghouse in 1917. ***Aircraft Equipment Department***

**NUCLEAR ENGINEERING** experience is still exceedingly uncommon, but Westinghouse probably has more knowledge in this very specialized area than any other company in the world. Westinghouse has designed and developed more nuclear power reactors than anyone else. Its engineers have worked in almost every field related to atomic energy. Five different commercial reactor designs are now under active development.

**UNDERWATER WEAPONS SYSTEMS.** Westinghouse engineers designed the Navy's first all-electric torpedo in 1942. Since then, Westinghouse engineers have continued work on new and improved underwater systems, to include high resolution sonar and a high speed, long range anti-submarine torpedo. Technologies involved include hydrodynamics, acoustic systems, servo mechanisms, and guidance control. ***Ordnance Department***

# Westinghouse

**DEFENSE PRODUCTS**

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AVIATION GAS TURBINE DIVISION
ELECTRONICS DIVISION
AIRCRAFT EQUIPMENT DEPARTMENT
ORDNANCE DEPARTMENT

**YOU CAN BE SURE... IF IT'S Westinghouse**

T/I combat surveillance

# Stay 'home' and see more

***Aggressor terrain*** and positions are open secrets to TI-equipped recon drones and snooper aircraft. Field commanders can now reconnoiter "in person" far behind aggressor lines *without leaving field HQ.* Instant, accurate, continuous data on thousands of sq mi of hidden territory can flow into headquarters *in the time one foot patrol could complete its mission.* Hundreds of targets can be spotted, evaluated and brought under fire in the same time interval . . . most of them within seconds after detection.

*This capability exists now at Texas Instruments.* For detailed discussion, military and industrial personnel with need to know please write or call: SERVICE ENGINEERING DEPARTMENT.

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APPARATUS DIVISION

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*An Editorial*

# Insurance or Insecurity?

**Instead of our usual editorial, this month we offer for your reflection the following excerpt from the testimony of Gen. Thomas S. Power, Commander in Chief of the Strategic Air Command, before the Defense Subcommittee of the House Appropriations Committee, Eighty-sixth Congress.**—THE EDITORS

☆ ☆ ☆ ☆

IN A philosophy of deterrence, one of the fundamental points is that we certainly should be able to answer one simple question: Whom are we trying to deter? We are trying to deter Mr. Khrushchev and the Soviets. So it is perfectly obvious that, from a deterrent point of view, what he thinks of our capability is of paramount importance.

What we think of ourselves does not really amount to anything so far as deterrence is concerned. It is only what Mr. Khrushchev thinks of our capabilities that is important from a deterrence point of view. Therefore, he must be made aware of our strength.

I am not advocating that we hide our weaknesses; but let us not hide our strengths if we are to impress this man.

There is another thing that we have to be careful of, and I will express it this way: People sometimes ask me what I think the minimum deterrent force is. They ask as though it were a package that one could get at the local store and buy off the shelf with a price tag on it.

I tell these people: I don't know what the minimum deterrent is, and what is more, there is nobody in this world who knows.

If anybody tells you they know what the minimum deterrent is, tell them for me that they are liars. The closest to one man who would know what the minimum deterrent is would be Mr. Khrushchev, and frankly I don't think he knows from one week to another. He might be willing to absorb more punishment next week than he wants to absorb today. Therefore, deterrence is not a concrete or finite amount.

There is a principle involved, a basic principle. I like to say, it is the same principle that governs you when you take out insurance on your automobile in order to protect yourself against a civil suit.

Everybody has different amounts of insurance. I guess some people drive around without any liability insurance. That is their right, if they want to do that. It is a pretty risky business and depends on how much you have to protect and how secure you like to feel. These amounts of insurance can vary. I am sure the people in this room have different amounts of insurance, possibly because they have different values they want to protect.

However, you have to pay for what you get and you have to know what you are buying. I say that the same principle is involved in this business of deterrence. Nobody knows what the minimum deterrent is. The people of this country, if they want to, can do away with their armed forces and can live without any protection. I wouldn't recommend it, because I don't think they would be around very long.

Or you can strive for this minimum deterrent, which is a difficult thing to find and be sure of. Or you can keep going further to the right, as we believe we should do, and get a "deterrent margin."

If this margin is big enough, you could carry it to the point where even an idiot would know that, if he attacks this country, he would be literally and figuratively destroyed. Ruling out the madman angle, then we would have real deterrence.

Whether you want to go that far or whether you want to stop somewhere in the middle is the people's choice.

My point is that you can have anything you want, but you should know what you are going after.

Another basic principle that ties into deterrence is this: I know that some people in this country—if I told them right now that we have twice as many bombs and twice as many bombers or twice as many missiles as the Russians—would go to bed tonight feeling secure. But they would have no business feeling secure. They just don't understand the problem, because it depends on who starts the war, who has the initiative.

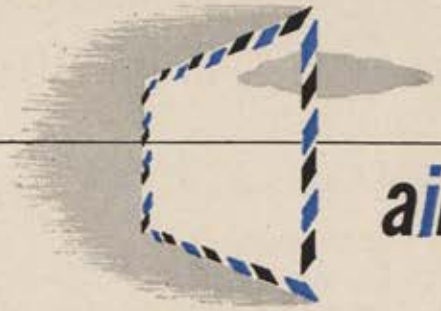
Today, really for the first time in the history of the world, a tremendous advantage accrues to the man who strikes first.

Let me try to put this in mathematical terms. Let us take the Strategic Air Command right now, with which I am thoroughly familiar. I know how many airplanes we have and how many bombs. I know how long it takes to load them. I know what targets they will strike, and I know about how many people will get killed and about how many works of man will be destroyed.

We will call that capability "unity," that is, give it the number "one." But since the Soviets will have the initiative, we are only in a retaliatory role and our capability will be greatly reduced.

Under conditions of retaliation, you have only a fraction of your force; namely, that part of your force which is on alert and can operate within the warning time available.

If we had one-third of our force on the alert today—and that is our goal for the ground alert force—and if we had fifteen minutes' warning against missiles, and if they could penetrate, then all we would have would be one-third of our force. So you see that, by passing the initiative, we have gone from unity, or one, to one-third. That is a combat-ready force which never has been maintained in the history of the world. No one ever has maintained a third of a military force on a fifteen-minute alert day in and day out. It never has been done. We think we can do it. We are approaching it now. We are a little over a year away. It was designed to meet the missile threat. We are going toward it, and I think we will meet it. . . .—END



# air mail

## Housing Article Hits Close to Home

**Anyone who thinks that housing isn't a subject close to the hearts of Air Force people should take a look at our mail over the past month. The letters on this page are only a cross-section of an enthusiastic response. But more important, indications are that the article ("Housing—Still AF's Number One Headache," March AIR FORCE/SPACE DIGEST) has done more good than merely to stir up a lot of talk. The housing legislation at this writing is still in committee in the Senate, but indications are that the amount finally authorized will be considerably in excess of that originally requested by the Department of Defense.—THE EDITORS**

*Gentlemen:* I have just read your article on Air Force housing in the March issue of AIR FORCE/SPACE DIGEST. As one vitally concerned with the housing problem in Strategic Air Command, I am pleased that you have presented for your readers a thorough analysis of the situation.

The housing problem facing the Air Force today is not new; it has been developing and compounding for several years. To meet the increasing challenge of providing a strong deterrent to aggression, Strategic Air Command has continually developed new operational stratagems and techniques. Two of these which have accented the housing problem very dramatically are the concepts of dispersal of the force and maximum alert.

To be effective, the strategic force must present a sufficiently complex target problem to preclude its complete destruction by surprise attack. This requires wide dispersal of its units. In some instances, presently existing facilities have been expanded; in others, new bases have been developed. In most cases, however, both on-base and off-base housing are practically nonexistent.

The concept of an alert force has been necessitated by the ever-decreasing time available for reaction to attack. Unless crew members and support personnel are housed in the immediate vicinity of the aircraft, the whole purpose of the alert force is defeated. Thus, on-base military housing is essential to the maximum alert posture.

The only way we can get past the stumbling blocks of our housing requirements is to bring these conditions directly to the attention of the nation. We in Strategic Air Command are convinced that the general public is not aware of our serious housing problem. If adequately informed, we believe that they will support our efforts through their legislative representatives. We sincerely hope that you will, without delay, present to the nation the seriousness of the situation. Your article and others which appeared in the *Air Force Times* and the *Army, Navy, Air Force Journal* are sorely needed to properly illuminate military housing requirements.

We are grateful for your efforts, and we hope that your presentation will evoke strong interest and support.

Brig. Gen. Horace M. Wade
Director of Personnel
Hq. SAC
Offutt AFB, Neb.

*Gentlemen:* Please accept my sincere congratulations for your outstanding article on housing. . . . It was an excellent analysis of the problem, and I hope will induce some remedial action in line with your proposals.

Brig. Gen. Dale O. Smith
Commander
Hq. 313th Air Division
APO, San Francisco, Calif.

*Gentlemen:* The article on housing was very good and indicates that there is "another side to the coin." Too frequently, we see in print brash statements of opposition to more Title VIII housing. Many of these stem from ignorance or avoidance of the cold, hard facts.

Our family housing problem is far from solved—we need more articles written to highlight it in terms meaningful to the interested citizen. Only in such terms can he evaluate for himself the validity of our urgent housing needs in lieu of possible hurried acceptance of any unsupportable clamor by local interests.

Brig. Gen. R. H. Curtin
Deputy Director for Real Property
Directorate of Civil Engineering, DCS/O
Washington, D. C.

*Gentlemen:* When I reported to my first duty station six months ago my reaction was, "My God, they can't expect Air Force families to live in huts like those!" These "huts" resembled ill-built, ill-kept garages. I, too, hope that Congress will realize the return in terms of satisfied, qualified personnel as opposed to the small investment.

March was a thoroughly excellent issue.

2d Lt. Christopher D. Koss
Hebo, Ore.

*Gentlemen:* . . . I enjoyed reading your story on Air Force housing and quite agree with your comments.

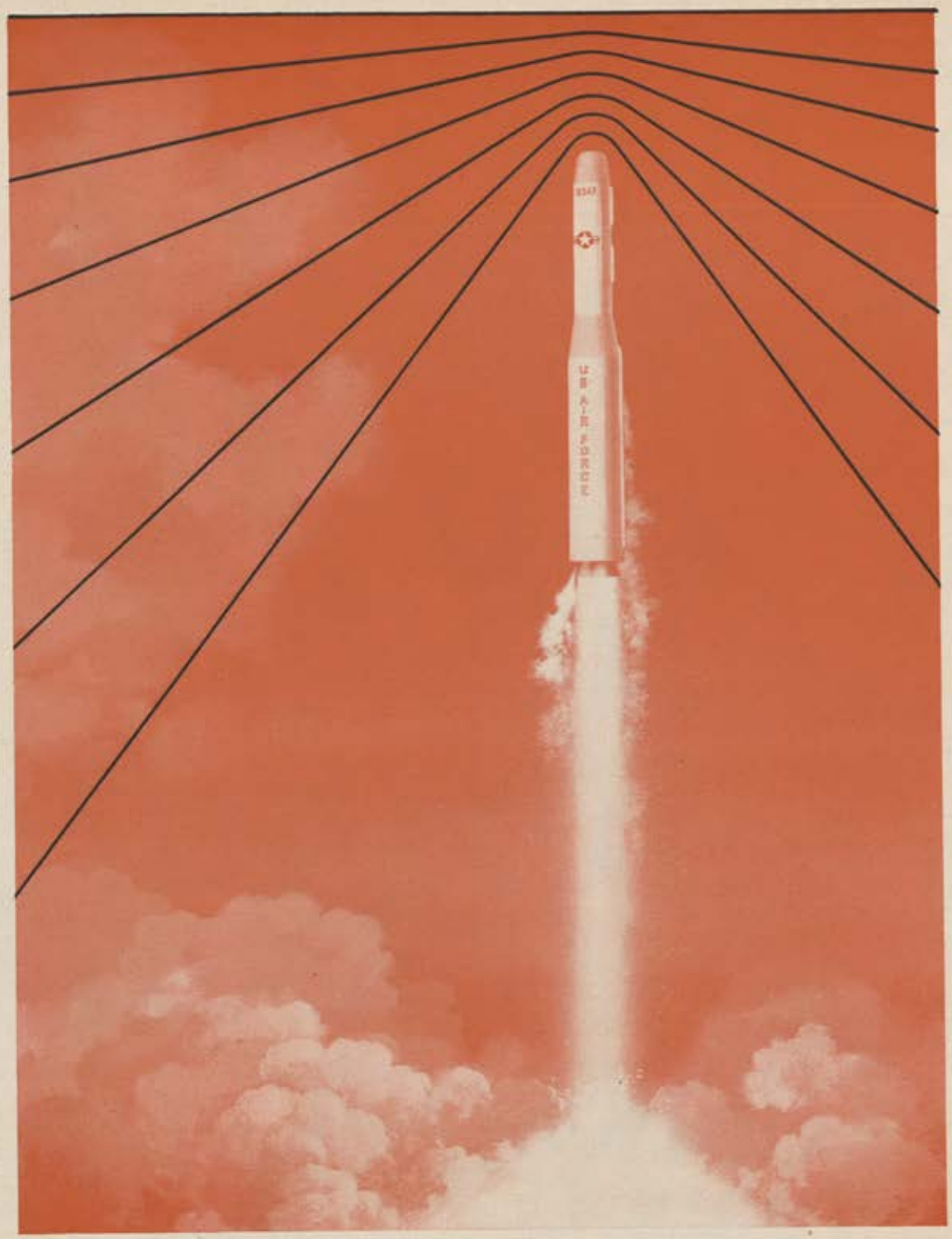
Articles such as this should help us in our efforts to obtain adequate housing with the attendant benefit of retention. . . .

Col. Jay P. Thomas
Commander
Malmstrom AFB, Mont.

*Gentlemen:* . . . Often when reading an article about which I have had firsthand knowledge of the facts, I have wondered, as I am sure you have, "Where in the world did this writer ever get his information?" Usually the facts are wrong, and the story just confuses the issue. However, your article was entirely accurate, and the housing problem with some proposed realistic solutions was succinctly presented. A job well done. If those in authority will carry the ball, we should receive some tangible benefits from your article. . . .

Maj. Wilbur L. Coats
Ent AFB, Colo.

*(Continued on page 13)*




***Titan nose cone from Avco*** — The recent flight of the Air Force Titan ICBM was achieved by the free world's most advanced rocket technologists. Avco scientists and engineers, pioneers in missile reentry work, are members of the Titan team. They are contributing a reentry vehicle designed to withstand the scorching friction during the reentry phase of the ICBM's planned intercontinental range flight. And now, Avco has been chosen as the associate contractor for the reentry vehicle of the next Air Force ICBM... the mighty, solid-fueled Minuteman.

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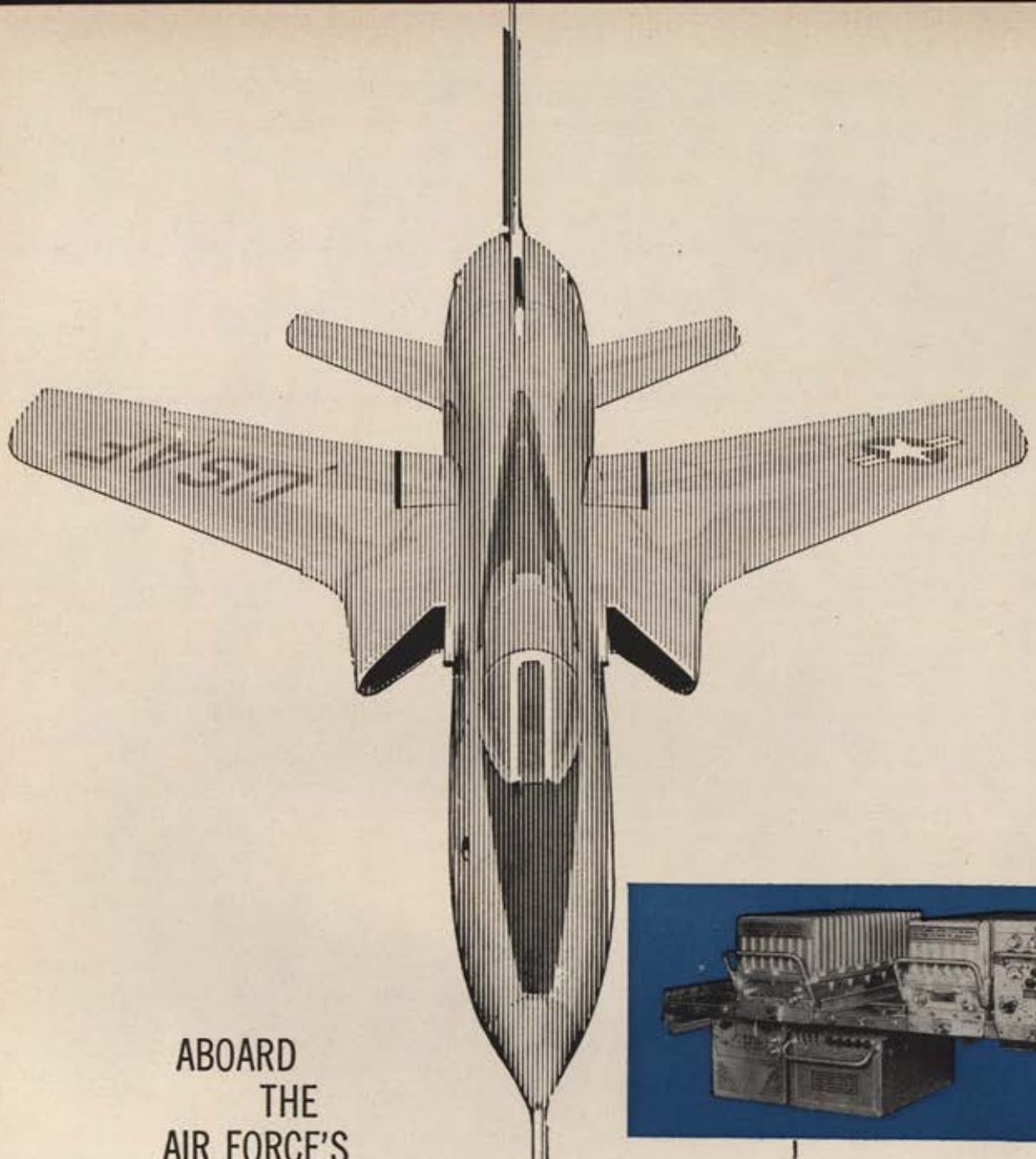

ABOARD
THE
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F-105

# COLLINS
# ELECTRONICS

In Republic's F-105 Thunderchief Fighter-Bomber, USAF's Tactical Air Command has a potent and versatile new aircraft — capable of striking at supersonic speeds with a variety of nuclear and conventional weapons.

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**Taiwan Strait Crisis**

*Gentlemen:* General Kuter has asked me to pass to you his appreciation and thanks for the extremely fine manner in which you presented his article on the crisis in the Taiwan Strait [March 1959].

In a recent letter the General said: "I want to have the story told not only for the benefit of the Air Force personnel who participated, but also for the many others who have direct interest in our brushes with the Communists. AIR FORCE Magazine was an excellent vehicle to accomplish this."

I agree wholeheartedly with these comments. In my opinion, you have done both our country and the military establishment a valuable service by making General Kuter's article a matter of public record.

Maj. Gen. Arno H. Luehman
Dir. of Information Services, USAF
Washington, D.C.

**Some Who Did Get Mad**

*Gentlemen:* In my mind there is a big question mark against the statement "No One Gets Mad Any More," inasmuch as a lot of thinking people I know have been harboring a slow burn ever since the Russians forced us to use the Berlin Airlift.

What is the slow burn about? Well, it is this: In two world wars the United States had mobilized (a bit late, perhaps) the forces which had been decisive in procuring a victory; and while we lost the touch during the Korean War, this was because the gamble was too close to the ultimate to risk losing millions as against the thousands who did make the big sacrifice.

This slow burn represents bitter resentment at the inability of our elected and appointed leaders to do a better job in winning the cold war, because those who think know that we have the brains and the resources to win the cold war decisively.

Why do we not organize as thoroughly now as we would if we were in a hot war to rid ourselves of this perpetual source of deep annoyance and resentment we all feel at having to tolerate the Moscovite tactics?

Every organization *inevitably* takes on the color and character of its boss, because, willy-nilly, this is where the leadership must come from if it is ever to come at all. Perhaps if we had a few more people like Gavin, who quit rather than go on with a policy he could not subscribe to, we would make more progress. Maybe the national backbone is degenerating into tripe rather than remaining the tempered steel rod which it has been in the past.

No, Mr. Editor. With this threat eternally before us, do I make my point clear about a slow burn? And how about retracting that statement that *No One Gets Mad Any More?*

Capt. R. E. Harrison, USNR (Ret.)
Washington, D. C.

*Gentlemen:* . . . I heartily agree with your comments regarding the apathy with which the American public receives news of those who have given their lives in the cold war. To the country at large, the suffering and death of war has again become impersonal. In most cases, except where the family circle has been touched, improper focus is given to the cause for which these individuals have died.

Gen. Thomas D. White
Chief of Staff, USAF
Washington, D.C.

*Gentlemen:* I don't agree with your editorial "No One Gets Mad Any More. . . ."

People did get mad. They threw eggs at Mikoyan before they even knew about the C-130. What did they get for their pains? Dragged off to the local bastille and a slap on the wrist from even our commander in chief.

Some news media did raise hell over this incident. Even before September 2, *US News and World Report* ran the tabulation of airmen who had been sacrificed, via Soviet gunsights, in the name of peace.

What's wrong? It isn't the people. They're riled up enough. Our State Department, our allies, the UN, and various US government bureaus insulate the "mad" of the people.

I may be prejudiced by having been shot at over Cologne, Schweinfurt, Madgeburg, etc., but I just don't think the people agree with our bureaucrats.

L. S. Abbott
Wichita, Kan.

*Gentlemen:* Your editorial about people who don't listen to the facts about today's situation was good. Made me think back to the time I returned from the Mideast.

When I talked about Soviet influence, people asked me how I liked the food out there. When I mentioned religious rivalries, people asked if everybody had five wives and were they good-looking. When I talked about inflated native currency, I was asked how far the Arabian oil wells were from Istanbul.

So I gave up talking to await the day when the pocketbook will be hurt and perhaps the boy next door killed.

The other evening I sat in my civilian suit between two society matrons of influential caste. The one on my left kept referring to me as Army. I said, "I'm Air Force."

"Well, aren't they the same?" she asked.

The lady on my right then chipped in to say, "Of course not, dear. The Air Force is separate. They wear blue."

"Oh, is that so? They must look cute," said the lady on my left.

And the lady on my right said, "They do. I simply love the Air Force men in their blue."

Then this female supporter of Air Force blue asked me, "Do you have any children?"

And I said, "Yes, one of them has 1,400 hours of jet time."

And she said, "My goodness, that's dangerous. Aren't you frightened? I should think that with your high rank you could get him out of it."

So I said, "He's crazy about the Air Force. It's his way of life."

Then the lady on my left said, "My, I'm worried about the young people of today. They do the craziest things."

At that time I got up and disappeared into the bar. My wife, who had been listening, joined me. . . .

Col. E. G. Morrison
San Francisco, Calif.

*Gentlemen:* . . . How come the staff of AIR FORCE/SPACE DIGEST wields such a potent typewriter? So help me, the lead editorial in March, "No One Gets Mad Any More," should be framed. And, I find I have developed a habit of looking for Claude Witze's byline when I pick up your magazine so I can start reading without bothering to see what he is going to write about. I know it will be good. . . .

Arthur H. Stewart
Toronto, Canada

**That None Shall be Forgotten**

*Gentlemen:* Thank you for . . . "No One Gets Mad Any More."

You treated the subject exceedingly well, and I read it with special interest since I have given considerable thought to our own combat crews who, in peacetime, have lost their lives in maintaining our national deterrent posture.

You may be interested to know that I have established only recently a "Memorialization Program" to ensure that our combat crews who were killed in the performance of their hazardous flight duty will not go

*(Continued on following page)*

unrecognized. On Sunday, March 15, we held in chapels throughout the command the first annual "SAC Memorial Observance Day."

Along the same line we are having a special stained-glass window designed which will be installed in the Offutt chapel in recognition of the high esteem we hold for those who gave their lives, and to the living who continue to wage the peace.

We hope that our annual memorial observance will become a treasured part of our command tradition in order that our heroic combat crew professional force will in this small way be accorded the honor they justly deserve.

Gen. Thomas S. Power
Commander in Chief, SAC
Offutt AFB, Neb.

### Yes, We Have

*Gentlemen:* What I want to know is: Have you gotten a copy of General Fellers' article "Where We Stand," [March '59 issue] on the desk of every senator and congressman in that town of yours? They will not take the time to hunt it out of the magazine but I think you should take the time to put a copy on every desk of every one of those fellows.

Roscoe Turner
Indianapolis, Ind.

### SSE

*Gentlemen:* I have just finished reading my March issue of AIR FORCE/SPACE DIGEST. The article in SPACE DIGEST by Donald W. Douglas titled "Space, Science, and Education" is, in my opinion, the best! Certainly this man should have an opportunity to talk to educators. . . .

Donald F. Kline
Nebraska State Education Assoc.
Lincoln, Neb.

### Ninety Days Only

*Gentlemen:* Thank you very much for the fine article, "Quality Control—For the Men as Well as the Machines," which appeared in the March issue of your magazine. This article will be of definite assistance in our campaign to obtain the highest quality personnel available for service in the USAF.

Maj. Gen. E. S. Ligon, Jr.,
Commander
Hq. 3500th USAF Recruiting Wing
Wright-Patterson AFB, Ohio

*Gentlemen:* There were a couple of small discrepancies in your article, "Quality Control—For the Men as Well as the Machine," and to avoid

*(Continued on page 28)*

# Temco | AIRCRAFT DALLAS


## NAVAL AVIATION MAKES HISTORY

### *with ALL-JET TRAINING*

NAVCAD Earland R. Clark of Stroudsburg, Pa., receiving congratulations from Rear Admiral Joseph M. Carson, Chief of Naval Air Basic Training.

On March 13 at the Naval Air Basic Training Center, Saufley Field, Pensacola, Florida, the first student pilot in Naval Aviation history soloed a primary jet aircraft — without previous propeller-driven aircraft experience. The flight was made in a TT-1 "Pinto" — designed specifically by Temco for all-jet training.

The first primary jet trainer ever purchased by any of the U. S. military services, the Pinto is designed for today's jet age. It is built closely along the lines of high-performance jet fighter aircraft and gives the student pilot the "feel" of jet training from the very beginning.

With its high safety standards, fine handling characteristics, optimum maintenance provisions and overall reliability, the Pinto is an ideal primary jet trainer. From initial cost to operation and maintenance, it is designed to provide better pilots at less cost, in less time. All in all, it gives the Navy a decided edge in the ever-advancing pace of military jet aviation.

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# REGISTER NOW...

# AFA's 1959 Convention

# Aerospace Panorama

**MIAMI BEACH • FLORIDA**

**SEPTEMBER 3 - 4 - 5 - 6**

*Miami Beach Auditorium, left, where Industry Briefings and Reserve Seminar will be held. New Exhibition Hall, right, site of AFA's Aerospace Panorama.*

*Seville Hotel, where AFA Business Sessions will be held, is in foreground. Fontainebleau and Eden Roc Hotels are shown in the extreme upper left corner.*

# The Program

**• WEDNESDAY—SEPTEMBER 2:**

6:00 PM AFA Directors Dinner Meeting*

8:00 PM AFA Leaders Meeting*

**• THURSDAY—SEPTEMBER 3:**

9:00 AM Reserve Forces Seminar

12:00 N AFA Honors Luncheon

3:00 PM 1st AFA Business Session

7:00 PM Panorama Preview Reception

**• FRIDAY—SEPTEMBER 4:**

9:00 AM 2nd AFA Business Session

9:30 AM 1st Industry Briefing**

11:30 AM Industry Buffet Luncheon**

2:00 PM 3rd AFA Business Session

2:30 PM 2nd Industry Briefing**

7:30 PM Annual Banquet

**• SATURDAY—SEPTEMBER 5:**

9:00 AM Symposium

12:30 PM Aerospace Luncheon

7:00 PM Air Force Reunion & Seafood Safari

**• SUNDAY—SEPTEMBER 6:**

1:00 PM Panorama Open to Public

* Closed Events.

** Not included in registration fee.

REGISTRATION FEE—$25 Per Person

LISTED to the left is the program for the Air Force Association's 1959 National Convention and Aerospace Panorama, to be held in Miami Beach, Florida, September 3-6, Labor Day week-end. You will note that the schedule is quite different than for previous AFA Conventions. The Convention actually ends Saturday night, September 5, with the major social event of the Convention—the Air Force Reunion and Seafood Safari. Previously, the Convention has ended on Sunday, with a brunch. The brunch now becomes the AFA Honors Luncheon on Thursday, September 3. The Panorama will remain open on Sunday, September 6, to enable the many Labor Day visitors to view the displays. It is undetermined whether or not the Panorama will be open on Labor Day.

The 1959 program schedule is designed so that those who bring the family to the Convention can remain in Miami Beach over Labor Day; or, those who wish can fly home Sunday and spend Labor Day with the family.

Thousands of Air Force personnel trained for World War II in Miami Beach. The Air Force Reunion Saturday night will bring back many memories of those days and will make it possible to renew many of the friendships made while serving together. Why not make the trip to sunny Florida a real double-barreled, family affair—attend the AFA Convention and spend a Labor Day vacation on the beach.

Complete, Clip, Attach Payment, and Mail to AFA Today

**ADVANCE REGISTRATION FORM FOR 1959 AFA CONVENTION**

NAME ..... RANK, IF MIL .....

TITLE .....

AFFILIATION .....

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CITY & STATE .....

*Identify me with the following group in the attendance record:*

( ) INDUSTRY ( ) SCIENCE ( ) AFA

( ) GOVERNMENT ( ) EDUCATION

( ) MILITARY ( ) PRESS-RADIO-TV OTHER .....

*Check the type(s) registration desired, attach payment, and forward to AFA, 324 Mills Building, Washington 6, D. C.*

( ) MEN'S REGISTRATION ..... $25

( ) LADIES' REGISTRATION ..... $25 TOTAL $.....

Baby, too, enjoys Northeast Airlines' *special* touch of folksy New England hospitality now spanning skies from Montreal to Miami!

Harry Archer, Champion, discusses with Tony DellaCroces, NE Engine Overhaul Foreman, and Doug Sperry, Powerplant Engineer, how Champion solved a serious problem for Northeast.


They flew NE's first Tri-motors, blazed NE's wartime polar route to Europe, now fly NE's Florida run: Hazen R. Bean, Milton H. Anderson, "living legends" with millions of miles of experience.

# A Vow — and How!

*An inside report on Northeast Airlines . . . another in a series on why the world's airlines, like business fleets, use Champion All-Weather Spark Plugs*

by HERB FISHER

international aviation authority, veteran test pilot, author

A quarter-century ago, a handful of aviation faithfuls congregated on a dirt airstrip under empty New England skies. A leather-helmeted young lady named Amelia Earhart chatted with some fellows named Paul Collins, Gene Vidal, Sam Solomon, Laurence Whittemore. Nearby, a couple of boyish aviators named Milton H. Anderson and Hazen R. Bean cranked away at two second-hand Stinson Tri-motors. Engines whined, roared, warmed . . . and the first load of paying Bostonians rattled skyward on wings of promise.

These visionary airline founders made a vow that August afternoon in 1933. They swore to perpetuate, always, along skyways between *any* cities, a special tradition of New England hospitality and service. They knew the destiny of their airline depended on it—during days of selling New Englanders on flying as well as later, when skies would glitter with competitive wings.

Today, a *singular institution of New England hospitality and service* spans the skies from Montreal to Miami: Northeast Airlines.

A pleasant surprise to even the most experienced travelers is Northeast's unique "*first-class*" service—wide two-abreast seating included!—at *low coach fares*. Pridefully NE acclaims it the only such service, night and day, on the east coast Florida route. Backbone of this hospitality airlift is a balanced short-haul, long-haul fleet—*truly* customized DC-6B Sunliners, zippy jet-prop Viscounts, modernized DC-3's—serving a balanced route structure with the greatest passenger density of any market in the world on its major leg.

Under four presidents—Collins, Solomon, George E. Gardner and my old friend James W. Austin—NE has grown from railroad ownership and government subsidy to major stature among the world's airlines. Northeast

Just a small fraction of the bevy of beauties enhancing Northeast Airlines hospitality aloft!


President James W. Austin, one of America's foremost transportation executives and inaugurator of many airline industry "firsts," chats with Herb Fisher alongside Northeast Viscount at Idlewild.


Night and the music—of precision maintenance at one of NE's several DC-6B and Viscount hangars. (A new $2½-million airframe and engine overhaul hangar is under construction at Boston headquarters.)

now racks up more mileage in three days than its two Stinsons flew that entire first year—and carries in a single day more than twice as many passengers as the whole whoppin' 1,904 carried the first year of operation!

Flying without communication, weather and navigation facilities, NE first linked (via cow-pasture airports) New England's far-flung population and resort centers. Then, in 1936, came devastating floods: Northeast flew mercy missions the clock around—medicine, food, evacuees. Endeared in the hearts of New Englanders, NE thus became an accepted part of the rock-bound tradition it had sworn to perpetuate aloft.

War came. Northeast immediately volunteered four-fifths of its equipment and personnel. NE uprooted materiel throughout New England, establishing airports, communications facilities and navigation aids on a pioneer North Atlantic route to Europe. Men and equipment were taxed for all their abilities acquired in combatting New England winters. Untold hazard and unsung heroism along this route—and on another route Northeast blazed across the pole—was noted by the Air Force in a special citation for "pioneering service beyond the call of duty." Stateside, remaining Northeast experts conducted advanced training schools for multi-engine pilots and navigators . . .

Northeast emerged from the war with priceless operational know-how—know-how gained from flying the world's worst weather and from perfecting maintenance techniques. With Atlas Corporation the major investor, NE spent millions in post-war expansion of equipment, routes and maintenance facilities, now, under President Jim Austin, ranking as America's fastest growing airline (increased seat-miles and equipment)—and one of the most modern. Climaxing long effort, NE recently was awarded its routes to several strategic points in Florida—and carried 100,000 passengers the first 12 months, tripling its previous traffic volume! The past year, NE added to its several new east coast maintenance stations a 38,000-sq.-ft. facility at Miami International Airport, for maintenance of four-engine aircraft . . . and at the moment is engaged in construction of a $2½-million hangar and five-story office building tying into the existing million-dollar Amelia Earhart Hangar at Logan International Airport, Boston. This maintenance structure will accommodate every size and type of aircraft going.

When NE ordered its big new DC-6B Sunliner fleet, it called for *custom-built* jobs with special features—wide two-abreast seating in coach configuration . . . 30 per cent more soundproofing than the standard DC-6B . . . dual-scope radar . . . and NE *specified* Champions as original-equipment spark plugs for the vital life-beat of the engines.

Why this?

"Because *we must* have *dependable* aircraft to meet increasingly high standards of on-time service," W. W. Mies, Assistant Vice President, Engineering and Maintenance, told me. "Our men have flown and tested them all. But Champion all-weather plugs, sealing out moisture and contamination, have proved to be the answer for firing those engines reliably—from our damp New England cold to Florida's heat."

John A. Auskelis, Superintendent of Overhaul, and Tony DellaCroces, Engine Overhaul Foreman, explained that it was DC-3 engine problems four years ago that rather dramatically brought in the Champion ¾-20 all-weather plug: To get any kind of plug reliability at all under inclement New England weather conditions, NE had been forced to operate costly air-drying systems for ignition leads and spark plug barrels. Still, expensive unscheduled plug removals persisted. A cost-reduction program spurred efforts to remedy this situation. NE tried everything—including the ¾-20 all-weather plug.

Results were so—well, *terrific!* that the same plugs were put into other aircraft, even those with low-tension ignition systems. Results here more than justified costs of ignition re-work! And since then, the lower price of Champion all-weather plugs has added to more important benefits of much greater performance dependability—and much less unscheduled removals during the 750-hour plug life.

That's why NE *ordered* Champions with its DC-6B Sunliners! Along this extended route of the most prevailing bad weather anywhere in the country, Champion is a recognized vital factor in assuring a high tradition of New England service and hospitality!

Amelia Earhart—NE co-founder, member of Board of Directors and ace promoter—prepares her plane for journey to aviation immortality. —AP

Jacqueline Cochran, world's foremost aviatrix, prepares for takeoff in jet fighter. A member of NE's Board of Directors, she does man-sized job on the ground, too.

**CHAMPION SPARK PLUG COMPANY, TOLEDO 1, OHIO**

# AIRPOWER in the news

**Claude Witze**
SENIOR EDITOR

## The Space Hunt Is On

WASHINGTON, D.C.

As of early April there is an investigation of the national space effort under way. It is being conducted by Sen. Stuart Symington, a Missouri Democrat and former Air Force Secretary, who is rumored to have aspirations for a move to the other end of Pennsylvania Avenue. This is worthy of mention here as an important part of the background, because Mr. Symington is holding this probe more or less as a lieutenant of Sen. Lyndon B. Johnson, a Texas Democrat whose name also appears on most lists of men in the race for 1960. Mr. Symington heads a Subcommittee on Governmental Organization for Space Activities. It is an offshoot of the Senate Committee on Aeronautical and Space Sciences, a parent body headed by Mr. Johnson. If this is a handicap to the Symington effort, nobody has admitted it, but it is fairly clear from the early testimony that there are some stumbling blocks in the way.

To begin with, T. Keith Glennan, boss of the National Aeronautics and Space Administration, made it clear that the senators are not going to find out what the National Space Council is doing unless Dwight D. Eisenhower tells them or authorizes somebody else to do so. The proceedings, Mr. Glennan says, are not secret, and there is no reason he could give why the American people should not know what is going on. But there is the matter of executive privilege and the fact that the President likes to keep close counsel.

In the hearings this viewpoint by Mr. Glennan developed from an early committee effort to have the witness give them a picture of the over-all space program. He was able to give them an efficient outline of the NASA mission, and the record was made complete with all the pieces of paper that outline NASA's relations with the Department of Defense. Mr. Glennan said his agency has a well-formulated program that reaches ahead at least thirty-four months. It was equally clear from the words of Roy W. Johnson of the Pentagon's Advanced Research Projects Agency that Defense has an idea where it wants to go in the next six years. But there has been little evidence, so far, that there is any coordination between these programs. And this is a subject of major importance to the committee and the nation.

When he was pressed for a bill of particulars, Mr. Glennan said, "We may not have written it up in just so many words and said: 'Now, this is the program.'" But, he insisted, there is a program which the committee can learn all about if it will listen to NASA and ARPA witnesses and put the pieces together in its own staff. Needless to say, this approach is not the one the committee had in mind. After the first two days, it was evident that the senators suspected Mr. Eisenhower, who is the boss in these affairs, does not *have* an over-all space program. If our readers have been trying to get the picture in focus themselves, with the aid of our series on the National Space Effort in the SPACE DIGEST section of this magazine, they have some idea of the magnitude of the job.


Wide World Photos, Inc.

**Glennan and Symington and USAF's X-15: NASA has a program and ARPA has a program, but Senate will have to look at them separately to find out what the country is doing.**

ARPA's Mr. Johnson, who was the second major witness before the Symington inquiry, gave it as his opinion that it is "impossible to have one single space program." So far, the committee has not seen fit to deny this, but there has been an awful lot of wordage in public print about Russian successes being attributable to singleness of purpose.

## The Secret of Russian Progress

Last year Russia produced only one automobile for every fifty turned out in the United States, but it also built four machine tools for every one made in America. It is little facts like this that lurk overhead like a cloud of economic ions in the sky during the persistent efforts to prove that the Reds are trying to spend us to death. If they succeed, will it be because we bought too many weapons or too many autos?

It was only a few days after the commander of the Strategic Air Command warned of a risk to the "whole country" that Allen W. Dulles, Director of the Central Intelligence Agency, gave out some economic facts about the opposition. He pointed out, in an address to the Edison Electric Institute, that Moscow is devoting about twice as much of its gross national product to military ends as the United States.

"The USSR military effort," he declared, "as a proportion of GNP is greater than that of any nation in the world. Their continuous diversion of economic resources to military support is without parallel in peacetime history."

If Russia were a poor country this might not be a terrifying fact in its own right, but Mr. Dulles went on to cite some statistics on growth: In the past seven years Soviet industry has grown at the annual rate of nine and a half percent. Our own rate is closer to three and a half.

Then Mr. Dulles gave the secret of Soviet progress, which is one of the things a lot of Americans say they want to know:

"It lies," he says, "in the fact that the Kremlin leaders direct a far higher proportion of total resources to national policy purposes than does the United States."

If this is the secret, and we have no reason to doubt the CIA evaluation, it is difficult to understand the weight carried here by the George Humphrey school of American economic incapacity.

It already has been pointed out by such US authorities as the Committee for Economic Development that there is no limit to what we can afford except the limit fixed by what we *need* for national security. We think Mr. Dulles has added force to the argument.

## The Menace of Managed News

One of Washington's most distinguished newspaper reporters, a man who shares the apprehension we all know over the secrecy prevalent in government operations, told a congressional committee last year that he is equally concerned about a tendency to manage the news. There are a lot of examples in this town to illustrate what he is talking about, and one of the most flagrant took place in the Pentagon on March 19, 1959. In the rush of news on that day the incident was not adequately reported in the daily press. But it is worth the attention of every citizen and particularly of those who labor in and near the vineyards of the Department of Defense.

In addition to the "news management" aspect, one reason why this incident is important is that the central figure was Donald A. Quarles, the Deputy Secretary of Defense, who is expected to succeed Neil H. McElroy as Secretary within a short time. Mr. Quarles was forced to call a press conference dealing with Project Argus, the three atomic blasts in space fired last summer from a ship in the South Atlantic (*see page* 55). He did so with so much reluctance and with such poor preparation and poor grace that the meeting degenerated at times into what *Business Week* called a "fencing match" and a "sorry performance in public relations."

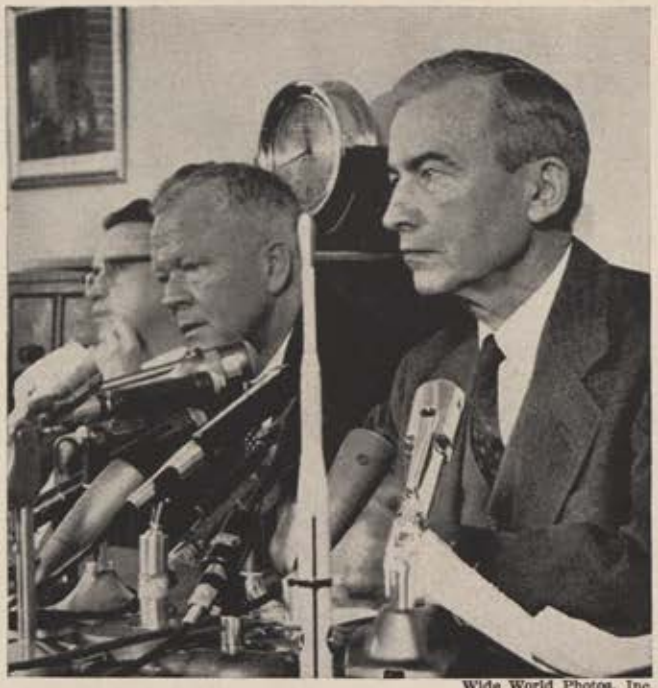
The background is simple. The tests were not publicly announced and remained a series of rumors for the more-or-less well informed until the esteemed New York *Times* decided it had enough of this nonsense and broke the story. The press conference—at which Mr. Quarles appeared with Dr. Herbert York, Director of Defense Research and Engineering, and Roy W. Johnson, ARPA director—was called the same day.

When he was asked why he waited for the *Times* to break the story, the Deputy Secretary said frankly, "We haven't had control of the timing of the thing the way I think it would be good for the government to have control of it, and we are making the best of the situation that confronts us this morning."

There was a question: "You mean you wouldn't be telling us anything about it if you had your way about it, Mr. Secretary?"

Mr. Quarles: "I might not be meeting with you this morning, and if I had met with you I doubt that I would have had more than a handful."

If there is any certain way to challenge and antagonize a group of competent reporters—and most of the Pentagon press corps qualifies for this listing—Mr. Quarles certainly hit the formula. With minor exceptions there was no matter



Wide World Photos, Inc.

**Deputy Defense Secretary Quarles presides. The subject: Project Argus. "You are anticipating the papers that are to be published, and we would prefer not to go into detail."**

of military security involved in this case. Yet the reasoning behind the handling of the news, which Mr. Quarles tried to explain, was enough to bring genuine sparks out of his audience and fill the room with tension.

Said the New York *Times* correspondent: "Well, now, Mr. Quarles, let me get this straight. Were these experiments not financed by the American people at taxpayer expense, and if this is true do not the results belong to the American people rather than the scientists?"

Mr. Quarles: "The results are not the property of the scientists. Of course, the scientists publish those things which we collectively judge to be in the interest of the American people to publish. There is no inherent right of publication and, in fact, the public interest will prevail in deciding what will be published. . . ."

The Deputy Secretary said, in effect, that the scientific journals would publish what the Administration thought was good for the public at some time in the future, when they get ready to publish it. And he told the regular press, which feels that it represents the people, that it would have to wait; he could not scoop the scientific publications by giving out the details. For the *Times* to have stepped out on its own under these circumstances, he contended, was not "playing the game with the Department of Defense just the way I would like to see it played."

In a further aggravation, Mr. Quarles told reporters that they could not address questions on Project Argus directly to Dr. York. They were to address their queries to the Deputy Secretary, and he would decide whether or not Dr. York could answer them.

The importance of this affair to contractors and persons attached to the Defense Department lies in the threat to technological progress that is contained in any effort to manage the disclosure of scientific information. There is a definite pattern emerging, in which an effort is made to time the announcement of major achievements so that they will have some effect, presumably good, on the carrying out of high-level policy. It is disturbing to know that this is condoned and practiced by officials at high levels who presume to pass on what the people should know.

*(Continued on following page)*

General Power: We got our strategic warning in 1848.

## The Force *Must* Be Mixed

*One of the elusive things in the national defense debate that has been going on this year has been a sound explanation of why both manned bombers and missiles must be part of the Strategic Air Command arsenal. There has been a disturbing sentiment in favor of dropping the manned bomber right where we are because there is a push-button weapon right around the corner.*

*An able correction of this misapprehension was made by SAC's boss, Gen. Thomas S. Power, in his testimony before the House Appropriations Subcommittee, where he expounded also on the philosophy of deterrence* (see page 9).

*General Power pointed out that the committee has to know why SAC needs a mixed force, at least in the foreseeable future. The reason, he said, is that our warning comes from radar, and radar is too good; it sometimes sees things that are not there. Here are his words:*

I . . . maintain that we got our first strategic warning in 1848 when Karl Marx and Friedrich Engels published the *Communist Manifesto*. The Communists told us what they were going to do, and they have been doing it ever since. They are accomplishing their goal. They have taken over a third of the people in this world and twenty-five percent of the geography. . . .

That is why we designed this manned alert force to be always under what we call positive control. Although we have not yet done it, we can launch this force; I have the authority to do so. But, mind you, I do not have the authority to drop an atomic weapon. Only one man in this country has that authority, and that is President Eisenhower.

However, I can launch this force if I think there is an emergency. There is no harm done. A force gets off the ground immediately. Nobody but people in SAC would know that I sent it out. There are no sirens blown or anything. They are launched.

They proceed on course toward their targets. Unless they get an additional instruction from me, which is passed in a secure, foolproof, and safe way, they return home; that is, unless they are told to go on.

This gives the civilian decision-making machinery a gift of an hour and a half—at least an hour and a half—to make their decision, because I do not have to get in touch with this force for an hour and a half, and no harm is done for that length of time.

Within that time period, if I do not get the decision to go to war because the warning should prove to be spurious, the force starts "failing safe," that is, returning home. This is why the manned force can live with these spurious signals.

Let me give you an example. Imagine it is a couple years from now. You know about the new missile-detecting radars, the "BMEWs," that are going in. Let us say the BMEWs are operational.

Let us imagine these BMEWs have been built, and it is 2:30 in the morning. The man operating the BMEWs has me on one end of the telephone and General Partridge on another circuit. The conversation goes like this:

"The radars have picked up 1,000 objects. The computer says they are ballistic missiles, and they will impact in the United States."

I have about twelve minutes left because it took him at least three minutes to do that.

What am I going to do?

I can launch the alert force. I wish you were out at Omaha right now so I could show you our control center and how we can get these airplanes notified in a matter of seconds, which is all it takes.

I will use the "hot line" to send off these airplanes. I will do that without any hesitancy because I know that, if this turns out to be a spurious signal, no harm is done. At worst, it is a fine training exercise. It can in no way cause an accidental war because nobody will really know about it. Certainly no Russian will know about it, because our aircraft would not approach Russian radars.

I will do this, as I said before, without any hesitancy. In this way, I will insure that this retaliatory force, the ground alert force, will not be destroyed.

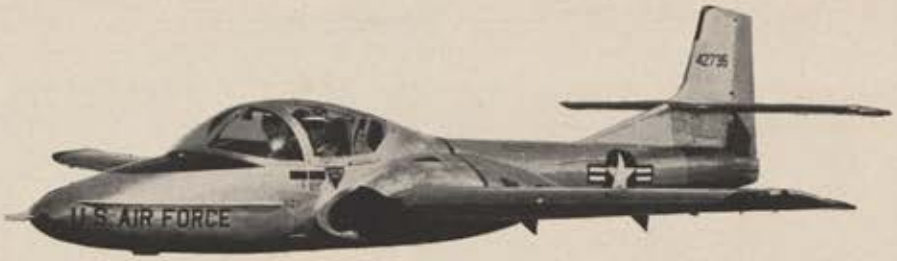
But in this time period we will also have a button whereby I can send the ICBMs on their way. I will have missiles at Vandenberg Air Force Base, Cheyenne, Offutt, Fairchild, and—I don't know whether Topeka will be in at that time or not, but let us assume it is.

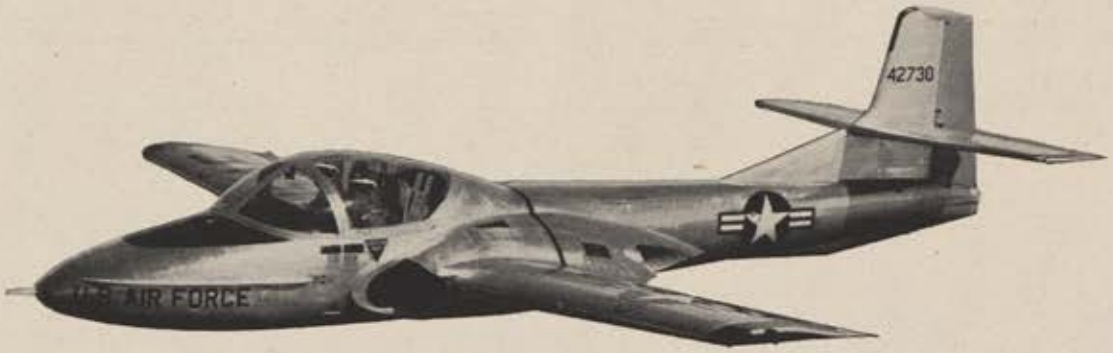
I can press that button and send the missiles on their way.

Do I want to do it, assuming I had authority to do so? Because sure as shooting, in another two or three minutes, this lad will say, "I am sorry, but those blips have disappeared off the scope." They were Sputniks, interference, or something like that. Therefore, I say the missile will have to ride out the attack.

I cannot see for the foreseeable future how we can launch them on the basis of radar detection alone. This is why their sites have to be hardened, and this is why they must be complemented with a manned bomber force that can get off the ground and insure survival.

Therefore, the manned bomber force insures its survival through getting warning and getting off the ground with that warning, while the missile force will have to rely on its ability to survive the attack. This is important when we consider the relationship between manned bombers and missiles. . . .—END




# Stepping up the pace of jet training...Cessna T-37


A firm foundation of an all-jet air force is an all-jet training program—and the U. S. Air Force is fast approaching that goal with Cessna's T-37. The high-altitude performance, high to low speeds, easy handling, and side-by-side seating of this twin-jet trainer permits a quicker, safer transition into combat jets. The big benefit: cadets learn faster while the Air Force achieves considerable savings in time and money. Cessna Aircraft Company, Wichita, Kansas.

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...NEWS IS HAPPENING AT NORTHROP

# RADIOPLANE PRODUCES FIRST COMBAT-READY SURVEILLANCE DRONES

## NEW SD-1 PROVIDES AN EYE IN THE SKY FOR ON-THE-SPOT BATTLEFIELD SURVEILLANCE

RADIOPLANE

In production and being delivered to the Army Signal Corps in operational quantities, the SD-1 is proved and ready to fly unmanned photo reconnaissance missions for tactical troops. Meeting tough Signal Corps standards, this Radioplane drone exemplifies Northrop Corporation's close cooperation with the U.S. Armed Services. Northrop-Armed Service teamwork provides an early awareness of future defense needs—enables a years-ahead start on vital research and development. Northrop management contributes cost-minded creativity, producing earlier effective answers to international defense problems – delivered at minimum cost.

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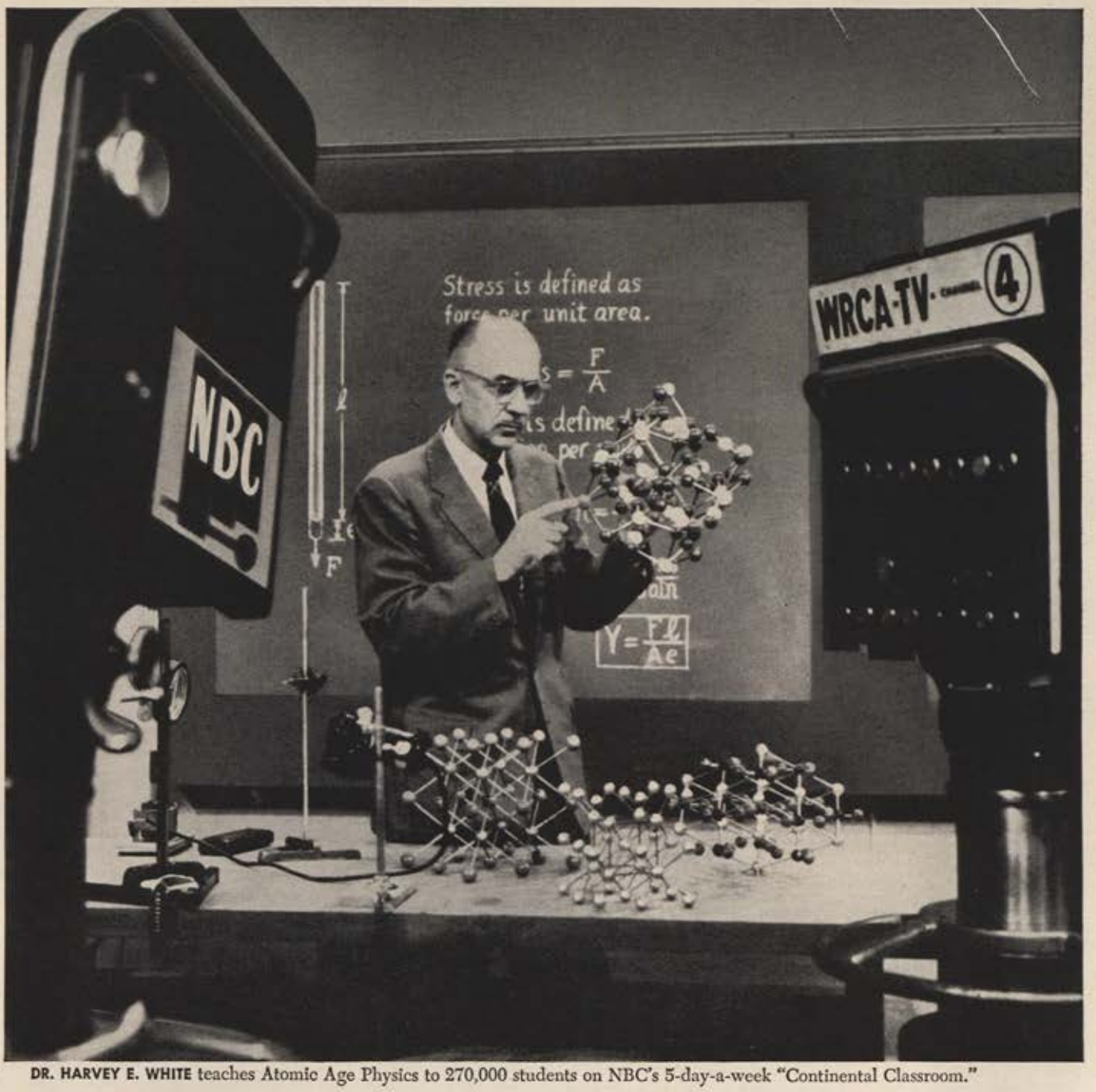
NORAIR




**DR. HARVEY E. WHITE** teaches Atomic Age Physics to 270,000 students on NBC's 5-day-a-week "Continental Classroom."

# RCA Electronics helps put new life into learning

Five years from now America's student population will approach 50 million—8 million above today's figure. By present standards there may be too few teachers and classrooms. But an important part of this problem will be solved *through electronics.*

Already, teachers are increasing student interest and covering ground faster with the help of such electronic aids as: RCA radios, records and record players, special audio-visual aids, TV, and tape recorders included in the "Language Laboratory Package." More than 200 colleges and secondary schools have installed closed-circuit TV to improve instructing techniques and spread top talent beyond the walls of a single classroom. Still other schools use the programs of America's 35 licensed educational TV stations—approximately 60% of which are RCA-equipped. Even at home, adults and youngsters alike are earning school credits through television.

Helping the teachers reach millions of students, providing communities with better schooling at the least cost are just a few of the ways RCA helps strengthen America—through electronics.

RCA RADIO CORPORATION OF AMERICA

# 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.*

Red China's ruthless drive to smash Tibetan resistance once and for all was based on top priority military considerations. Chinese technicians, working under Russian direction, are understood to be building intercontinental ballistic missile bases in high-altitude locations throughout the country, according to Eastern European sources.

Tibet's peculiar geography, externally and internally, makes it immensely valuable in today's strategic picture. High-altitude Tibetan ICBM bases could strike at free world bastions over a vast and vital area. They would also be comparatively impregnable, buried in secret mountain fastnesses.

Within 3,000 miles of Tibet are the Philippines and most of Southeast Asia including Formosa. Much of the Mideast, Australia and Japan are within 6,000-mile range.

• • •

Russia's buildup of key air and submarine bases in Albania continues. Focal points for this effort are air bases dotted across the small Balkan satellite and a major submarine base on the island of Saseno in the Bay of Valona.

The fields are equipped to handle MIG-15 and MIG-17 aircraft, both of which can use sod runways. Submarine pens at Saseno could regularly service eighty to 100 subs. Should the need arise, a sizable fleet of Red U-boats would thus be able to roam the Mediterranean with Saseno as their base.

The island would be no pushover for attackers. It has bomb-proof shelters for sub crews, antiaircraft emplacements, and runways for fighter aircraft.

Albania sits close to the center of the Mediterranean. It obviously occupies a position in Russian strategic thinking akin to that held by Malta for traditional British planners.

• • •

**Soviet proposals of military aid have spread to the Western Hemisphere. Russia some time ago offered to supply Argentina with MIG-15 fighters and TU-104, IL-12, and YAK-16 transports, and single-rotor helicopters. So far, Argentina isn't interested.**

• • •

Next major export move by Russia will be in electronics. Moscow is expected to offer a range of electronic equipment to foreign markets in the near future. Top items will be instruments to control machine tools, devices for spectrographic analysis, and various types of speed indicators for metal-cutting equipment. In exchange, the Russians want to buy equipment associated with chemical production, especially for the production of synthetic fibers and plastics. Russia has been conducting a crash program in the chemical field for some time—but it has proved disappointing.

In addition, both aluminum and oil products, thought as recently as 1952 to be bottlenecks in the Soviet military economy, will be offered for export in increased quantities by Russia this year. Aluminum has been in ample supply for at least three years, despite full-scale Soviet aircraft and missile programs. Russian oil, production of which has increased rapidly since the war, will be piped to the European satellites starting later this year. It also may be pushed outside the Communist world. Russian home consumption of oil is minimal; there are few private autos on Soviet roads.

• • •

More and more Soviet MIG-17s are being refitted as all-weather interceptors. The radar, a small unit, is situated at the central body of the air intake. The plane's armament remains unchanged in the all-weather configuration.

At the same time, the YAK-25 all-weather fighter, code-named Flashlight by NATO, is getting new missile armament. The fighter was formerly equipped with air-to-air missiles of the heat-seeking type with a range just under fifty miles. Practical firing range was less. New missiles going into the YAK-25s are said to have a range of about seventy-five miles.

YAK-25 missiles are carried in the underbelly of the airplane on a tray which is dropped into the airstream for firing purposes.

• • •

**There are at least six different versions of Russia's new delta-wing bomber, NATO code-named Bounder. One version was understood slated to become a test vehicle for the Soviet atomic reactor, whenever the latter actually is ready for testing. This version has been sitting at a Soviet flight test center near Moscow for some time.**

• • •

Both of the Soviet Union's turboprop medium transports —the AN-10 and IL-18—are now being used in the Arctic. The AN-10 "Flying Whale," designed by A. K. Antonov, operated there through the entire winter. This aircraft, suited to short, sod-covered fields, is designed primarily for operation in the more backward regions of the USSR. Both airplanes are receiving thorough in-service testing before entering regular Aeroflot service. This is in sharp contrast to the propaganda-productive TU-104, which was rushed into service as soon as possible after it came off the assembly line.

A number of TU-104 accidents taught the Russians a lesson. Decentralization remains a Russian theme. Reports on the nation's aircraft industry and in the field of scientific research are the latest illustrations of this fact.

About 700,000 person were employed last year at about 400 engine, airframe, and component plants in the Soviet Union. The figures outline more decentralized aircraft industry than this country's.

In scientific research, the sixteen Soviet republics are setting up miniature academies of sciences of their own. This is in keeping with a suggestion from the head of the Soviet Academy of Sciences in Moscow, A. N. Nesmeyanov.

The move aims to spark new competition among Soviet researchers. The Kremlin also is averse to having all its eggheads in one basket in the event of all-out war.

• • •

**NOTES: Red China is training women as pilots for both military and transport aircraft. . . . There are now 11,000 officers and men in the East German air force, with some 400 aircraft.**—END

any misunderstanding . . . the record should be set straight.

There are two discrepancies which require clarification. This article stated that second lieutenants will draw staff sergeant's pay for two years while taking specialized training, and then they will get Regular USAF commissions. Actually, trainees in this program will draw staff sergeant's pay only for the ninety-day period of training, at the end of which they will be commissioned as second lieutenants in the Reserve of the Air Force, drawing the standard pay and allowances of a second lieutenant. While serving their three-year tour of active duty, they will be eligible to compete for Regular commissions.

Thanks for relaying information concerning the Officers' Training School Program to your readers. We think the program is one of the finest ever offered college graduates. . . .

Capt. Gilbert E. Chinnock
Officers' Training School
Project Officer
Hq. 3500th USAF Recruiting Wing
Wright-Patterson AFB, Ohio

**Maj. Gen. Clements McMullen**

*Gentlemen:* The March article "Logistics Without Wheelbarrows" [p. 32], excerpted from one of the late Maj. Gen. Clements McMullen's letters to the editors, inspired me to make a few comments about this great man.

General McMullen described how he, along with two Mexican laborers, the operator of a tug towing a line of flats, and an engineer inside of the airplane to operate the electric hoists, unloaded forty tons of air freight from the XC-99 in thirty minutes. I was an amazed witness to this unloading job by a major general. This performance was typical of General McMullen's concern and interest in details of operations at the lower levels, even though the command and burdens of operation of the largest Air Materiel Area, San Antonio, were his. The employees at Kelly AFB today will attest and praise General McMullen's many years of economical, efficient, and outstanding management until his retirement in February 1954. Mechanized conveyor belts, overhead rails, and automatic supply trains, all designed and installed because of his foresight and desire for speedier movement of Air Force supplies, still operate in Kelly AFB supply and maintenance areas.

As one of the XC-99 pilots, and project officer, I was fortunate in becoming personally acquainted with General McMullen and frequently discussed the accomplishments and problems of this airplane in which he was vitally interested. Each meeting was an inspiring one. His suggestions for a better operation were continually forthcoming, and praise was not lacking when it was due. This frequent, direct contact with thousands of personnel throughout the San Antonio Air Materiel Area enabled him to be known to all as the general with active and positive leadership.

I humbly pay tribute to an Air Force great.

Capt. James M. Pittard, Jr.
Edwards AFB, Calif.

**Museum Pieces**

*Gentlemen:* The article, "Wanted: Old Airplanes," which appeared in the March 1959 edition of your magazine, is bringing in information from all parts of the globe on aircraft we want for the Air Force Museum. I am frankly a little amazed at the number of telegrams, letters, and phone calls we are receiving.

Colonel Glines did us a favor by writing the article, and the Air Force Association did us a larger favor by publishing the story. I cannot think of a better way of obtaining the aircraft we so sorely need to complete our collection. . . .

Maj. Robert L. Bryant, Jr.
Director, Air Force Museum
Wright-Patterson AFB, Ohio

**AF Reprint Distribution**

*Gentlemen:* Reprints of Claude Witze's very fine article, "Learning to Live with the Sonic Boom" [January '59], have been received here, and we agree that it fills a real need in our community relations effort.

You may rest assured that we are putting them to good use and that we are grateful to you and Mr. Witze for your thoughtful consideration of this Air Force problem.

Col. Julian B. Cross
Chief, Information Services
Air Materiel Command
Wright-Patterson AFB, Ohio

**Riding for a Fall**

*Gentlemen:* Concerning . . . the letter from Lt. Gen. George E. Stratemeyer in the March issue of AIR FORCE/SPACE DIGEST . . . I feel it's time for some "red-blooded American" to state "realistically" an all-important fact.

It is just such an arrogant and completely unwarranted attitude of superiority that has caused a large part of the world to hate us and open a sore made to order for the infectious germs, hate, fear, and resentment, which characterize Communist progaganda.

American brainpower and American genius are no better nor no worse than those of any other nation on earth, and the sooner we admit this the better. And whether General Stratemeyer "refuses to accept such statements" or not doesn't change the facts.

This attitude is identical to that of every nation that has ever attained world power—just before they had the living tar beaten out of them. It was our attitude just before the Japanese practically knocked us off the map in 1941. It was the same attitude of the Japanese that allowed us time to benefit from our resultant humility and come back to win. Unfortunately, we grew a swelled head which has been expanding ever since. And unless we immediately and swiftly reduce this swelling and cure this disease we won't even be a second-rate power regardless of where we stand as of this moment.

Howard P. Child
Colorado Springs, Colo.

**SOP for GOC**

*Gentlemen:* It was with some amazement that I read the letter in your March issue by J. E. T., Albany, Ga., regarding the CAP and the GOC. He apparently is highly uninformed regarding GOC operations.

Before he wrote, he should have found out that under standard AF operational procedures, the GOC reported *only* multijet bombers and jet fighters in groups of three or more, and no commercial jobs or even KC-97 tankers were reported. . . .

It is true the CAP flew some training missions over GOC posts. These were designed to test out terrain features over the particular area for low-level flights. In nine years I believe we had three such tests, and all under special operational orders from the AF Filter Center. We never reported CAP planes at any other time.

His assertion that the GOC reported only "a few planes" other than CAP flights would seem funny to any GOC member. Even with commercial and private planes out, we were kept quite busy.

We operated here for nine years under the White Plains and Albany Filter Centers, part of the New York and Boston Air Defense Sectors. We never reported CAP "puddle-jumpers" except under rare special orders.

L. M. Cook
Supervisor, USAF-GOC
Millerton, N.Y.

*spatial comprehension* . . .*

# capabilities

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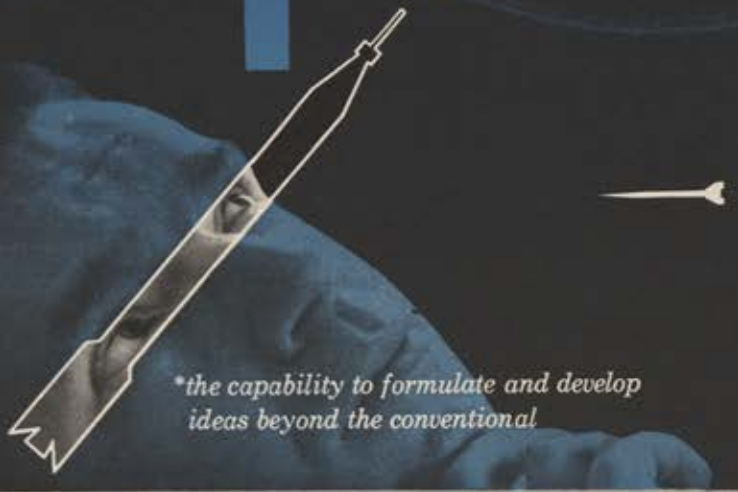

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# FLIGHT LINES

**Maj. Gen. Bernard A. Schriever, new commander of Air Research and Development Command, replaces Lt. Gen. Samuel Anderson, will soon have a third star. As commander of ARDC's Ballistic Missile Division, Schriever has been in charge of America's top-priority ballistic missiles program.**

Pilots may soon **hear emergency warnings** and directions from a voice-warning system being flight-tested at ARDC's **Wright Air Development Center.** Designed to replace present warning lights and horns, a **tape-recorded voice** is triggered in an emergency and **alerts the pilot to danger,** calmly reminding him of **standard emergency procedures.**

**Proficiency flying** by armed forces pilots **has been cut** by a Department of Defense directive expected to save the government an estimated $40 to $50 million a year. **New rules:** Annual review of **actual need** for flying officers; **reduction of required flying time;** annual **screening of individuals** for qualifications; **continued flight pay** for "selected individuals who have held aeronautical ratings for more than twenty years," without requiring them to fly.

The **Federal Aviation Agency** has **eliminated** three **Air Defense Identification Zones** (ADIZ) and relaxed flight requirements within remaining ADIZs. The **Western, Eastern, and Presque Isle** Identification Zones were discontinued as of April 1.

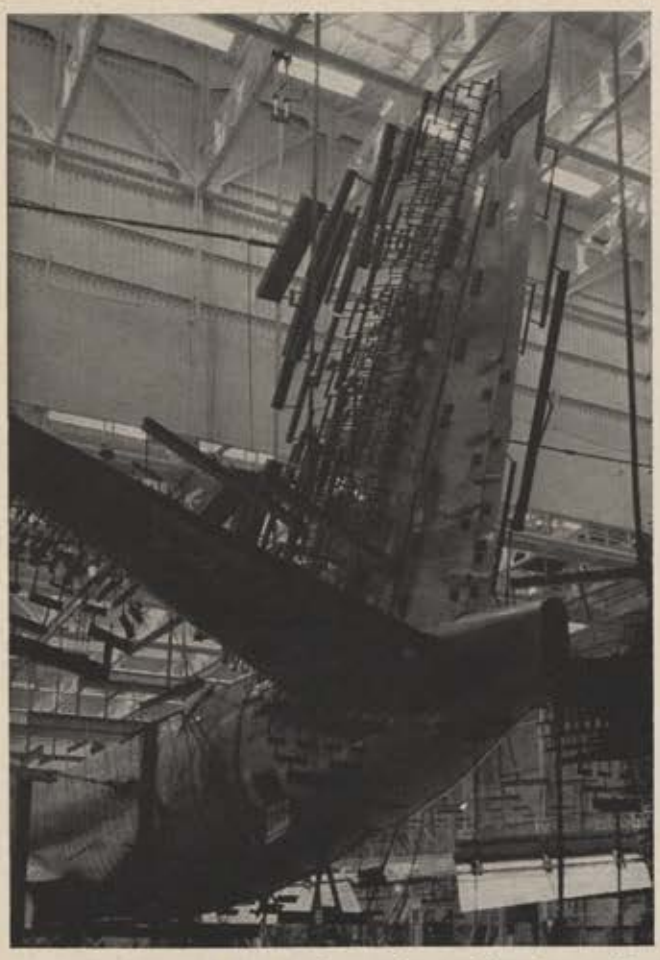
**Civil Air Patrol** began publishing a national **monthly newspaper,** *CAP Times,* in March. It will be **sent free** to all CAP members and to others for $1 a year. Its address is Army Times Publishing Co., 2020 M St., N.W., Washington 6, D.C.

Washington, D.C.'s **459th Troop Carrier Wing** has won **CONAC's 1958 Flying Safety Plaque** for the best flight safety record in the command. Wing commander is **Brig. Gen. Ramsay D. Potts, Jr.,** USAFR.

USAF has ordered an undisclosed number of **North American T-39 Sabreliners,** twin-jet utility trainers powered by GE J-85 turbojet engines.

The United States has agreed to **provide Pakistan** with seven or eight twin-jet **Martin B-57** night intruder light bombers. They are scheduled for delivery late this year or


**A scene from RUR? No, but almost. This is General Electric's new creature, "Handyman," developed by GE's Aircraft Nuclear Propulsion Department to handle radioactive objects, used behind seven-foot-thick concrete walls that protect the operator. Here Project Engineer Ralph Mosher manipulates Handyman in a demonstration of the robot's ability to clutch an object and simulate the action of the human hand.**



**The second Convair 880 off the production line is tested for stress with a force of sixteen tons against the tail surfaces.**

early next year as part of an **accelerated program of military aid** for Pakistan under the Mutual Security Act.

**PEOPLE . . . Gen. Nathan F. Twining,** USAF, has been named by President Eisenhower to **continue as Chairman of the Joint Chiefs of Staff** for another two years. **Gen. Thomas D. White,** USAF, and **Adm. Arleigh A. Burke,** USN, will also serve for additional terms as uniformed heads of their services. To replace retiring Army Chief of Staff **Gen. Maxwell D. Taylor,** the President has appointed **Gen. Lyman L. Lemnitzer,** General Taylor's Vice Chief of Staff. . . . In the office of the Secretary of Defense, **Philip LeBoutillier, Jr.,** has been named Deputy Assistant of Defense, to succeed **Cecil P. Milne,** who is the new Assistant Secretary of the Navy.

**STAFF CHANGES . . . Brig. Gen. Osmond J. Ritland,** who has been Maj. Gen. Bernard A. Schriever's deputy, will be the **new Commander of ARDC's Ballistic Missile Division** when General Schriever becomes chief of ARDC (*see opposite page*). . . . **Maj. Gen. Wiley D. Ganey,** former Assistant Vice Commander, Hq. ATC, Randolph AFB, Tex., has become Commander, Chanute Technical Training Center, ATC, Chanute AFB, Ill. . . . **Brig. Gen Thomas E. Moore,** who was Chief of Staff, Hq. ATC, Randolph AFB, has been reassigned to Sheppard Technical Training Center, ATC, Sheppard AFB, Tex., as Commander. . . . The new Commander of Amarillo Technical Training Center, ATC, Amarillo AFB, Tex., is **Brig. Gen. Charles H. Pottenger,** former Commander of the 315th Air Division (Combat Cargo), PACAF.

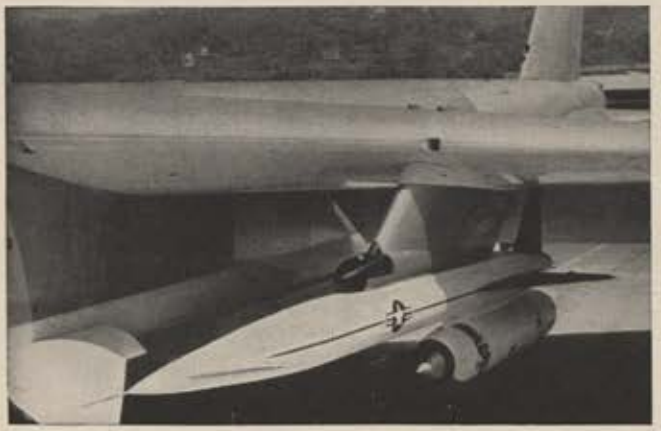
**Brig. Gen. Stanley Holtoner,** who was Commander, 832d Air Division, TAC, Cannon AFB, N. M., is the new Military Assistant to the Director of Defense Research and Engineering, Office of the Secretary of Defense, in the Pentagon, replacing **Brig. Gen. Robert H. Warren,** now Vice Commander, Hq. APGC, Eglin AFB, Fla. . . . **Brig. Gen. Frank B. James** has been reassigned from duty as Air Attaché, England, to become DCS/Intelligence, Hq. NORAD and Hq. CONAD, at Hq. ADC, Ent AFB, Colorado Springs, Colo. . . . **Brig. Gen. Travis M. Hetherington,** who was Chief, USAF Section, MAAG, Japan, is now Commander, 39th Air Division, PACAF, APO 919, San Francisco, Calif., replacing **Brig. Gen. James O. Guthrie,** who is the new Director of Development Planning, DCS/Development, Hq. USAF, Washington, D.C.

**Brig. Gen. John A. Hilger** has been reassigned from duty as Chief of the USAF Group, Joint Military Mission for Aid to Turkey, to become Chief of Staff, Allied AF Northern Europe, APO 85, N.Y. . . . **Brig. Gen. Jack G. Merrell,** former Deputy Director of Personnel Planning, DCS/Personnel, Hq. USAF, Washington, D.C., has been assigned as Deputy Commander, EASTAF, MATS, McGuire AFB, N.J.

—Michael B. Miller

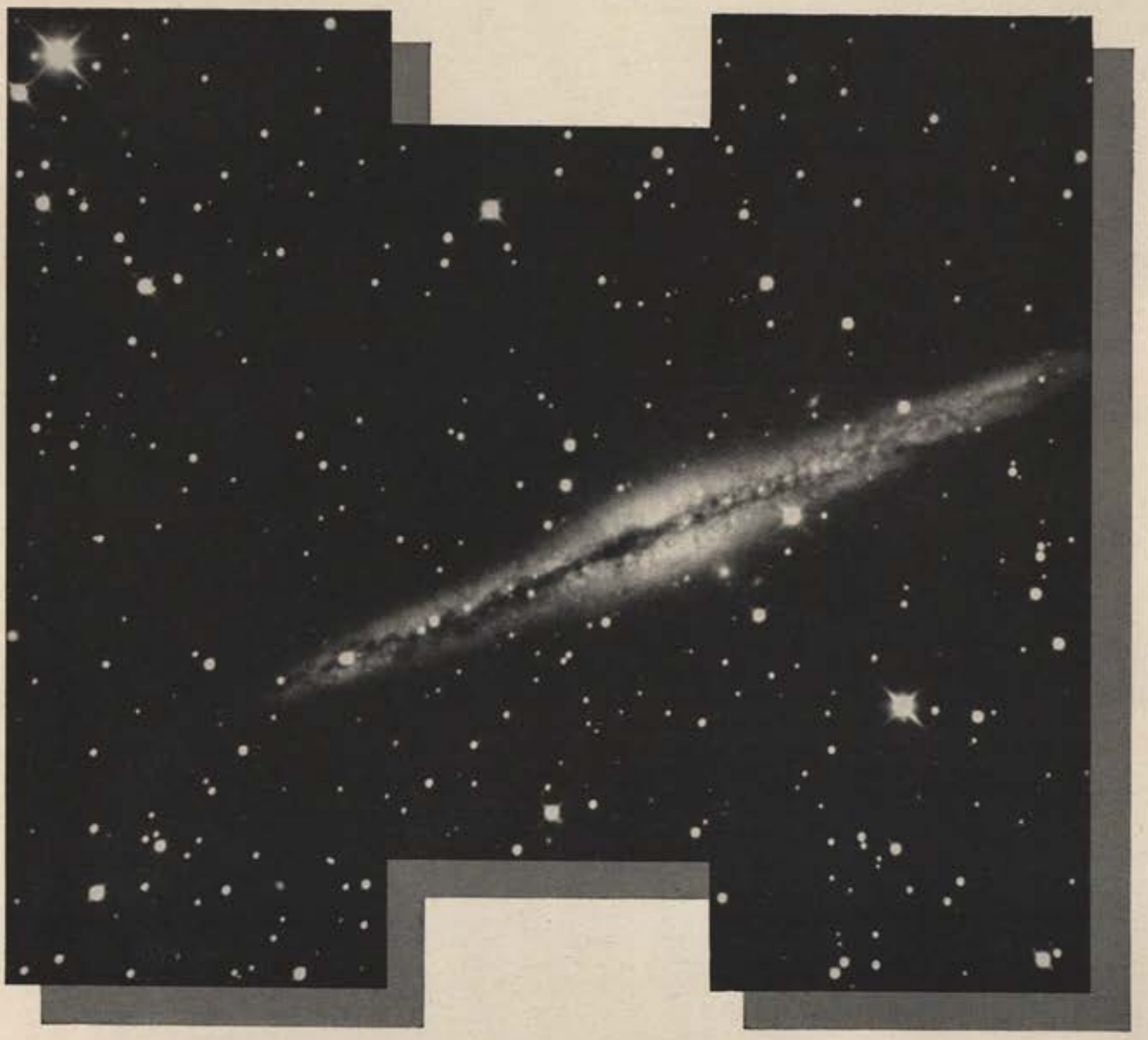
Davis Studio, Washington, D. C.

**Air Force chief scientists and assistants, "sorcerers and apprentices," pose at a recent dinner at the National Aviation Club, Washington, D.C. Seated, from left, Dr. Ivan A. Getting, Dr. Courtland D. Perkins, Richard E. Horner, Dr. James Doolittle, Dr. Joseph V. Charyk, Dr. George E. Valley, Dr. Louis N. Ridenour. Standing, Peter J. Schenk, Lt. Col. David W. Pearsall, Dr. Chalmers W. Sherwin, David T. Griggs, Dr. H. Guyford Stever, Col. Peter J. Taylor. Missing from the group, T. F. Walkowicz.**



**North American GAM-77 Hound Dog air-to-ground strategic missile currently under test, under the wing of a Boeing B-52.**

# THE SKY IS



# NO LONGER THE LIMIT

Under the water . . . on the water . . . on land . . . in the air . . . and far out into space . . . Hughes advanced technology is providing reliable electronics systems for many types of military applications.

In the space satellite field, for example, Hughes is active in the design of guidance and control systems and sensing devices using infrared, optical and radar techniques.

Communications and telemetry systems are under development which deflect their signals from meteors and artificial satellites. As part of this project, circuit modules have been developed which combine design simplification, lowered costs, and maximum part interchangeability.

A leader in radar, Hughes is building the Army's new Frescanar — a three-dimensional radar which is digitally programmed to instantly identify high-speed targets. It simultaneously gathers bearing, range and height information with one antenna of radical new design.

Other radar systems are now being developed for AICBM, early warning, missile guidance and air traffic control. Hughes is also working on integrated electronics systems for undersea warfare.

More than 30,000 people are devoting their energies to converting Hughes advances into reliable hardware. As the West's leader in advanced electronics, the many Hughes activities constitute a major contribution to our country's defense might.

**The wide range** of activity at the Hughes Fullerton facility extends from basic data processing and surveillance radar research through final design and packaging.

**Ferromagnetic studies** conducted by the Hughes Research Laboratories include fundamental research in the physics and chemistry of ferrites, synthesis of ferrite materials and development of ferromagnetic devices.

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# VIEWS & COMMENTS

## Semantics in the Cold War

*One of the biggest problems in fighting the diplomatic battles of the Cold War is the difference in the interpretation of the meaning of words used in common by both sides. Rear Adm. John E. Clark, Deputy Director of the Defense Department's Advanced Research Projects Agency, outlined this dilemma pointedly in a recent article, from which we have excerpted the following portion:*

THE first disadvantage we suffer in any negotiations with the Communists dealing with the term "peace" or "peaceful" is that we are largely incapable of understanding what they mean by the term. One of our seven fatal fallacies is our assumption that the Communist meaning of "peaceful" is the same as ours. In so assuming, we are laying the basis for suicide by semantics. In any negotiation they are never "sincere"—in our meaning of that word. They are, however, both constant and consistent. The Communists never deviate from their basic dogma that the social and economic structure of capitalistic nations inevitably generates war and that, consequently, "peace" can be achieved only by complete worldwide subjugation of capitalism and creation of a universal federation of "soviet socialist republics." Therefore, any action toward the conquest of capitalism is a peaceful action; similarly from this premise, any action by a capitalistic nation to preserve the *status quo*, or even to thwart the worldwide march of Communism to the extent necessary for its own survival, is warmongering.

Our own naive idea of "peace" is a sort of live-and-let-live status in which men are neither killed, tortured, starved, nor imprisoned en masse for political beliefs; in which neither life, nor liberty, nor property is forfeited without due process of law. These things, to us, are essential elements of living at peace. Yet, perversely, we will apparently support or attempt to buy anything—without any of these elements—so long as it is called "peace." We seem completely incapable of understanding, either intellectually or psychologically, that the Communist type of "peace" can be infinitely more terrifying and vicious than any "wars" we have thus far endured.

In "war" the prospective victims at least have a chance to fight back; in Communist "peace" it is always too late for that. The Communist countries and their slave states have enjoyed "peace" for some dozen years continuously now, yet the Hungarian Freedom Fighters could not really fight back against the massed tanks and mechanized might of the Russian Army. The millions of Russia's own Kulaks could not fight back against mass starvation-to-death imposed as an instrument of Communist Party policy. The scores of millions of Chinese peasants liquidated in the vast prelude to the ultimate slavery of peoples' communes had no chance to fight back against the benevolent "agrarian-reformer-not-real-Communist" masters. An estimated 14,000,000 in the year 1951 alone were liquidated; and more scores of millions to come will die, as foreshadowed by the Macao-verified machine gunning in mid-December 1958 of the pitiful resistance in the Sappa Island commune of Wanchai.

—*From "Programming for Space Defense," the* Judge Advocate General Journal, *USN, February 1959.*

## Is There Any Other Way?

*The present-day draft has been with us for nearly twenty years, from the old-fashioned "conventional war" days to the present age of nuclear deterrence, yet there has been little serious thinking about whether it is still the best approach, as the Milwaukee* Journal *points out:*

COMPULSORY military service, which used to stir up bitter public and congressional debate, seems now to be wholly acceptable. Almost apathetically, Congress voted the other day to extend the draft for four more years.

As it is administered, the draft is far from universal. Exemptions and liberal deferments make the law inequitable. But as yet no acceptable substitute has been found for providing military manpower in quantity. In 1947-48 the draft was suspended for fifteen months; in spite of costly efforts, recruiting fell 600,000 short of meeting a goal of two million men. Lt. Gen. Lewis Hershey, Selective Service Director, says that the draft's "hot breath" causes three or four young men to volunteer for every one inducted.

To many congressmen the draft also reflects America's determination to remain militarily strong. As Senator Russell (D.-Ga.) put it, the draft extension will "tell the Kremlin that the United States means what it says." And congressmen who have criticized President Eisenhower for insisting upon manpower cuts would scarcely be consistent if they let the draft law expire.

Where Congress showed a lack of wisdom, though, was in rejecting the proposal of Senators Case (R.-S. D.) and Morse (D.-Ore.) for a civilian commission to study alternatives to the draft. If the military trend continues toward less quantity but more quality of manpower, a better method will have to be developed so that the services can obtain—and keep—the men they need.

Perhaps President Eisenhower will make up for this congressional lapse. He has used presidential commissions on many occasions in the past—for example, in the study that led to overhaul of military pay scales. Even though the draft has four years more to run, it is not too early to start searching for an effective alternative.

—*Editorial which appeared in the Milwaukee* Journal, *edition of March 23, 1959, reprinted with permission.*

# There Still Is No Defense

*Project Argus or no, effective antimissile defense is still nowhere near around the corner. After the recent atomic blasts in space, there was much enthusiasm for the idea that "radiation" shields could protect against incoming missiles. W. Selove, who is associate professor of physics at the University of Pennsylvania, took strong exception to the idea of "radiation shields" in a recent letter to the editor of the Washington* Post and Times Herald, *which appeared in that newspaper April 5, 1959, and is reprinted here with special permission.*

MUCH public speculation on a possible radiation shield against missiles has followed recent reports on the "Argus" nuclear explosions above the atmosphere. Some news reports have supported the completely mistaken conclusion that a magic film of radiation may safeguard us from missile attack.

This mistaken conclusion could easily have been avoided by a more candid policy governing information release by the Defense Department or the President's Science Advisory Committee.

It is a delusion to think that a radiation film produced by nuclear explosions above the atmosphere can provide a shield against missiles. Even relatively large nuclear explosions, of such size that heavy fallout could result on the land below (the use of "clean" bombs would reduce fallout, but not eliminate it), would give only a tenuous layer of electrons, spread over the world.

For example, if 100 megatons of fission yield were released above the atmosphere, the strontium ninety level over an area of hundreds of thousands of square miles could be increased to ten times the present value, or more; yet the worldwide layer of electrons produced above the atmosphere would be so diffuse that it could be absorbed by a fraction of an inch of steel, and would raise the temperature of such a steel layer less than one degree. Destruction of an incoming missile, in other words, still requires close interception. . . .

It is sadly true that man's ancient faith in the suitability of war as an ultimate resort cannot be changed instantly. But unless the people and the governments make a real effort to understand the overwhelming effects of nuclear war and the fact that a real defense against intensive ICBM H-bomb attack does not exist and quite possibly never will, we shall probably stumble into devastation.

# The March of Automation

*Although many people talk cavalierly of missiles taking over the military show in its entirety—and doing it tomorrow—there is food for thought in the following discussion of the manned aircraft and its successor by Britain's retired Air Chief Marshal Sir R. Ivelaw-Chapman. The author points out that the human factor will always remain vital in the execution of military tasks and that the automated device will take over only those tasks that it can do with a reliability comparable with or better than the human operator. The Air Marshal's remarks are excerpted from a longer article, which was published in* Fifteen Nations, *during the time of the tenth anniversary of the formation of NATO.*

I THINK it safe to predict that the ballistic missile, partly because of its economy in operation and partly because, at present at any rate, no defense against it is known, will force its way into the forefront of the armories of all nations that anticipate being involved in nuclear war. Other nations will hang onto their manned bombers for as far into the future as it is wise to forecast. Those nations who consider they are liable to be involved in either nuclear or so-called "limited" war will have to keep a few manned bombers to fill the high explosive function.

This leaves the question as to *when* those nations who are set upon ballistic missiles as their main weapons will make the change-over. Personally I think that there is so much to perfect in this weapon that the change-over is going to be much later than many are predicting today. *I would put it as late as the end of the 1960s before any nation becomes predominantly reliant on the guided missile as the main offensive weapon in the air.*

That leaves us with the fighter. Here the prospect for an early swing-over to the guided weapon is more promising. Compared with the bomber, the time of flight is much shorter and so the technical problems of its development will be less. The prospects of economy in manpower, in initial cost, and in running cost all feature on the "credit" side. Admittedly the lack of human brain in the air is a disadvantage, particularly when in limited war the fighter may have to combine the role of "armed reconnaissance" with its main function; but the dictates of economy are likely to prevail in the long run.

I would predict, therefore, that the surface-to-air guided weapon will take "pride of place" in air defense just as soon as its technical development permits. Obviously so drastic a change will have to be spread over a number of years, but the movement has begun already and is likely to be completed amongst the major powers of the world by the period 1961 to 1964. Smaller nations may well take longer to affect the change-over since "armed reconnaissance" may rank so high among the roles of their fighter forces that they will be reluctant to replace these aircraft with an automatic weapon that cannot fulfill this function. To such nations the guided weapon may appear a luxury they cannot afford.

*To summarize, then, I think the manned aircraft is likely to be with us for all time in the transport and reconnaissance roles. In the bomber field it will remain predominant at least until the latter part of the next decade. Even after the ballistic missile has taken over the main offensive task from the manned bomber, the latter will still be needed by those nations that have a "limited" war commitment.*

On the fighter side, in *pure air defense* the guided weapon will complete its "take-over" from the manned fighter within four to six years from now; but where the fighter has to combine pure air defense with other roles, it is likely that the manned aircraft will be seen in circulation for many years beyond that period, and perhaps indefinitely.

## NUTSHELL

"Just what is space? Dr. James A. Van Allen . . . offers this definition . . . 'Space is the hole that we are in!'"
—New York *Herald Tribune*

# suit-ability

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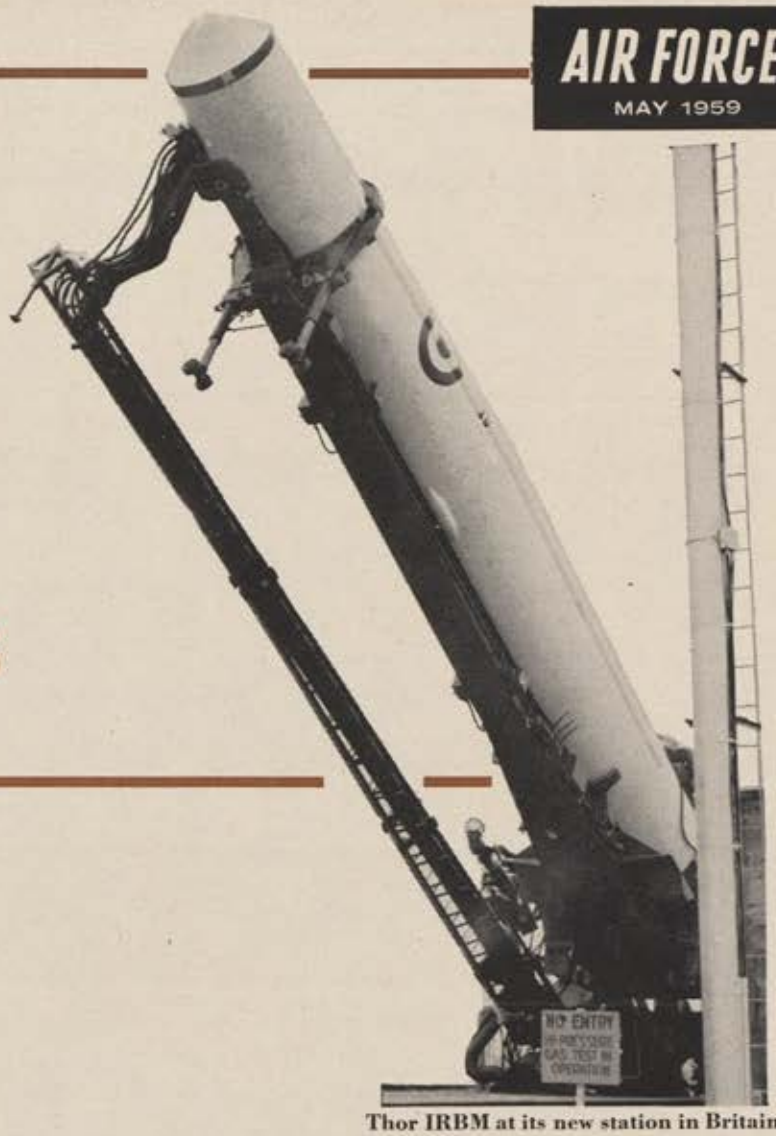
# THE THOR at Readiness

## *an exercise in partnership*

**Robert R. Rodwell**




**Thor IRBM at its new station in Britain.**

POISED on their launchers amid the flat wheatlands of eastern England, a small number of Douglas Thor intermediate-range ballistic missiles are now approaching operational service. They are the first ballistic weapons to form part of the free world's nuclear deterrent, but it is not that alone which makes these Thors unique, for they are the outcome of a two-nation partnership without precedent in United States Air Force history.

Developed and supplied by the United States, the Thors bear the red, white, and blue roundel of the Royal Air Force. They are operated by that service with training and technical assistance from the USAF, which retains control of the nuclear warheads. For the missiles to be fired in anger (and the proximity of Europe certainly precludes their being fired for practice) both the United States and British governments will have to signify consent.

The inauguration of Thor into service has not followed the pattern of any American weapon system before it. For the first time a major weapon has been supplied to a foreign power in advance of its supply to the United States armed services, and it is the first weapon system over which two nations exert operational control. Launch emplacements have been constructed and crew training started in the UK while research and development for it are still under way in the United States. New test data and information on modifications are constantly passing to the units overseas, and they in turn are feeding back information to those engaged in R&D. Its establishment in Britain has demanded massive airlift effort, radically new logistic concepts, and the smooth cooperation of numerous agencies, American and British. That the first Thor unit was built so soon after the inauguration of the program in February 1958 is proof that this cooperation has worked well.

It was in March 1957 that President Eisenhower and the British Prime Minister, Harold Macmillan, arrived at an agreement in Bermuda for the supply of ballistic missiles to Britain until such time as Britain produced her own. In the discussions that followed, Thor was selected as the missile to be provided.

The actual formal written Anglo-American Missile Agreement was signed in London in February 1958, one year after the Bermuda talks, by American and British representatives. The agreement provided for the training of RAF personnel in the United States, and for the USAF to retain custody of the nuclear warheads, in accordance with American law. It was made clear that, apart from the custody of the nuclear warheads, American participation would dwindle, after the establishment of the bases, to providing technical assistance through contractors' representatives and the necessary logistic support.

The speed with which Thor is being established in Britain is in no small measure due to a policy, adopted by both nations, of using the specialist staffs of existing military organizations to implement the Bermuda pact. Few new organizations have been created. Building on existing organizational foundations, in addition to saving time, has saved the taxpayers of both countries much expense.

*(Continued on following page)*

Before extensive work could begin on building the missile installations in Britain, technical understandings and agreements had to be arrived at in the wake of the initial agreement. These technical agreements were the outcome of long and frequent conference sessions involving both sides, and they laid down the procedures and responsibilities of the various participants. As construction of Thor sites in Britain was to run parallel with its development and testing in the United States, special provisions had to be made. One was that no handling procedures would be adopted in Britain without first being proven by the R&D workers in the United States. Certainly there were to be no test firings, or even static runs of the powerplants, in Britain. No Thor will ever rise from one of the British bases in anything but the last resort!

The 7th Air Division, that part of Strategic Air Command which operates from British bomber bases, was made the USAF supervisory organization for the Thor program, operating in concert with RAF Bomber Command and the British Air Ministry. Executive control is wielded by the 7th Air Division commander, Maj. Gen. William H. Blanchard, a gigantic man from Norwell, Mass. General Blanchard, when operations officer of the World War II Twentieth Air Force, prepared the operations plans for the first atomic bomb to be dropped on Hiroshima, and later commanded the world's first nuclear deterrent unit, the 509th Bombardment Wing.

General Blanchard used his existing SAC organization, which had established and was operating the SAC-UK complex of bomber bases, to forward the American responsibilities of the Thor program. Seventh's directorates and special staffs undertook the missile planning, personnel programming, and logistical and operating procedures in addition to their bomber forces responsibilities.

To coordinate the activities of the many Air Force agencies concerned and to monitor the progress of the joint US-UK effort, 7th Air Division did add a Directorate of Ballistic Missiles at its Ruislip, Middlesex, headquarters. To head the Directorate of about forty officers and airmen, General Blanchard named Col. George C. McDowell, who as early as 1944 served on the Joint Chiefs of Staff Committee on Guided Missiles.

The program, for an unrevealed number of missile bases, is being accomplished in three phases. The first installation, near Feltwell in Norfolk, commanded by Group Captain Andrew Willan, has reached the final phase, and there the first RAF unit to handle Thors, No. 77 (Ballistic Missile) Squadron, is based.

The first phase is the works services phase—the ditch-digging and concrete-pouring period. The basic construction of installations is done by British contractors working under the supervision of the British Air Ministry and the existing USAF works services organization in the United Kingdom, that of the Third Air Force headquarters, which is the 7th Air Division's newest neighbor at Ruislip. Third Air Force works services branch translates American constructional engineering specifications to British standards.

Following the first phase, the American civilian contractors' men move in for the assembly, installation, and check-out phase. The supervision of this part of the program is the responsibility of segments of Air Materiel Command working with representatives of the Air Research and Development Command in the combined Ballistic Missiles European Task Organization. BMETO rep-

**Far from home, Thor cautiously pokes nose out of British shed. Assembly line for this Thor bridged an ocean.**

**Right, Thor intermediate-range missile, newly-emblazoned with the Royal Air Force roundel, is raised in United Kingdom gantry during dry run. Densely populated Britian's proximity to European continent precludes test firing.**

**Below, another view of Britain-based Thor running through its limited paces. Thors are emplaced amid flat wheatlands of eastern England in keeping with formal Anglo-American Missile Agreement signed in London in February of 1958. Under it, joint consent of both nations is required for use of the missile.**

resents the major USAF ballistic missile agency, the Air Force Ballistic Missile Division, of Inglewood, Calif. The Thor service program has called for stronger ARDC participation than is normal with new weapon systems because it is still under development.

After satisfactory check-out of the missiles and their installations by the US contractors' representatives, working more or less as the final end of the assembly line, 7,000 miles from its start, the final phase—training, maintenance, and operating techniques—is entered.

For this, 7th Air Division has a field unit, the 672d Technical Training Squadron, commanded by Col. William A. Delahay. Until the RAF is able to undertake its own training commitment, Colonel Delahay's unit supervises the training of RAF personnel. Several hundred RAF officers and airmen have now been through courses at prime contractors' training schools in the United States, notably the Douglas Aircraft facility at Tucson, Ariz. Launching crews have been schooled at the SAC installation at Vandenberg AFB, Calif. The flow of these people to and from the schools is arranged by the UK Military Assistance Advisory Group (MAAG).

These United States-trained Britons are only now returning to Britain for duty with the RAF, and the personnel for the first missile squadron has largely been trained on the spot by contractors' representatives and USAF technicians, who themselves have completed contractors' courses in the United States, varying in length from three to twenty-four weeks. The 672d TT Squadron is also responsible, in the early stages, for the maintenance of the missiles and installations until there are sufficient trained RAF personnel to enable it to be withdrawn.

From the first base, Feltwell, 672d TTS is already withdrawing, to concentrate its efforts at other bases emerging from the installation and check-out phase. The squadron is leaving behind a small working detachment to fulfill the warhead custodian role.

To reach this stage at the first completed base, and to be moving towards it at the later installations, close liaison by all parties concerned has been necessary. "We have had a wonderful relationship with the RAF people appointed to manage the British side," said General Blanchard, "for everybody has been most cooperative." Probably much credit for this easy cooperation should go to General Blanchard who, from the time he was named chief adviser to the British for the missile program—and to sign the technical agreements for the USAF—has kept up a constant, close personal supervision of the main USAF/RAF joint coordinating committee and its six technical subcommittees: Works Services, Equipment, Communications, Training, Technical/Maintenance, and Operations. The work of these subcommittees, composed of specialists from both sides, has obviated much laborious staff work at higher levels.

On the British side, the program direction was under Air Marshal Sir Geoffrey Tuttle, the Deputy Chief of Air Staff. The ballistic missile squadrons being formed come under the operational control of a Bomber Command Group, alongside of the squadrons flying Victor bombers, latest of Britain's three-manned, four-jet V-bombers. The Group is commanded by Air Vice Marshal K. B. B. Cross, who is the Commander in Chief (Designate) of RAF Bomber Command, at present commanded by Air Chief Marshal Sir Harry Broadhurst.

*(Continued on following page)*


Airlift played major role in establishing Thor sites in Britain. Here C-124, Thor missile pose for Stateside shot.

SAC personnel in England examine model of Thor base used to brief top-level officers, visiting civilian officials.

## THE THOR AT READINESS

CONTINUED

If you ask which major US command has carried the heaviest burden in the young Thor program, the answer is the Military Air Transport Service—some 5,900 tons of it for the first RAF squadron formed! The logistics of the operation have thus far been based upon air transportation. In these early stages, where much of the equipment is preproduction, and spares backup may be lacking, the serviceability of individual items has often been critical, but MATS has made possible the very rapid flow of parts to Britain and the return of items for factory modification in the United States.

Approximately 300 C-124 Globemaster loads proved necessary to establish just one Thor squadron. Of these, about fifteen were needed for transporting the missiles themselves, the rest being made up of ground equipment. All this represented about 5,900 tons of materiel airlifted.

The English terminal for the Thor airlift has to date been the 7th Air Division bomber base at Lakenheath, in Suffolk, through which traffic has flowed for twenty-four hours a day. The effort at Lakenheath is now in decline, for the later installations will be supported by RAF airfields to which the delivery transports can fly direct. Sea transport will also be used more as time goes on, according to present plans. The Feltwell installation was built on an old grass flight training airfield, which had no surfaced runways for aircraft of the Globemaster's size, and everything had to be hauled the last few miles by road from Lakenheath.

So much for the air transportation needed to implement the Bermuda agreement; MATS was in on the program some time before it reached the airlift stage, for its Air Photographic and Charting Service was the agency responsible for the initial survey and charting of the missile locations.

Thors-for-Britain has meant more than the introduction into service of a new and untried weapon system; it has involved the introduction of completely new logistics concepts to give to the missiles the instant readiness that has for so long been SAC's business. The establishment of missile locations 7,000 miles from the centers of production has meant that these systems have had a searching test from the start. The participation of two national air forces has been a further obstacle to be surmounted in the establishment of smooth working, speedy supply lines. Standard logistical methods have been evolved to which both USAF and the RAF comply; RAF adoption of USAF supply methods will enable the missile squadrons to deal direct with supply depots in the United States.

Representatives of Air Materiel Command are behind the establishment of the new logistic systems, working through the Ballistic Missile European Task Organization and through the London Air Logistics Office, part of AMC's European setup and yet another example of established staffs being harnessed to the program. The new logistic systems being evolved are completely electronic. Demand cards placed in transceiver sets in England cause identical cards to be produced by similar sets at the AMC depot at San Bernardino, Calif. These cards are processed electronically by an IBM-705 computer. "The aim," to quote Colonel McDowell, "is to evolve methods where a demand is filed in England and a shipping order appears instantly in California."

For six years Colonel McDowell was responsible for early logistics planning at Headquarters, Air Materiel Command, and at the Air Force Ballistic Missile Center, Inglewood, and he had much to do with the introduction of electronic methods and new logistic concepts. Prior to this part of his career he had served for two years on the Joint Chiefs of Staff Committee on Guided Missiles, from 1944 to 1946, so his association with missiles goes back to long before June 1958, when he arrived in England to form the Directorate of Ballistic Missiles. With Group Capt. R. F. Harmon of the Air Ministry, he cochairmans the joint USAF/RAF coordinating committee.

As General Blanchard's number one missile staff officer, Colonel McDowell works very closely with Colonel Delahay of the Technical Training Squadron. This should not come hard to him, for these two have been working together, or against each other, for twenty years—against each other when they played on opposing college athletic teams. Both are from the Dallas, Tex., area, and they are oldtimers with twenty years or more service—McDowell graduated from West Point in 1937. Delahay worked up to his present big responsibility, which he assumed last May, through missile programming and planning in the Pentagon, where he was chief of the Bomber Branch in the Operations Directorate, before becoming base commander at East Kirkby, a now-defunct SAC airfield in Lincolnshire, England, which he left for the missile post.

Both these officers have had close dealings with senior

RAF officers, and close personal contacts are a feature, at all levels, in the two-nation program. The small detachments of American officers and airmen left behind as the warhead custodian parties will live and work side by side with RAF personnel. At the RAF missile sites American airmen will live in standard RAF accommodations, eat RAF meals, and use RAF clubs and sports facilities. Family quarters available at each base will be allocated to the respective services in proportion to their strengths on the base. American airmen will work duty rosters with RAF personnel, and only in higher matters of discipline will 7th Air Division intervene.

Apart from the warhead detachments, direct American participation, after the RAF has taken over the show and is meeting its own training requirements, will be mainly by the civilian technical representatives of the weapon system contractors—which is the usual method adopted with manned aircraft when they enter service with a foreign power. These technical representatives will dwindle in number from the present figure for there are many engaged in installation and check-out and in training RAF personel at the present time. In March of this year there were about 900 American contractors' representatives in the British Isles.

The constant feed-in of new techniques and modifications arising from the simultaneous research and development program going on in the United States requires a large civilian technician force. But the flow of information is not all one way, for although new technical procedures are not evolved in England, there have been plenty of practical lessons learned about Thor in setting it up for service; and information from these, acted upon in the United States, will make the subsequent adoption of the missile elsewhere just that much more trouble-free. Nobody engaged in the enterprise in England doubts for one moment the wisdom of starting the operational program when research and development were still proceeding—there was so much to be done in introducing the first nuclear ballistic missile that, had the Allies waited for more test firings, Thor's entry into service might still have been years away.

How long it will remain on its English emplacements as an integral part of the West's deterrent only time can tell. Britain is developing her own ballistic missile, the de Havilland Blue Streak, which will have a Rocketdyne motor built under license by Rolls-Royce. A lightweight, pressurized-steel construction gives it a greater fuel load, and therefore range, than Thor. Blue Streak is commonly said to be in the 2,800-mile class. Certainly it has earned a different name—"long-range ballistic missile," suggesting that it is out of the IRBM class of 1,500 miles.

It would be idle to pretend that the introduction of Thor into Britain has been without its troubles, but, surprisingly, the most publicized ones affected least the people closely involved in the program. The unique nature of the Bermuda agreement, denoting one nation to operate the missiles and another to hold the warheads, was enough to evoke widespread criticism and some ill-considered ridicule when the terms of the joint agreement were initially published.

Additionally, there were people sincerely concerned about the wisdom of stationing nuclear missiles in crowded England and thereby inviting attack. There have been several protest marches, the biggest being held at Easter this year. Generally the people taking part have sincerely believed that Britain should renounce nuclear weapons and embark on unilateral disarmament "as an example to the world." Some other participants have been Red sympathizers, and a great many have merely gone along to see the rest protesting.

But the people who have criticized the program merely on the grounds that the missiles are being foisted on Britain and that the RAF has only a subordinate part to play should have heard General Blanchard when he emphasized that the RAF is the operating agency for the missiles, in every sense. "We of the 7th Air Division," he said, "are working ourselves right out of this particular job just as quickly as we can."—END

**Above, British and American officers together at Feltwell, the first RAF Thor installation. At farthest right is Maj. Gen. William H. Blanchard, commander of SAC's 7th Air Division.**

**Above, right, distinguished guests at RAF missile sites on the North Sea coast. Left to right, British Defense Minister Duncan Sandys, the president of Douglas Aircraft Corp., Donald Douglas, Jr., and Maj. Gen. Blanchard. Douglas Aircraft produces the Thor.**

AIR FORCE/SPACE DIGEST *readers will find Bob Rodwell's byline familiar. A staff writer for the British magazine* Aeronautics, *Rodwell has contributed several times to these pages. His most recent article in this magazine was "A Look at Britain's Missile Programs," which we published in January '59. He has flown in many of the latest US and British aircraft, and last year qualified for a Mach Buster's lapel pin when he broke the sound barrier as a passenger aboard the North American F-100F fighter.*

*No Matter What Kind of War . . .*

# TAC Is Vital to Our Deterrent Power

**Claude Witze**
SENIOR EDITOR

F-100 on zero launcher. Hardened installation, proposed for Europe, would protect plane from threat of nuclear attack.

THERE isn't a place in the world where an aggressor can hide from USAF's Tactical Air Command, no matter what kind of a war he starts. This makes TAC an important part of the free world's deterrent power.

It should not be necessary to get into a discussion of the semantics of war to prove this point about TAC's potential and contribution. The *kind* of war is not important. It can be limited war, general war, brushfire war, all-out war, conventional war, nuclear war, or any other kind of uprising in which a show of force is needed to make it completely clear there can be no appeasement.

Gen. O. P. Weyland, TAC commander, recently gave it as his opinion before a congressional committee that "the distinction between cold, limited, and total war tends from time to time to become rather fuzzy." He gave as examples the outbreaks of last year in Lebanon and Formosa, in both of which TAC played a vital role.

In the Middle East there was no shooting to speak of. TAC sent a Composite Air Strike Force to the scene along with US Marines and Navy aviation. There was a showing of the flag, which was a sign of American and NATO determination. There was, on the other hand, a lot of shooting in the Formosa Strait. It was Chinese Nationalists and Chinese Communists who were shooting at each other, with moral and air materiel support for the former from General Weyland. But when it was all over, the General admitted to Congress, he was not sure whether the war was a limited or cold one. But again, a TAC Composite Air Strike Force (CASF) clearly was a factor in the outcome.

"Obviously, cold wars can lead to limited wars," General Weyland told an Appropriations Subcommittee of the House of Representatives, "and it is entirely possible that limited war, if we actually became engaged in it, could expand to total war.

"I feel in any of these situations in backing up our national policy there is a common denominator for putting teeth into our policy, and that is putting military force into it which the Communists understand better than anything else.

"This force should be of the proper degree and kind at the right place and the right time.

"To fulfill these criteria, tactical air forces are unique in their capabilities to fulfill all three missions in cold, limited, or total war."

One of the best tributes to the practicality of this approach was in the March '59 issue of AIR FORCE/SPACE DIGEST, where Gen. Laurence S. Kuter, commander in chief of the Pacific Air Forces, gave details of "The Taiwan Strait Crisis" and concluded that the display of strength by CASF and the Navy showed we were there to support an ally—and to make the Communists pause.

"This," said General Kuter, "is effective deterrence, and it is the basic lesson of Taiwan."

It is interesting and perhaps significant that General Weyland frequently refers to tactical air forces (lower case) instead of the Tactical Air Command (upper case). There is a sound reason for this that may be overlooked by people who think he is pleading for a Command instead of arguing for a concept. In a theater of operations, be it Europe, the Middle East, or the Far East, it is not TAC but the US tactical air forces that carry out the mission.

Either through CASF or regular rotating units that serve time in a foreign theater, the tactical air forces are drawn from TAC to fill primary responsibilities of the unified or theater commanders. They are placed in position primarily to work in conjunction with other forces committed to the unified or theater command for use on the land or sea or in the air.

TAC is the only combat-ready command directly under Gen. Thomas D. White, USAF Chief of Staff. At the same time, under the Defense Reorganization Act of 1958, its components are not under his command when they get into a theater where combat is possible. In this way, TAC differs most radically from the Strategic Air Command, a specified command, which can operate anywhere in the world only on direct orders from the Joint Chiefs of Staff.

General Weyland expresses his mission this way:

"In the application of tactical airpower in achieving the over-all missions of the theater commander we,

**General O. P. Weyland, "General TAC" in USAF: "We can take decisive action in defense of peace and freedom anywhere on the globe, today, tomorrow."**

more than any other of the forces available to such a unified commander, constitute the force which can exercise the greatest strategic influence on that theater or unified commander's mission as a whole. We are especially trained, especially equipped and qualified to do this joint work in teamwork with the other services."

General Weyland maintains that his units normally based in the United States currently thirty-one wings of tactical air—"can be the best limited war deterrent force we have readily available." Out of this pool must come rotational units for deployment to US Air Forces, Europe (USAFE) and the Pacific Air Forces (PACAF). In addition, TAC provides CASF—the fast fire-alarm service that is packed and ready to hit any spot in a matter of hours. Back of all this, TAC has responsibility for the development of new aircraft, the doctrines, tactics, and techniques of employing them in the field. To do this job, it gets less than nine percent of the dollars programmed for USAF in a typical fiscal year.

In TAC there are three numbered Air Forces:

- Ninth Air Force, Shaw AFB, Sumter, S. C.
- Twelfth Air Force, Waco, Tex.
- Nineteenth Air Force, Seymour Johnson AFB, N. C.

The first two of these are operational, equipped with fighter-bombers, day fighters, tactical bombers, reconnaissance, missile, and refueling squadrons. The third, headed by Maj. Gen. Henry Viccellio, consists of fewer than a hundred personnel who are in charge of no aircraft and no bases. Their mission is to plan for the fire-alarm calls, to make sure that a CASF unit is ready and capable of taking

*(Continued on following page)*

off on short notice for any trouble spot in the world.

In the case of the Middle East, CASF Bravo consisted of twenty-four North American F-100 fighter-bombers, six McDonnell RF-101 tactical reconnaissance aircraft, twelve Martin B-57 tactical bombers, and nine Douglas RB-66 reconnaissance bombers.

Bravo was in Europe forty-eight hours after the call; the first planes arrived about twelve hours after the alarm. All were supported by TAC transports and refueled in their long flights by KB-50 tankers.

About six weeks later a second CASF was organized to meet the Formosa Strait crisis and reached the Pacific theater again within a matter of hours. In both of these cases the job done by General Viccellio has been justified. The preplanning, the analysis of every possible trouble that might impede the action, the conditions that could prevail in a limited war, the airfields and logistics that were available all were taken into consideration. In addition to fast reaction, mobility and flexibility are characteristic of the CASF operation.

General Viccellio points out that all tactical air forces on rotational duty overseas stand committed as treaty forces to help our allies and that they have a general war mission. For them to move out to meet peripheral challenges would weaken the front they stand to protect. On the same basis, he argues that the Strategic Air Command has a major job to do, one that it should stay with to maintain the big nuclear deterrent. He also feels that tactical air forces are by their nature best fitted to carry out limited war activities on the most economical basis.

On top of this, TAC senses from its realistic experiences in Lebanon and Formosa that the CASF concept is a major factor in maintaining the faith of our allies in the American determination to stand firm in the face of Red aggression. General Viccellio says that a CASF reaction from Myrtle Beach, S. C., in which planes start winging over the Mediterranean within twelve hours after a fast decision at the Pentagon, is more impressive than a demonstration out of a base in Germany or North Africa. So far as the efficiency of the effort is concerned, he cites some simple figures from the Middle East example: CASF flew 2,366 missions on that expedition, most of them for reconnaissance or merely as displays of strength and the flag. There were only forty-three aborted sorties.

The actual striking power of the tactical aircraft is part and parcel of its flexibility. It is not confined to nuclear weapons, but can strike with conventional bombs and rockets as well. This nuclear capability, with small but potent explosives, is one that never will be taken over by missiles if the target is unfixed or unknown. Here the manned airplane alone, which can seek out the moving target or hit the target of opportunity, will maintain its value as a tactical weapon.

In his testimony on the fiscal 1960 budget General Weyland did not voice any strong protest over the programmed funds for his operation. He did say that the structure is reduced to "rock bottom" and "I personally consider that we are in a precarious or questionable position."

He then went on to portray a situation similar in some respects to that of SAC as outlined by its commander in chief, Gen. Thomas S. Power (*see page 9*). General Weyland said that today's TAC, airplane for airplane, man for man, and unit for unit, is superior to the Russian effort in this area. But when it comes to modernization of the Tactical Air Command and continued qualitative superiority, the General has reservations.

The outlook is that TAC's share of the programmed USAF dollar will remain in the eight to nine percent neighborhood. But the total outlay for research and development support, leading to better operational systems for tomorrow, is headed sharply down. In fiscal 1959, the current year, about $40 million was devoted to this effort. For fiscal 1960, the present outlook is that only $28 million will be de-

**Flyaway equipment and ammo-kits prepared for deployment with CASF to Mideast.**


**Republic F-105 will provide TAC with firepower, mobility, and versatility to surpass that of any aircraft now flying. Next TAC plane must be V/STOL type.**

voted to improvement of TAC's future capability.

There are a number of deficiencies that loom ahead. Now coming into the TAC inventory is the Republic F-105 fighter-bomber, but in limited numbers. The same is true of the Lockheed F-104 day superiority fighter. For the follow on, General Weyland feels strongly that there should be a concentrated effort to develop a vertical or short-takeoff-and-landing aircraft. The TAC designation is V/STOL.

In the interim he has suggested further work on the North American-developed zero-launching technique for existing aircraft that normally need runways. For Europe, where the TAC units are vulnerable to Russian IRBM attack, the zero launchers should be put in hardened stands. The structure, General Weyland says, can be built to withstand the pressures of nearby nuclear attack. He says he has discussed this with theater commanders as a device to ensure survival of tactical weapons and that they agree the hardened zero launcher is a "practical and economical solution." There are no funds provided for the project in the new budget.

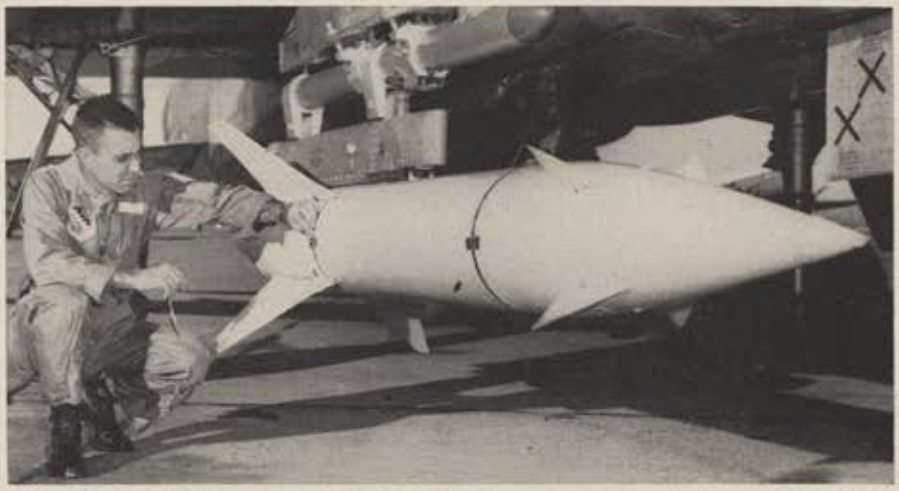
Another favorite subject for speculation in TAC's future is the North American A3J. It is an advanced airplane, capable of Mach 2 speeds, designed for the Navy. Major virtue of this aircraft would be its fully integrated bombing and navigation system carried on a heavy-hitting vehicle capable of landing and taking off from relatively short runways.

Another major area for improvement of TAC equipment, one that becomes more critical as the F-105 goes into regular operation, is in the refueling equipment. The entire tanker fleet needs updating because the existing KB-50J piston-powered tankers—TAC has four squadrons of twenty aircraft each—are inefficient for refueling modern jet fighter-bombers. The KB-50J has jet auxiliary power but still forces the fighter pilot to lose considerable altitude and speed to effect refueling. The requirement probably is for four squadrons of Boeing KC-135 jet tankers to maintain the CASF ability as a worldwide tactical deterrent.

Use of this tactical deterrent in the field usually defined as limited war is something that needs more attention in the current debate over our limited war capabilities. There have been some witnesses in recent weeks who argue that our total kill capability is too great and there is not enough emphasis on the less-than-total capability. This approach does not give proper evaluation to the role played by tactical air.

Effectiveness of the Tactical Air Command, like that of the ground forces in Europe, is dependent on the certainty that the Strategic Air Command stands in back of every military effort by the free world. For this reason nobody, not even TAC, will argue today that SAC should sacrifice to support any other kind of military strength. This goes for tactical air, the ground forces, the Navy, and the Marines.

It all goes back to the simple case that the American people can afford what they need. They can afford what they need in tactical air as well as in every other area.—End



**White Lance, USAF version of the Navy Bullpup, is supersonic air-ground missile.**

**Sidewinder, here mounted on F-104, proved of value against Chinese Communists.**

Menacing nuclear test cloud: "All of us live today in horror of nuclear war." But would outlawing tests be wise?

*The Case Against*

# THE NUCLEAR TEST BAN

## A SPECIAL ANALYSIS

*We are now in the midst of a voluntary one-year ban on nuclear weapon testing. The arguments in favor of seeking to make such a ban permanent are persuasive and have been well aired. The other side of the coin—the case against the ban—has not been so cogently expressed nor so widely circulated. Here is an analysis presenting the arguments of an expert who opposes a permanent ban on nuclear tests. We feel these views deserve expression in the interests of open national debate of a critical issue.*
—THE EDITORS

WE SHOULD not agree to a permanent international ban on nuclear testing under present circumstances, despite the spontaneous and enormous appeal of such a proposal.

Rather, it is of the utmost importance to the United States and the entire world that we resume conducting such tests and utilize their results to the optimum degree in the fields of weaponry and peacetime nuclear development. This should be done as soon as possible after the current one-year test ban agreement comes to an end in October.

The reasons for this are many—military, political, scientific, economic. And they are urgent.

Arguments in favor of a long-term ban fall, for the most part, into two categories. They are based either on a general sense of international morality or the fear that radioactive by-products of nuclear explosions will gradually poison mankind.

Only a fool would dismiss either of these positions out of hand. They require examination.

Unfortunately, undiluted morality, or idealism, as a national motivation has compounded a sad case history in recent years. This pragmatic truth has been an unpleasant pill for Americans to swallow.

An appropriate example, all too appropriate, perhaps, is seen in the outcome of idealistically elevated attempts at global disarmament between the two world wars of this century. The rise of the Axis powers and the horrors they wrought were a direct result. The next link in the chain was the rapid growth of Communist power in a war-ravaged world.

Another painful example comes from an entirely different area of national life. Prohibition, although promulgated in the interests of morality, actually provided an unprecedented stimulus to organized crime. The so-called "syndicate" and other facets of underworld life that developed as a result remain with us today; their activities are among our major problems as a nation.

Today, among many of our best thinkers, there is the sinking sensation that we are at it again, seeking with idealistic purpose to ban nuclear testing and then nuclear weapons.

The second strain of thought in opposition to nuclear testing is based on concrete biological data, fragmentary but nonetheless frightening. Yet here is presented a problem that can surely be overcome.

The peoples of the world are entitled to full protection from possible ill-effects of nuclear testing. Some of the nuclear tests of the past should have been handled more carefully. In fact, most tests—Western tests at any rate—were held amid maximum precautions along these lines. Future tests could be held underground or in space, or under other "safe" conditions.

The fact is, at relatively minor cost, the problem of fallout can unquestionably be avoided in future nuclear testing. Testing *can* be resumed without contaminating milk and other foods with strontium 90 or other harmful substances.

We can, at this point, go one step further in discussing the over-all question of a nuclear ban. Let us assume for a moment, contrary to the contention of this essay, that a permanent cessation of nuclear tests at this time is desirable. How likely is realization of this end?

This, in short, is the political side of the picture. Despite numerous concessions on our part, which have given away a good portion of our bargaining and security positions, the Soviets have not yielded to American demands for a "meaningful" and "reliable" test ban. Nor are they likely to accept any scheme which does not predominantly serve their own strategic interests.

On the technical side, the primary issue is whether a test ban could be controlled and enforced. The US sought an answer to this question by calling an international conference of experts from East and West at Geneva last year. The result was a carefully-worded technical agreement, parts of which were questioned by some members of our scientific community. This gathering was followed by the current international conference on nuclear testing at Geneva.

It now appears that there is utterly insufficient knowledge of the numerous scientific variables entering into the test ban problem. Top experts seem unable to design a truly effective inspection system.

Even if they could, constant changes of technology would require an extraordinarily flexible set-up to keep the inspection system up to date. In the absence of open tests which allow nations to keep track of nuclear progress, such a periodic modernization of the inspection system would have to be predicated upon full scientific exchanges—in other words, upon the abolition of nuclear secrecy. At the present stage of history, this would seem a wildly Utopian goal.

Suppose for the moment that, in spite of all, a system technically good enough to discover test ban violations came into being. It still would be necessary to prove transgressions. Verification would be extremely difficult, if not impossible. For example, it might require finding a minuscule cavity in an enormous mountain mass, a "room" two miles inside Mount Whittier or Mount Ararat. Creative imagination boggles at such a problem. Inspectors would require the right to dig forever and wherever they wanted, all over the globe. How much digging would the inspectors have to do before they were truly convinced that no violation did occur? How large a digging crew would be required? There are hundreds of unidentifiable earthquakes every year. Would weekly digging expeditions be required?

The Geneva technical agreement, as amplified by later negotiation, envisages an inspection force of about 6,000 men. This figure appears too low. It could not begin to meet global demands on it—including high altitude inspection and protection against specially devised technologies of evasion and deception.

For there is no reason on earth why we should trust the Soviets to cooperate in good faith to carry out a test ban agreement. If the ban were operational, events might actually force us to insist on broad-gauged verification expeditions. We would then be moving from one resultant diplomatic crisis to the next, a sorry commentary on hopes that a test ban would reduce international tension.

Or, just as in 1949 and 1950 we gave up worrying about North Korean border incidents, we could give up worrying about inspection system warnings. Disaster might follow.

In all probability, as soon as the Soviets made the inevitable discovery that the ban hampered their armament development, they would violate the ban secretly or withdraw from the pact openly. Either way, the US would be left flatfooted while Russia took off down the arms race track.

Since the US cannot, for any length of time, retain its qualified test personnel on a standby basis, we would lose at least one year before we could follow the Russian suit.

*(Continued on following page)*

If we did not make an immediate decision, we would be delayed by perhaps two years.

It is generally agreed that, during the period of test ban, Russian nuclear science could reach the level of US atomic knowledge. Thus, in jumping the gun on the ban, Russia might achieve a decisive margin in nuclear technology.

Let us at this point depart from our hypothetical assumption that a nuclear test ban is, in fact, desirable. We have seen where the matter of such a ban stands, and where it could lead, in practical terms. This is not, however, where the brief for test resumption rests.

Rather, there are myriad *positive* reasons for conducting tests to push the state of nuclear progress as far as we can as fast as we can.

Twenty years after the discovery of atomic fission, nuclear technology remains in its infancy. No scientific discipline begun experimentally has ever lost the need for experiment. Nuclear physics has always been based on experiments, foremost among them explosive tests.

The international situation makes it imperative that we stay ahead in nuclear technology. The US has been forced into a technological race which it cannot afford to abandon. Revolutionary changes in nuclear technology are clearly foreseeable. Weapons improvements are urgently and vitally needed throughout our entire arsenal.

Obviously, each new missile needs nuclear warheads which must fit its precise configuration. It is illogical to develop new weapon systems and at the same time discontinue further development of the explosives they are designed to deliver. We cannot act as though the knife does not need a blade.

It has been argued that because our "nukes" already produce all the yield that may be useful, nuclear weapon tests no longer are necessary. Perhaps we have reached the limits of practical *bomb* yields. Yet we cannot possibly assume that we have attained optimal yield-weight-diameter ratios. These, clearly, are of the utmost importance in missile warfare. As the weight and space requirements for control equipment to be carried in the missiles grow, as second generation missiles move through the research stage, as third generation missiles appear on the horizon, and as targets become smaller and tougher, thus calling for increased accuracies, the need for optimal warheads becomes ever more urgent.

Solid-fueled missiles will render this requirement absolutely critical. Unless we attain really high warheads for longest range and accurate ICBM delivery, we will not acquire an effective strategic missile capability, nor will we preserve our present deterrence posture. So much for the yield problem.

Our offensive capability still is based on "dirty" nuclear weapons. This is unsatisfactory because heavy fallout causes unnecessary casualties, restricts freedom of strategic and tactical action, and may "backfire" on the user.

In a very real sense lack of clean weapons also precludes effective defense against nuclear attack. Effectiveness in missile defense is a function, not only of electronics as has been asserted, but also of yield and numbers. With "dirty" defense weapons, the greater the yield and the higher the number of surface-to-air missiles, the more harmful the fallout which will rain down on friendly territory. Not so with clean warheads.

Further, defense missiles are relatively useless unless they are available in large numbers; hence those missiles should be cheap. But in order to be cheap, defense missiles should be small and uncomplicated. To compensate for the resultant relative inaccuracy, the yield must be large; but to be usable over friendly territory, large yield warheads must be clean. To complete the circle, both yield and "cleanliness" require large weights and diameters.

In the present state of the art, large yield, clean warheads must be placed in *large* missiles, which *cannot* be economical. The clear conclusion is that really satisfactory defense weapons cannot be attained without a very substantial nuclear testing program.

To emphasize this point, it might be noted that at present the power of the offensive exceeds the power of the defensive by a margin broader than ever before. It is this presently unchallenged superiority of the offensive which has made nuclear surprise attack a matter of constant, hourly threat. A much strengthened defense could price aggression out of business.

Nuclear weapons also affect defense in ground warfare. An aggressor force would find a nuclear ambush war very hard to cope with. Small combat teams armed with portable nuclear weapons, which would combine the invulnerability of guerrillas with the firepower of divisions, would be more than a match for aggressor armies. This means that nations with small ground armies would have a chance of defending themselves successfully against aggressor hordes. Such nuclear weapons could be an excellent deterrent against local "brushfire" aggression. As yet the free world has failed to develop an effective on-the-spot deterrent against this brand of limited territorial aggression. A nuclear test ban would prevent solution of this critical problem.

There are, in addition to military factors, related political reasons for test resumption. If, armed with test-developed weapons, small nations possess the capability of fighting a future war without risking national extinction, their governments will not be tempted to surrender to nuclear blackmail. An aggressive government can use war scares as foreign policy tools under the present circumstances. New weapons, developed in tests, could change this state of affairs.

Finally, and ironically, the dreaded nuclear tests may hold a key to the good life for many.

Little publicity is accorded the discouraging fact that in many areas of the world population growth is outpacing economic development. Even if capital were available in the quantities needed—which is not the case—the problem of exploiting untapped sources would bulk large. Nuclear technology cannot be considered a panacea, but it could make formidable contributions to economic growth.

Nuclear techniques could be used for the construction of ports and canals, redirecting rivers, building tunnels and difficult roads. Nuclear-aided engineering could improve the water supply of arid areas, or of any area, for that matter. Nuclear explosions could unlock trillions of barrels of oil contained in shales and sand tars, open access to other minerals. The nuclear explosive could be one of the most valuable "single package" assets ever discovered by mankind.

But, once more, the potential cannot be achieved without testing.

To summarize: Resumption of nuclear testing would serve the interests of the free world in almost every conceivable way. A permanent ban, conversely, would be to our extreme disadvantage.

Widely, powerfully, sincerely expressed views to the contrary would seem to be based mainly on splendidly-intentioned unreality and fear of a danger that can be overcome.

All of us live today in horror of nuclear war. We must work and pray to prevent it. Unfortunately, calling off nuclear testing now by agreement with world Communism cannot help. It could be a catastrophic mistake.—END

May • 1959

# SPACE DIGEST

*THE SPACE AGE IN PERSPECTIVE*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# SPACE DIGEST

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## *From the Editors...*

AS WE went to press, the successful demonstration of a method to convert atomic energy directly into electrical power was reported by scientists working on the Atomic Energy Commission's SNAP (Systems for Nuclear Auxiliary Power) project at the AEC's Los Alamos Scientific Laboratory in New Mexico.

It is too early to tell, of course, what the exact application of this new technique will be in spaceflight. But it will doubtless advance needed knowledge of new propulsion and power systems for space vehicles; and it begins to answer the problems of intermediate hardware in "conventional" atomic power systems, which made nuclear power questionable for use in space systems.

Such quietly announced but notable advances underscore, we believe, the need for the sort of thoughtful analyses of the space age in perspective which fill these pages.

The earth-bound may ask: Why talk about "space control" when we are still in the unmanned satellite stage of space exploration? The answer is simple. It is inevitable that what today is theoretical will be practical tomorrow. Man will enter space.

Proof of that statement is available with the announcement (*see page 54*) of the names of the seven men who will form the Project Mercury team for placing a US airman in orbit.

As youngsters, most of these seven honored astronauts probably knew that someday they would fly—but into orbit!

*Atomic Explosions in Space . . .*
*Round Trip Radar to Shrouded Venus . . .*
*and the Naming of the Orbital Team*

# MERCURY: THE MEN FOR THE MISSION

*WILLIAM LEAVITT*
*Associate Editor*

Malcolm S. Carpenter, Lt., USN, thirty-four.
Leroy G. Cooper, Jr., Capt., USAF, thirty-two.
John H. Glenn, Jr., Lt. Col., USMC, thirty-seven.
Virgil I. Grissom, Capt., USAF, thirty-three.
Walter M. Schirra, Jr., Lt. Cmdr., USN, thirty-six.
Alan B. Shepard, Jr., Lt. Cmdr., USN, thirty-five.
Donald K. Slayton, Capt., USAF, thirty-five.

FOR these seven, the greatest adventure in the history of US flight is just beginning. They are the seven members of the Project Mercury astronaut team now in training for the first American manned flight into orbit.

One of them—no one knows which one now—will make the first flight. Of the remaining six, most, possibly all, will make subsequent flights.

They were introduced to America and the world at a packed press conference last month in the Washington, D. C., news auditorium of the National Aeronautics and Space Administration, managers of the US manned orbital project.

The three Air Force, three Navy, and one Marine test pilots who form the astronauts team were chosen after grueling medical, psychological, psychiatric, and spaceflight stress simulation tests at the Lovelace Clinic at Albuquerque, N. M., and the Air Force's Wright Air Development Center at Wright-Patterson AFB, Ohio (see SPACE DIGEST, February '59). They were the finalists in a thirty-two man pool.

What sort of men are they? And why did they volunteer?

Some of the questions of the battery of reporters who grilled the Astronauts as they sat on stage dealt with these matters.

Why did they volunteer?

They are all experienced test pilots for whom the orbital job is both akin to accustomed tasks and a chance to explore the unknown, the new, grand dimension of flight, while serving their country. Their IQs all surpass 130.

They are all married. Their wives, apprised of the assignment, have given their support to their husbands' participation in the project.

One of the selected volunteers, Lieutenant Carpenter, drew admiring laughs from the press when he remarked that he had been at sea at the time Mercury's call for volunteers was announced and that his wife had volunteered for him.

*Carpenter, USS* Hornet; *Cooper, Edwards AFB; Glenn, USN Bureau of Aeronautics; Grissom, Wright-Patterson AFB; Schirra, Patuxent Naval Air Test Center; Shepard, Atlantic Fleet; Slayton, Edwards.*

They all have enormous faith in the eventual success of the project, one on which all Americans and all mankind will focus attention, whether or not US astronauts are actually the first to enter space.

Why seven astronauts instead of the originally scheduled twelve-man team? NASA said that since such a large percentage of the first sixty-nine possibilities called to Washington volunteered, it was decided to use a smaller nucleus and a smaller final team so that each could participate to the maximum.

From the moment of their brief exposure to the press at the press conference to the time of the mission, the seven will be on TDY at the NASA Research Center, Va., moving around the country for their training—till The Day.

IN ALL the excitement over the long-delayed announcement of Project Argus —the September 1958 blasting of three atomic bombs 300 miles over the South Atlantic and the attendant blanketing of the earth in a thin man-made layer of radiation—more attention was paid to the questionable antimissile capability of such explosions than to the monumental scientific significance of the feat.

Argus marked a new departure. For the first time man has truly entered the cosmic laboratory not merely to observe natural phenomena but to *create* phenomena. Centuries from now Argus may stand as the first of a series of space experiments that may someday include the actual alteration of planetary orbits (would Mars be more hospitable if you could bring it closer to the sun?). Hundreds of feats are almost beyond present imagination . . . the creation of artificial atmosphere or something as far out as telekinesis —the transmission of the human person from point to point by disassembling his atoms in one place and putting them together in the right order somewhere else. Such achievements would not be man "playing God"—but using his ingenuity for beneficial purposes and to advance knowledge.

Of course the immediate significance of Argus was in terms of what value it might have as a space weapon. The space atomic blasts, which confirmed the generally accepted delineations of the Van Allen radiation belts, stirred up much speculation on possible missile-destroying effects of atomic explosions in space. There were sug-

*Project Argus. Low-yield atomic blasts were detonated in space 300 miles over the South Atlantic in the fall of 1958 to check theories on earth's magnetic field and chart military applications. The big question brought up by experiments was antimissile capability of atomic blasts in space.*

*Lincoln Laboratory's Millstone Hill radar used in bouncing round trip radar to, from Venus.*

gestions that the neutrons emitted by the nuclear explosions in space could detonate the warhead of an incoming nuclear missile. For a few days after the Argus announcement, the press was filled with speculation on "radiation" shields for anti-missile defense.

One physicist, S. Fred Singer of the University of Maryland, said that the neutrons emitted would be insufficient to have any detonating effect on the nuclear warhead. Another, W. Selove of the University of Pennsylvania, was even stronger in his negative views (*see "Views and Comments," page 35*).

Far more important militarily was the apparent demonstration that the radiation created by the space blasts created a kind of screen capable of disrupting radar.

This phenomenon has value for both attacker and defender in nuclear missile warfare. If the attacker's missiles were homing in on a radar beam, the beam might be blacked out by blasts set off in the space over the target.

On the other side of the coin, the attacker might be able to set off atomic explosions over the target area to disrupt radar-warning systems prior to attacking with missiles.

It was interesting to note that, as definite answers to the antimissile capability question appeared unavailable, the press switched to something more obvious—using space A-blasts to drench enemy manned space vehicles with death-dealing radiation. Whatever the final decision—and it is unlikely that it will be announced—about antimissile effects of Argus-type blasts, it becomes clearer that the ICBM is by no means *the* ultimate weapon. It is only the deadliest one available today.

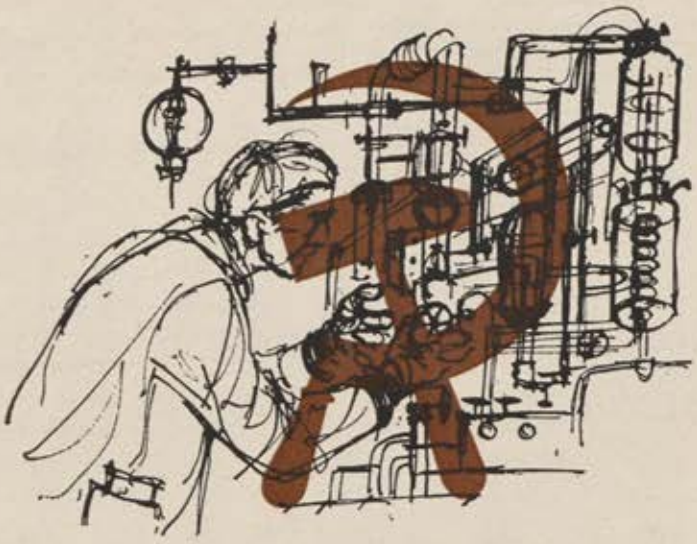
The increasingly important science of space communications—already bolstered by the 400,000-mile transmission from Pioneer IV and the 1958 relay achievement of the USAF Atlas "talking" satellite—has spurted ahead again.

Late March saw announcement by Massachusetts Institute of Technology Lincoln Laboratory personnel of a successful establishment of radar contact with the planet Venus. The contact with Venus was made in February 1958 at a distance of something on the order of 28 million miles. The reason for the delay in announcing the significant feat was the desire of the Lincoln Lab scientists to be absolutely sure that the signals received back were truly from the celestial neighbor. Analysis took months. According to the research team at Lincoln, headed by Drs. Robert Price and Paul E. Green, the radar pulses returning from their round trip to Venus were so faint that very careful separation of other celestial noise was necessary—and time consuming.

Beyond communications demonstration, the Venus radar round trip helped determine more accurately the distance between Venus and earth. In like manner future radar transmissions to other planets could help determine with greater exactitude distances to other bodies, the only limitation being the ability of radar to get out far enough and come back, in a readable way, to earth.

Future spacecrews will need such exact "geography" when they set out for the planets.

MIT's Lincoln Lab performs electronic research for the Air Force, Army, and Navy through a tri-service contract administered by the Air Research and Development Command.—END



*An On-the-Spot Report . . .*

# SOVIET ORGANIZATION FOR RESEARCH

*W. A. NASH*

THIS AUTHOR, together with Professor Naghdi (University of Michigan) and Professor Langhaar (University of Illinois), recently had the opportunity of spending twenty days visiting various research laboratories in the Soviet Union. This trip came about as the result of personal invitations issued by the Soviet Academy of Sciences to the three of us, and our sponsorship was obtained from the National Academy of Sciences, Washington, D.C. The invitations were specifically to tour research laboratories active in the field of mechanics. Since certain of these laboratories are located in universities, it was also possible to ascertain some features of their engineering educational system, particularly in the area of graduate-level education.

During the twenty-day period we visited the following establishments:

- Institute of Mechanics, Moscow.
- Institute of Construction, Tbilisi.
- Institute of Mathematics, Tbilisi.
- Institute of Structural Mechanics, Kiev.
- Leningrad Polytechnic Institute.
- Leningrad University.
- Stechlov Mathematical Institute, Moscow.
- Moscow State University.
- Central Scientific Research Institute for Structural Design, Moscow.

With the exception of Moscow State University, the various research and educational centers listed are housed in old and rather poor structures. In fact, few counterpart institutions in the United States could be found in such poor physical plants. Evidently no building programs are planned for these institutions; funds for new buildings will be used to establish new laboratories in other cities in the Soviet Union.

In sharp contrast to these decrepit buildings, the equipment in the laboratories within the buildings is excellent. To cite a particular example: in the area of materials properties we saw many unique test machines that do not exist anywhere in the United States. These machines are used almost exclusively in research investigations. Laboratory equipment for both undergraduate and graduate student instruction far surpasses that to be found in even the better-equipped American universities.

It was apparent that the development of student demonstration apparatus is considered an important part of faculty endeavor, and no expense seems to be spared to provide excellent laboratory equipment for student use. Again, to be specific, many unique models to demonstrate various phenomena in nonlinear mechanics are in the laboratories of Leningrad University. This author does not know of any American university having such splendid demonstration apparatus.

The basic philosophy followed throughout the Soviet Union is that both fundamental and applied research in all fields is to be carried out at so-called "institutes." These are laboratories, each organized to carry out investigations in specified areas of endeavor, and the laboratories do not have any connection with any universities. However, it frequently happens that senior research men from the laboratories offer a course in their specialty at some nearby university, and it is also common to find certain specialized courses on a graduate level being offered at the institutes. The question of "credit" for these lectures does not arise since no formal credits are required for the attainment of graduate degrees. More will be said about this later.

The rank of "professor" is bestowed upon outstanding members of research institutes. The tenure system followed for these men, as well as for professors in the universities, is of interest. Appointments to the rank of professor are initially for a five-year period, and at the conclusion of that period the individual's record is carefully reviewed. If he has been active in research investigations in his field (in the case of those employed at institutes), or if he has successfully combined teaching and research at a university, then he is appointed for another five-year period. This process continues throughout his life, with a new and thorough review every fifth year. There have been numerous occasions when a man's appointment was not renewed at the end of one of these periods. No permanent tenure appointments exist in the USSR.

As is now rather well known, salaries of senior faculty members and research workers in the various institutes of the Soviet Union are extremely high in comparison to those of the semiskilled factory worker. Because of the highly anomalous currency situation existing there, direct comparisons of dollars with rubles are almost meaningless, so it is perhaps better to compare salaries of professional men with those of ordinary workers. The basic salary of a full professor in the Soviet Union is approximately six times that of the factory worker. The more eminent professors are members of the Soviet Academy of Sciences and receive salaries approximately thirty times that of the factory worker.

Furthermore, this basic sum is almost always supplemented with consulting income from Soviet "industries" and from book royalties. Incidentally, the royalty system is of some interest. Authors of undergraduate books that present essentially no new material receive only a two percent royalty. Authors of graduate-level books presenting new material receive royalties as high as twenty percent.

Almost all of the scientists encountered during the course of the trip spoke some English, and the few who did not spoke either German or French. Almost everyone was able to read English, German, and French. In addition to the linguistic abilities of these people, excellent and rapid translation services are available so that any Soviet scientist can quickly obtain a written translation of any paper published in almost any foreign language.

The Institute of Scientific Information (Moscow) receives copies of all American, English, German, and French periodicals, translates the table of contents, writes brief abstracts of each paper, and within a month from the time of receipt of the periodical in the Soviet Union every scientist working in the field has the abstracts in his possession. Photocopies of desired papers may be quickly obtained upon request, and, if desired, a translation into Russian can be furnished within another month.

After rather extensive contact with many Soviet scientists, as well as examination of curricula at the several institutions listed above, we were forced to the conclusion that the recipient of a "diploma" received after five years of university work is at about the same level of accomplishment as a person who has just received an M.S. in America. In many cases the level lies between M.S. and Ph.D.

The average age of the "diploma" recipient is twenty-one years. If the man has an outstanding undergraduate record, he is permitted to continue in graduate school. There are no formal course requirements for either of the two advanced degrees. Usually, the student attends lectures and carries on self-study for approximately two years at a university, then frequently obtains full-time employment at some research institute for at least a year. During this year he prepares a dissertation which must be an original piece of research suitable for publication in the better Soviet scientific journals. Upon acceptance of this dissertation he receives the degree of "candidate." Actually, the degree is called "candidate in the technical sciences" (in the case of engineers) or "candidate in the physical sciences" (for those students in physics or mathematics).

The mode of defense of the dissertation is of considerable interest. Several months before the scheduled date of the examination, printed abstracts of the dissertation are widely distributed to prominent scientists throughout the Soviet Union. Anyone who is interested may then obtain a photocopy of the entire dissertation and offer written comments to the professors constituting the student's committee. All such questions and comments must be satisfactorily answered before defense of the dissertation is permitted.

The actual defense may be attended by any authorities in the man's particular field, and frequently twenty or thirty well-known people actively participate in the man's final oral examination. Fortunately, we had ample opportunity to examine a number of "candidate" dissertations in the field of mechanics, some at Moscow State University, some at Leningrad University. The quality and degree of originality of these investigations covered a rather wide range, with a few being approximately the same as a "good" American M.S. thesis, but with most being of the level of a "good" or even "excellent" Ph.D. dissertation in the United States.

There is no question that almost all of them would be suitable for publication in the better American scientific periodicals should they ever be submitted. It was said that, of all "diploma" recipients, approximately twenty-five percent eventually receive the degree of "candidate" in either the technical sciences or the physical-mathematical sciences. At least in the field of mechanics it may be said that the Soviet degree of "candidate" is roughly equivalent to the American Ph.D.

The Soviet "doctorate" is a degree based upon the continued production of original high-level research. There are no formal course requirements, and doctoral candidates usually attend only a few formal lectures but devote much time to self-study. If a man has established a creditable reputation during the period when he was working on his "candidate" degree, he is permitted to work toward a "doctorate."

In almost all cases, doctoral candidates are employed full time in research laboratories (seldom in university teaching) where they are usually at the project leader level (if not higher). In this capacity the man continues to do original research and publish the results of his findings in the better Soviet journals. After an interval of approximately seven to nine years, with the publication of approximately one paper per year, the man is ready to do his doctoral dissertation.

Again, we were able to examine a number of such dissertations, and in every case the level of the work was at least as high as that of a "good" American Ph.D. dissertation and in many cases higher. The same system pertaining to defense of the dissertation applies to the doctoral degree as to the "candidate" degree. It is said that, of all men who receive "diplomas" in either the technical or physical-mathematical sciences, about three percent eventually receive "doctorates."

It was apparent that the doctoral degree is granted only to men who are already established in their fields, such men frequently having had eight or ten papers published in the better literature. More important, the attitude of the man is considered, and it appears that the "doctorate" is granted only if there is every indication that the man intends to spend his entire career doing basic research in his field. Since the minimum age at which one can attain a "doctorate" is about thirty-five years, it appears that the applicant's professors could form a reliable estimate of his future progress prior to granting the degree. Evidently there are seldom, if ever, any cases where the holder of a "doctorate" is employed in industry.

At the undergraduate level, students coming

from families whose income is below a fixed level are automatically granted stipends to attend universities, and it appears that there is seldom, if ever, a student who is unable to receive a university education because of insufficient personal funds. All this provided, of course, that he has passed the extremely difficult college entrance exams. Contrary to certain statements that have recently appeared in the popular press, this student subsidy is not automatically granted to all students irrespective of need. Sons and daughters of well-paid scientists and industrialists pay a rather high tuition.

Some details of the undergraduate program in mathematics and mechanics at Moscow State University might be of interest. There are about 18,000 full-time day students enrolled in the university. Of these, approximately 2,000 are enrolled in mathematics and mechanics, 800 of these 2,000 being in mechanics.

The first two years for both mathematics and mechanics students are identical. Mechanics students during the third and fourth years study theoretical mechanics, applied mechanics (mostly nonlinear vibrations), theory of mechanisms, theory of elasticity, theory of plates and shells, theory of plasticity, theory of creep, hydrodynamics, gas dynamics, aerodynamics, and wave dynamics (elastic and plastic wave propagation).

The fifth year is devoted to some practice in industry as well as the writing of a thesis. An oral state exam must then be passed before the "diploma" is granted. This exam is uniform throughout the Soviet Union. A student gets a second chance to take this exam if he fails the first time. Only rarely is a third opportunity given.

If the student chooses elasticity as his specialty, he must pass exams in six of fourteen topics available in elasticity. These would include elasticity of anisotropic bodies, thermal stresses in structures, structural dynamics, and others. However, a general course in elasticity theory is required of all mechanics majors. Most graduates of the mechanics curriculum obtain employment in research institutes.

During the first two years these students also take courses in American, English, and French literature. In conversations with some of these students we were rather surprised at their familiarity with the classical literature in these languages. In many cases they had read these classics in the original language, not translations into Russian. Contemporary literature from these countries is evidently omitted. Also, the first year program includes one course in Marx-Lenin philosophies. This is the only appearance of this type of material in the entire curriculum.

Almost the same program is to be found at Leningrad University. Incidentally, engineering is never taught at the universities in the Soviet Union, but always at separate polytechnic institutes. Likewise, law and medicine are always found in institutes apart from the universities.

To Americans, the number of women enrolled in the engineering and scientific schools is a considerable surprise. It is said that one of every three students enrolled in the engineering schools in the Soviet Union is a woman. For example, in the department of mathematics and mechanics at Moscow State University, fifty-one percent of the undergraduates are women. In the same department at Leningrad University, fifty-two percent are women.

The research institutes we visited were staffed with many women investigators, most of them at the level of project leaders, not merely laboratory technicians. In a broader sense this is not surprising since there seems to be little, if any, difference between the work done by men and that carried out by women in the Soviet Union, even in such fields as heavy construction and road building.

After examining numerous research investigations in progress at the laboratories, we did not find the highest level of basic research in the field of mechanics to be any better in the Soviet Union than in the United States. However, the quantity of this high-level work in the Soviet Union is now between two and three times that in America, with the almost certain expectation that the Soviet endeavor will increase rapidly (as evidenced by the large number of students who are currently undergraduates and beginning graduate students) to such a point that within five to ten years from now their efforts will perhaps be of the order of ten times our present effort. Unfortunately, the current indications are that our research effort during that period will increase only by a very modest amount.—END

*Dr. Nash is Professor of Engineering Mechanics at the University of Florida, and has previously served on the faculties of the Illinois Institute of Technology and Notre Dame. This article appeared originally in* Industrial Laboratories, *published by Relyea Publishing Corp., Chicago, Ill., and is reprinted with their permission and that of the author.*

# ARPA

## *The Defense Department's "SPACE AGENCY"*

The primary effect of Sputnik on the Defense Department's space age research and development has been organizational. Before Sputnik, the military services—through such organizations as the Air Force's Air Research and Development Command, the Army's Ballistic Missile Agency, and the Navy's Office of Naval Research—did most of the "nuts-and-bolts" work "in-house" and contracted advanced research and development. They still do. But there has been interposed, for purposes of funding and coordination, a Defense Department "space agency" (which also is concerned with projects not strictly "space"), the Advanced Research Projects Agency (ARPA), as well as an over-all Director of Research and Engineering. ARPA's mission is described in the following fourth article in SPACE DIGEST's series on our National Space Effort. The accompanying chart, on the following two pages, shows graphically the relationships within the Department of Defense (including ARPA) in the National Space Effort.

THE intent of Congress, in legislation on the national space effort, was to create a separation of management between "civilian" space exploration and projects having "primarily military" applications.

Because of the continuous interchange of talent, hardware, and facilities in the still infant science of space technology, this is easier said than done.

But the ground rules have been laid, and under them the Defense Department is designated as the planner and funder of space research and development expected to have military applications.

These include among others: observation, navigation, communication, and meteorological satellites; super-thrust engine clusters; advanced forms of propulsion; maneuverable space vehicles with a reentry capability; and solid and exotic fuels.

ARPA, born after Sputnik, is headed by Roy W. Johnson, a former General Electric official. It has important dissimilarities from the National Aeronautics and Space Administration (see April '59 SPACE DIGEST). These differences go beyond differences in mission.

NASA is an executive agency unto itself with a considerable "in-house" research establishment carried over from its predecessor, the old National Advisory Committee for Aeronautics (NACA). NASA, as explained in April SPACE DIGEST, uses both its own research and development facilities and the facilities of the military services for its projects.

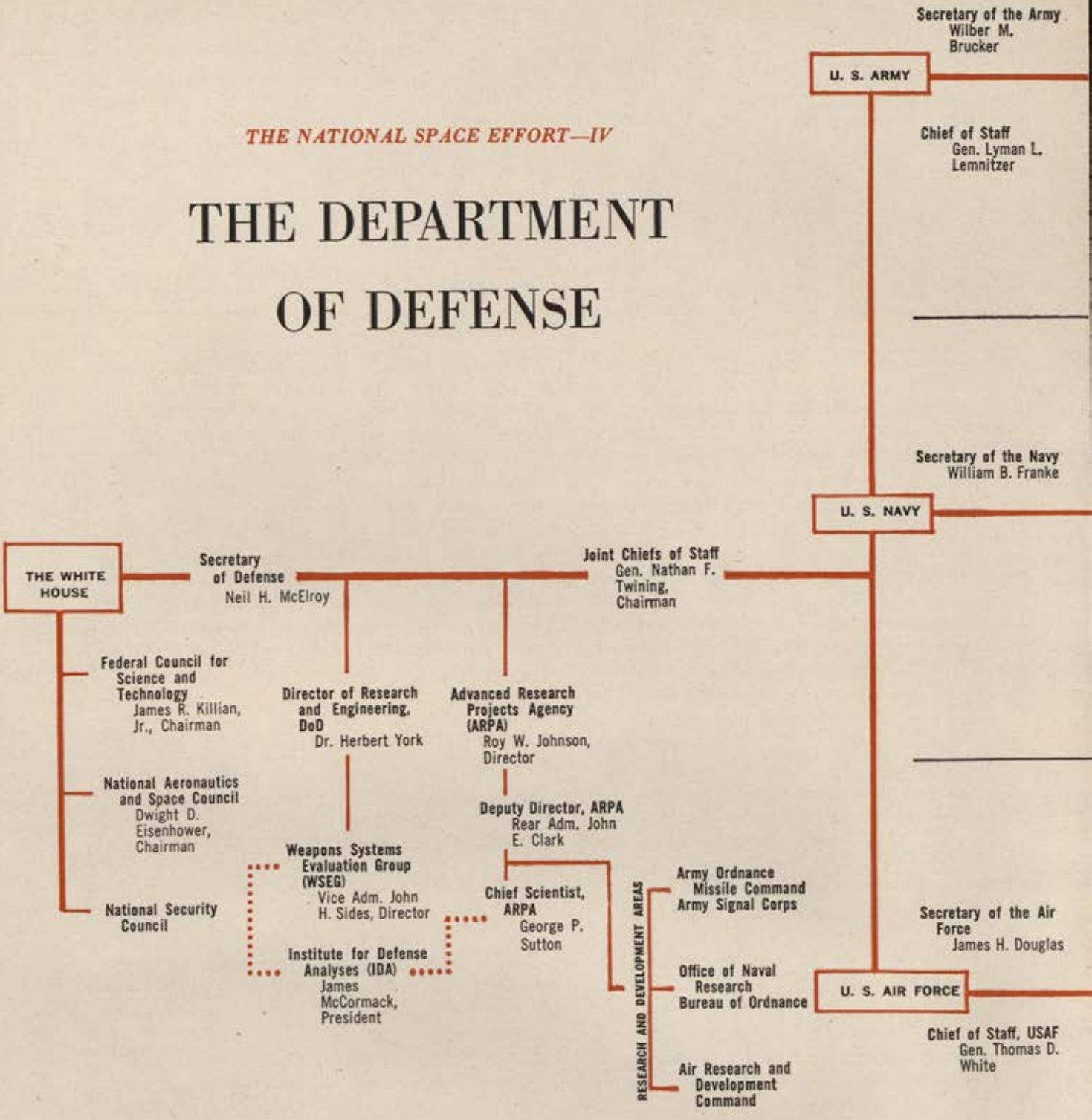
ARPA is, by its own account and present operation, a small-staff line agency of the Defense Department. Its principal job—with a FY '59 budget of approximately $427 million—is to initiate and fund programs in space technology, assigning them for development by the military services. These are, principally, the Ballistic Missile Division of the Air Force's Air Research and Development Command and the Army's Ordnance Missile Command. Those in turn let contracts to industry and research groups in a manner similar to the pre-ARPA approach. ARPA itself has no laboratories and does not contemplate setting any up.

ARPA does have contracting rights, but, for the most part, it has preferred to give the already established service research and development branches the contracting assignments, confining its own activities to initiating programs and keep-

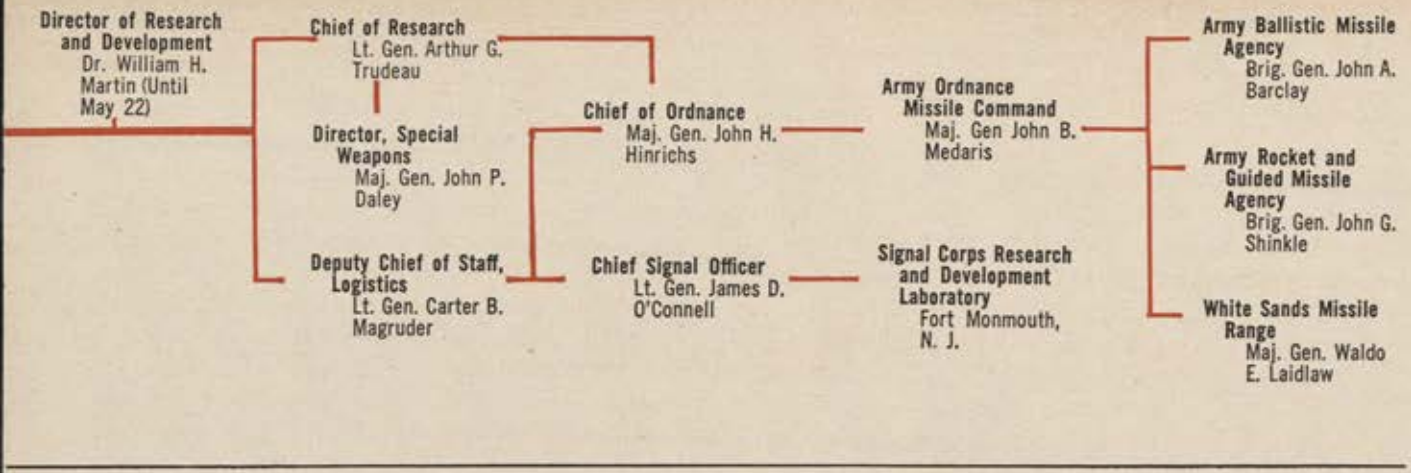
*See the following pages for a chart showing the command relationships within the Department of Defense, including ARPA and the three services, and DoD's role in the National Space Effort.*

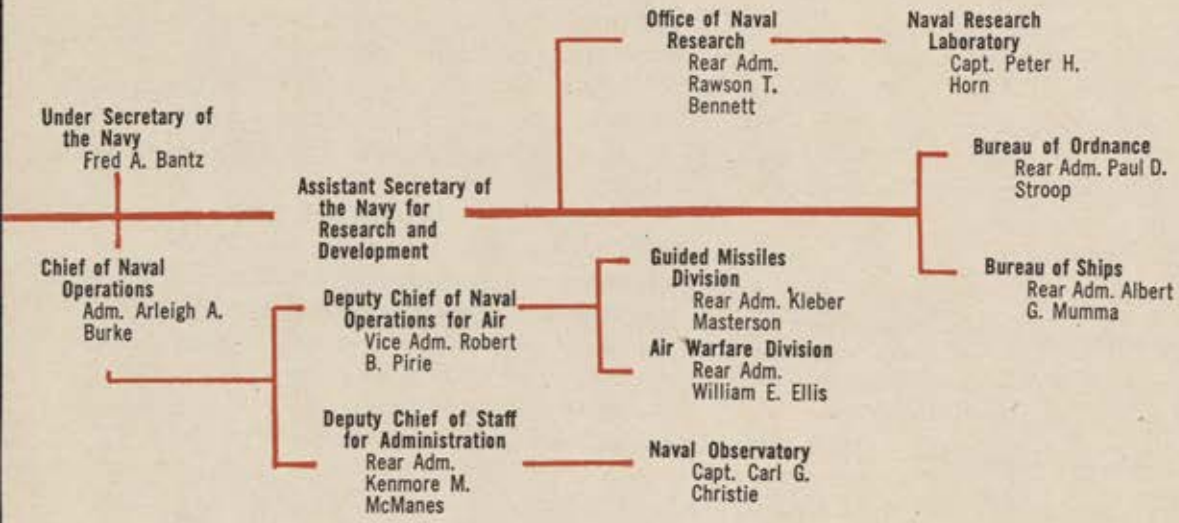
*THE NATIONAL SPACE EFFORT—IV*

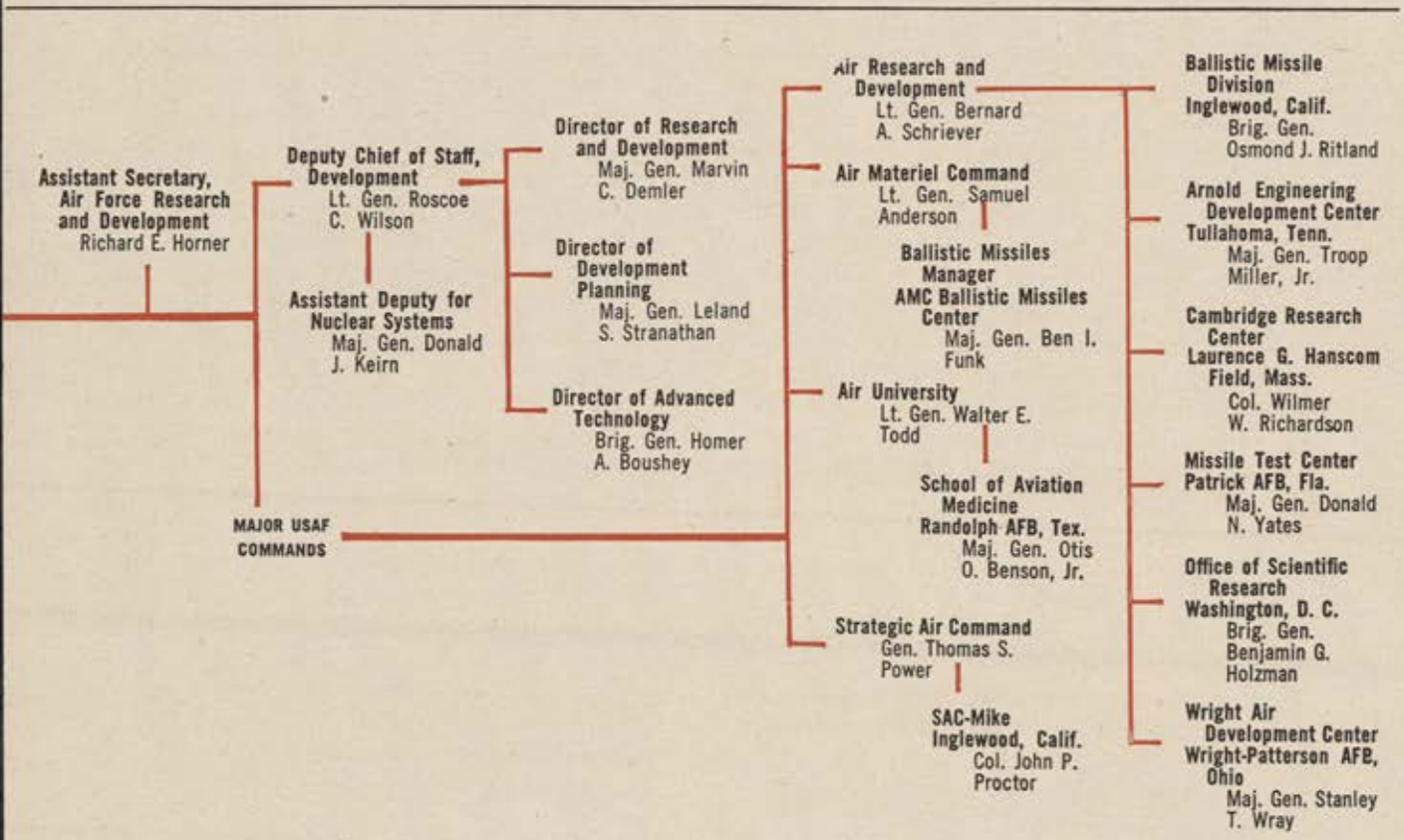
# THE DEPARTMENT OF DEFENSE




a *SPACE DIGEST* chart • April 15, 1959


Director of Research and Development
Dr. William H. Martin (Until May 22)
Chief of Research
Lt. Gen. Arthur G. Trudeau
Director, Special Weapons
Maj. Gen. John P. Daley
Deputy Chief of Staff, Logistics
Lt. Gen. Carter B. Magruder
Chief of Ordnance
Maj. Gen. John H. Hinrichs
Chief Signal Officer
Lt. Gen. James D. O'Connell
Army Ordnance Missile Command
Maj. Gen John B. Medaris
Signal Corps Research and Development Laboratory
Fort Monmouth, N. J.
Army Ballistic Missile Agency
Brig. Gen. John A. Barclay
Army Rocket and Guided Missile Agency
Brig. Gen. John G. Shinkle
White Sands Missile Range
Maj. Gen. Waldo E. Laidlaw


Under Secretary of the Navy
Fred A. Bantz
Chief of Naval Operations
Adm. Arleigh A. Burke
Assistant Secretary of the Navy for Research and Development
Office of Naval Research
Rear Adm. Rawson T. Bennett
Naval Research Laboratory
Capt. Peter H. Horn
Bureau of Ordnance
Rear Adm. Paul D. Stroop
Bureau of Ships
Rear Adm. Albert G. Mumma
Deputy Chief of Naval Operations for Air
Vice Adm. Robert B. Pirie
Guided Missiles Division
Rear Adm. Kleber Masterson
Air Warfare Division
Rear Adm. William E. Ellis
Deputy Chief of Staff for Administration
Rear Adm. Kenmore M. McManes
Naval Observatory
Capt. Carl G. Christie


Assistant Secretary, Air Force Research and Development
Richard E. Horner
Deputy Chief of Staff, Development
Lt. Gen. Roscoe C. Wilson
Assistant Deputy for Nuclear Systems
Maj. Gen. Donald J. Keirn
Director of Research and Development
Maj. Gen. Marvin C. Demler
Director of Development Planning
Maj. Gen. Leland S. Stranathan
Director of Advanced Technology
Brig. Gen. Homer A. Boushey
MAJOR USAF COMMANDS
Air Research and Development
Lt. Gen. Bernard A. Schriever
Air Materiel Command
Lt. Gen. Samuel Anderson
Ballistic Missiles Manager
AMC Ballistic Missiles Center
Maj. Gen. Ben I. Funk
Air University
Lt. Gen. Walter E. Todd
School of Aviation Medicine
Randolph AFB, Tex.
Maj. Gen. Otis O. Benson, Jr.
Strategic Air Command
Gen. Thomas S. Power
SAC-Mike
Inglewood, Calif.
Col. John P. Proctor
Ballistic Missile Division
Inglewood, Calif.
Brig. Gen. Osmond J. Ritland
Arnold Engineering Development Center
Tullahoma, Tenn.
Maj. Gen. Troop Miller, Jr.
Cambridge Research Center
Laurence G. Hanscom Field, Mass.
Col. Wilmer W. Richardson
Missile Test Center
Patrick AFB, Fla.
Maj. Gen. Donald N. Yates
Office of Scientific Research
Washington, D. C.
Brig. Gen. Benjamin G. Holzman
Wright Air Development Center
Wright-Patterson AFB, Ohio
Maj. Gen. Stanley T. Wray

ing track of their progress, especially when they are divided among Air Force, Army, and Navy. An example of one such divided project is the reconnaissance satellite.

This project, originally known as Sentry, but which has had a series of other names, is concurrently under development as an ARPA project by ARDC, AOMC, the Army Signal Corps, and the Office of Naval Research.

ARDC is providing the early propulsion, AOMC the "tomorrow" propulsion—the 1½ million-pound-thrust engine called Project Saturn. The Signal Corps is working on the communications payload, and ONR is planning the tracking system. Together, as ARPA sees it, all these approaches will meld eventually to create a weapon system. Which of the services will operate the final system will be up to the Secretary of Defense.

ARPA's assignment is thus to act as the research and development management arm of the Secretary of Defense and to set up a unified, single space program on the military side, utilizing the capabilities of the military services and their established industry suppliers of talent and hardware. In addition, ARPA is authorized to "farm out" projects to other government agencies.

To do its job, ARPA is organized with a staff of about eighty people.

Of this staff, approximately thirty are managers and administrative people, and the remainder are providers of technical advice. The technical group are scientific people from the Institute of Defense Analyses (IDA) who give technical advice on contract with ARPA. IDA is a nonprofit group of university technical specialists which also serves as a "brain factory" for the Defense Department's Weapons Systems Evaluation Group (WSEG), and the Joint Chiefs of Staff. In a somewhat unusual arrangement, George P. Sutton, who is Chief Scientist at ARPA, is also Director of IDA's Advanced Research Projects Division. This arrangement also existed when Dr. Herbert F. York, the newly appointed Director of Research and Engineering, was Chief Scientist of ARPA.

Here is probably a good place to explain the role of Dr. York in his new job.

When Dr. York was first appointed to the new post of Director of Research and Engineering, there was much speculation as to whether Dr. York would now be ARPA Director Johnson's boss.

On the face of things, that appeared to be the new status of Dr. York. But things are not that simple in the Pentagon.

As Dr. York explained it to inquiring senators, his is a staff job and ARPA is a "line" agency. This would seem to mean that Dr. York is to serve as a staff adviser to the Secretary of Defense on all research and engineering matters, which would include military space technology, but also in many other scientific areas. Thus Dr. York's role is somewhat similar to that of Dr. James R. Killian as Special Adviser for Science and Technology to the President.

But the analogy is only a rough one. Dr. York is charged with *thinking* about and *planning* for whole areas of technology, and he is a statutory officer, while Dr. Killian's job is even more generalized and primarily concerned with national organization of scientific effort.

Dr. York and the staff he is gathering about him are concerned with broad questions, such as, "What can we try in communications?"—*not* specific projects. His job will be to recommend to the Secretary of Defense technical *areas* that ought to be pursued or not pursued and to point up unnecessary duplication of effort, as well as to review work being done on operating levels.

The relationship between ARPA and Dr. York's office can be discussed only in terms of the Secretary of Defense and his authority.

ARPA Director Johnson reports directly to the Secretary of Defense, and his assignment of projects to the military services is subject to the order or approval of the Secretary. But at the same time he and ARPA are, like all the research and development agencies in the Defense Department, now under Dr. York's supervision.

Hence, ARPA can go to the Secretary of Defense with proposals for a specific project, and it is the Secretary who will make the decision. But of course the Secretary's principal scientific adviser is Dr. York, so certainly Dr. York's influence will be sizable and often decisive.

In a similar vein, although ARPA hands out most of the space assignments and funds for space technology to the military services, its word is not necessarily the last word. The Air Force, Army, or Navy can, through its civilian secretary, go directly to the Secretary of Defense for a decision.

As constituted, ARPA's Director sits at more or less the same level, in relation to the Secretary of Defense, as do the civilian service secretaries. ARPA acts essentially as a funnel for the regular military research and development establishment, serving as a combination of foreman and financier. Although there are many people who feel that ARPA is an additional layer in a structure already quite complicated, it is in business and seems likely to stay so.—END

ALBERT C. STILLSON

# SPACE CONTROL

## *HOW . . ?*

## *AND HOW MUCH?*

SCIENCE is giving man the physical and technological powers of Superman in a Buck Rogers suit. Man is attaining an awesome ability to control, exploit, transform, and destroy his earthly environment. The time is fast approaching when he will be able to move mountains, wipe out most diseases, circle the earth in a flash, and build machines to do a large part of his mental as well as his physical labor. He is now rippling the fringe of outer space. Soon he will have created a whole new age—the space age.

There is little to indicate, however, that science will give man either super-wisdom or super-morality with which he can alter radically his values, beliefs, institutions, and political behavior. A revolution greater than any scientific and technological revolution ever known would take place if men and nations were to utilize outer space for purposes different from those for which they have utilized the earth.

In spite of hopes and dreams for peaceful and regulated activities in outer space, we can expect that outer space will become another arena of competition among sovereign states and between the East and the West, in particular. Outer space competition will affect, and someday it may tip, the East-West balance of power. Likewise, the East-West balance of power must determine the feasibility of foreign policy goals, including goals such as the peaceful use and regulation of outer space.

In the space age, as at the present time, East-West competition will require that United States national security policy rely heavily on military power. While the detailed characteristics of outer space military policy will depend greatly upon future scientific and technological developments, some broad strategic concepts will be needed to give form and direction to that progress. Too often in the past, policy makers and military strategists have abdicated one of their major responsibilities: To attempt the very difficult task of directing and greeting the development of new weapons and new weapon systems with foresight and insight.

One concept which has been basic to seapower and airpower doctrine, each of which deals with a kind of spatial military power, is that of control. The concept of control may also be very helpful in analyzing outer space military power, which

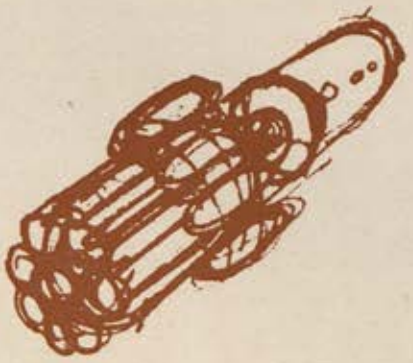
can be regarded as the purest form of spatial military power. The task of this article is to take a first step toward analyzing the concept of the military control of outer space and suggest some ways in which such an analysis may give helpful perspectives on national security policy in the outer space age.

Control of the sea and the air can be defined as the ability to use the sea and the air for national objectives and to prevent an enemy from using the sea and the air to attain his national objectives. What these objectives are and against whom they are to be supported determine how much, what kinds of, and in what ways control is to be sought.

In the abstract, control of the sea and control of the air, like the concept of perfect competition in economic theory, are analytical tools designed to render meaning to reality rather than to describe reality. The concept of control in seapower and airpower doctrine gives policy makers and strategists a standard against which they can estimate their military objectives and capabilities in relation to those of their enemies. That these objectives and capabilities do not permit perfect control does not mean that the control which is possible is not militarily advantageous or even vital.

For centuries, Great Britain came closer than any other nation to exercising perfect control of the sea. In employing wisely the strategic doctrine of control, Great Britain built and maintained a war fleet to ensure the safety of her communications and trade routes, to support her national objectives, and to prevent her enemies from using the sea to their own advantage. Although the British war fleet, operating from a worldwide network of naval bases, could take the measure of the naval forces of England's enemies, the control of the sea which the British war fleet won by decisive naval battles was not only imperfect but inadequate when decisive naval engagements did take place. Enemy commerce raiders could still use the seas, and enemy merchantmen could still make successful voyages.

Britain found it necessary, therefore, to establish control points, such as Gibraltar, which dominated the narrow exits and entrances separating and uniting the seas. Even these control points did not prevent Britain's enemies from using the sea advantageously. As a result, "close-in" blockades of enemy harbors and coastlines and blockades of sectors of the sea by naval squadrons were also employed by Great Britain to further seal off her enemies from the sea. Blockades, too, were a less than perfect means for controlling the



sea. The vastness of the sea, the vagaries of the weather, and the cleverness of enemies weakened and sometimes made ineffective the most carefully worked out blockade plans.

In more recent years, science and technology added new dimensions to sea warfare. England was forced to devote a large portion of her naval efforts to the task of ensuring her own use of the sea. She herself had to fight against strangulation by blockades of new types. She had to fight against the severing of her communications and trade routes by enemy submarines and aircraft.

As we know, however, Great Britain derived great political and military benefits from striving for control of the sea. She found that control of the sea was a viable strategic doctrine because the benefits conferred by less than complete control of the sea were greater than the costs of trying to achieve complete control and because an advantageous control of the sea was, in the main, technologically feasible. In spite of recent scientific and technological developments, control of the sea still seems to be a viable military concept, although it may not remain so beyond the immediate future.

Military control of outer space, on the other hand, may not be a viable strategic concept, for outer space military power will continue and will accentuate problems of control with which airpower doctrine has had to contend. These problems stem from scientific and technological revolutions in weapons and weapon systems.

In World War II the arena in which airpower played its part was infinitely smaller than the arena in which outer space military power will be exercised. Yet when the Allied air forces had general control of the air, their enemies, by obtaining temporary use of limited airspaces, could still carry out successful operations. With the advent of weapons of mass destruction, a temporary use of limited airspaces by relatively few planes is sufficient for the mounting of not

only successful but devastating attacks. Ever faster and more mobile delivery systems will make it increasingly difficult to prevent an enemy from launching major and repeated offensives. In the space age just a few missiles and rocket ships, launched from dispersed bases on the earth and in outer space and equipped with thermonuclear weapons, could easily constitute major and perhaps decisive military offensives.

Unless or until man lives in outer space a life independent of the earth, the use of outer space will have meaning only in relation to life on earth. For this reason, military control of outer space will be significant only to the extent that it affects the military policies and capabilities of the nations on the earth. The Soviet Union might develop the ability to use exclusively large sectors of outer space. But if she could not use this control to prevent the Western powers from destroying her earth-bound power centers, the East-West balance of military power would not be basically affected.

What, then, are the chances that use of outer space would significantly affect military relationships on earth? One possibility is that preempting outer space "property" such as the moon and putting into outer space man-made bases and platforms may lead to the creation of outer space control points similar to those earthly ones owned by Great Britain and used by the British Navy to control the sea.

It can be argued that, if the United States achieved control over the moon and built a military base on it, a very effective deterrent to Communist aggression would result. While a major Communist attack might wipe out most or all of the West's earth-bound retaliatory power within hours, Soviet missiles and spaceships would require about four and three-quarter days to travel from the earth to the moon. This time lag would give a moon base ample opportunity to mount a retaliatory attack against Communist power centers on earth. A moon base might, therefore, cancel out the advantages to be gained by initiating total war.

The value of a moon base as an outer space control point would depend partly on whether the threat of earth-bound retaliation or the threat of an earth-launched attack on the moon would deter a military power which dominates the moon from undertaking major aggression from either the earth or the moon. The answer to this question cannot be known at present, but simply by raising the issue it can be seen that there can be no sharp dividing line between earth-bound and outer space military power and control.

Another reason for doubting whether a moon base would be able to exercise any appreciable control over the actions of an enemy is that outer space "overseas" bases, unlike naval bases and air bases, probably will be established with relative ease and with relatively few restrictions as to their number. A moon base might readily be neutralized or put out of commission by a man-made space station or platform so located as to dominate the moon. It would appear, for the same reasons, that any space control point imaginable, either artificial or natural, could be neutralized or destroyed by either space-launched or earth-launched weapons.

As far as we can now foresee, the concept of control in outer space military doctrine is not invalid because outer space military powers cannot use or even dominate sectors of outer space. The invalidity of the concept arises from the fact that military adversaries cannot be prevented from using outer space effectively and that they can, with relative ease, neutralize, by-pass, or destroy outer-space control points established against them.

The probability that there can be no militarily decisive control of outer space and no viable concept of control in outer space military doctrine is significant in many ways for national security policy in the space age.

The inapplicability of such a concept in the space age indicates that, at a time when policy makers and military strategists desperately need

a doctrinal framework on which to hang and give a degree of order and meaning to new and perplexing scientific and technological developments, they will find it difficult to obtain guidance from existing strategic doctrines. As a result, policy makers and military strategists will have to soar into outer space instinctively—"by the seat of their pants," so to speak. This does not mean that they will always have to rely on posterior guidance systems or that they will have to soar aimlessly.

A hazy but basic guideline for outer space military policy is that outer space weapons and military instruments will undoubtedly be militarily advantageous and play an important if not major role in the East-West military struggle. The improbability that outer space military power, in itself, will determine the East-West balance of military power does not lead one to the conclusion that the United States need not pursue an active and imaginative outer space military program. Reconnaissance and communications satellites, space stations, and space bases for missiles and rocket ships may join with both earth-based outer space weapons and earth-bound weapons in such ways that the power of defensive as well as offensive weapon systems will be greatly augmented. A "mix" of outer space and earth-bound weapon systems may be incomparably superior to earth-bound weapon systems.

What the proper "mix" of outer space and earth-bound weapons should be at any given time in the space age will be hard to determine. We can be fairly certain that no single weapon or weapon system would give a clear military advantage over an enemy, although each weapon and weapon system would have definite and constantly fluctuating military advantages. This situation, plus both the lack of a workable concept of control in space age military doctrine and ever changing weapon technology, will make for an uncertain and unstable balance of military power between the East and the West. Such instability could easily lead to miscalculation of military capabilities, and it might be conducive to reckless foreign and military policies.

At the present time, the so-called "balance of terror" helps to work against recklessness in foreign and military policy. But a balance of terror, to be meaningful, requires a concrete approximation of the risks which aggression and war would entail. It is exactly this approximation which the volatile nature of space age weapons and weapon systems may prevent. A general feeling of terror in the space age would not deter war as effectively as fears of identifiable and measurable war dangers.

The dangers inherent in the instability of the balance of East-West military power in the space age will be joined by another danger which also springs from lack of an appropriate concept of control in outer space military doctrine. This danger is that fighting in outer space would automatically involve earth-bound military power, and that fighting on earth would automatically involve outer space military power. Because neither outer space nor earth-bound military power gives promise of being decisive in itself, the two, being "mixed" for maximum military security, could not easily be "unmixed" in case of war.

For this reason, it does not seem that in envisaging and planning for space age military security we should place emphasis or importance on the likelihood of being able to wage total war in outer space alone. A total war between the East and the West which could be waged entirely in outer space without involving directly life on earth certainly would be more desirable than a total war which ravaged both outer space and the earth. Outer space fighting, however, could not settle decisively an East-West war unless the victor won military control of the earth. This will be precluded, apparently, by the nature of space age weapons and weapon systems.

Skirmishes in outer space alone may, on the other hand, be possible. It is not unreasonable to assume that outer space military competition may result in outer space fighting. A situation which comes immediately to mind is the shooting down of an adversary's reconnaissance or "seeing-eye" satellite. Depending on the level of political tension and the heat of outer space military rivalry, such an act might result in retaliation in kind or on a broader front. We have some grounds for hoping that outer space skirmishes will not expand into total war, because military control of outer space will not exert a decisive military influence on the international power struggle. But

outer space fighting that involves or jeopardizes the strength of the "mixes" of outer space and earth-bound weapons could easily develop into total war. The same can be said of "brushfire" wars or skirmishes that start on the earth.

With the instability of the space age balance of military power, the volatile nature of weapons and weapon systems is constantly being altered and refined by science and technology; and with the great variety of weapons which will operate through, in, or from outer space, policy makers and military strategists will be hard put to place the proper emphasis on the military instruments which will best support national objectives. Nonetheless, at least two guiding principles for the allocation of space age national defense efforts appear to have merit.

The first is that space age defense policy should not attempt to use and at the same time to deny to an adversary large sectors of outer space. Control of outer space, in itself, is not likely to be of primarily military significance, and attempting to colonize outer space will dissipate efforts that could be better invested in decisive military power. Control of sectors of outer space may be considered important for psychological, ideological, or scientific reasons. The over-all political considerations of outer space national security policy may dictate a policy of control, whereas narrower considerations of military strength may dictate otherwise. The very great anticipated costs of space age security policy demand that careful attention be paid to national means and national ends.

The second guiding principle is that a large portion of national security efforts should be devoted to military defense of strategic areas on earth and to civil defense. The power, speed, sophistication, and mobility of outer space weapons and weapon systems will increase hundreds if not thousands of times the capabilities of military offense. A fleet of rocket ships, for example, attacking from hidden earth bases or from dispersed and far flung space bases could wreak havoc on earthly power centers. For this reason, a requirement for rugged civil and passive defenses seems to be indicated. Defense of earthly power centers, by relying on offensive power, would face the immense task of destroying hidden, dispersed, mobile, and numerous enemy bases and power centers. Defense by offensive power would run the grave risk of awarding an enemy the first and perhaps only blow.

Defenses against missiles and all types of space vehicles will be costly. Such defenses constructed in outer space would probably be ineffective because of the improbability of attaining a militarily meaningful control of outer space. The remaining and apparently the only successful defense of earthly power centers would be a "close-in" defense. To be effective, even a close-in defense would undoubtedly have to stretch into wide sectors of outer space. But insofar as possible, it should be a closely knit defense grid. Any other type of defense not only promises to be ineffective, but also would result in dissipation of security efforts. All this does not mean that major efforts should not be put into military offense. It does mean that in the space age we cannot afford to neglect, as we have been wont to do in the past and the present, what are now called air, civil, and passive defenses.

What has been said here must be regarded as purely suggestive. We must be imaginative enough to begin planning for national security policy in the space age, and we must be flexible enough to alter those plans when necessary.

We cannot know with certainty that a thoroughgoing military control of outer space, and therefore a viable concept of control in outer space military doctrine, will not be possible. The important thing is not to make "right" of "wrong" speculations about space age military power and doctrine. The important thing is to start thinking about these matters.

One who does this, no matter what particular set of hypotheses he derives, must conclude inescapably that political, military, and scientific instability in the space age will be very great. Living with and developing wise national security policies within the framework of this instability promises to be an immensely difficult task. The task will be made possible only if we have the courage to recognize it for what it is—a dirty but necessary business.—END

*Mr. Stillson is an analyst in national defense in the Foreign Affairs Division of the Legislative Reference Service of the Library of Congress and was previously a research assistant at the Institute of War and Peace Studies at Columbia University.* *This article was originally published in the* Journal of International Affairs, *edited by graduate students at Columbia's School of International Affairs, and is reprinted with permission of that publication and the author.*

*The Importance of Being Graphic*

# *A Visit with Space Doctor Hubertus Strughold*

*WILLIAM LEAVITT*
*Associate Editor*

THERE are currently two honorary mayors of San Antonio, Tex., site of the world's first center for the study of space medicine, the Air Force's Division of Space Medicine at Randolph AFB. One of them is T. Keith Glennan, Administrator of the National Aeronautics and Space Administration. Mr. Glennan received the honor during a recent visit to Randolph, shortly after the announcement of the Project Mercury program to place a US airman into orbit.

The other is a gregarious, ruddy-faced, white-haired, German-born physiologist in his sixty-first year who speaks precise English with a strong but pleasant accent. He is Dr. Hubertus Strughold, the now-famous "father of space medicine." Dr. Strughold a decade ago helped to found, with the strong backing of the then commandant of the Air Force's School of Aviation Medicine, Maj. Gen. Harry G. Armstrong, what at that time was called the Department of Space Medicine. Dr. Strughold's name has become synonymous with this newest branch of medicine, and he holds the first awarded academic title of Professor of Space Medicine at SAM.

I visited last month with Dr. Strughold. My assignment was to find out "what manner of man" he is and to record the doctor's views of his own contributions to the burgeoning field of astronautics.

We sat together over coffee in his modest office a few doors away from that of the commandant of SAM, Maj. Gen. Otis O. Benson, Jr. We talked of the swift movement of events that have brought man, almost to his own surprise, to the very brink of spaceflight.

I asked Dr. Strughold, whose record of aeromedical research goes back to the days of Lindbergh, including basic studies of the effects of oxygen deprivation in high altitudes, what he thought his own major contribution to the new age had been.

And surprisingly, he glossed over his laboratory work in the thirties and forties in Germany, where during World War II he was chief of the Aeromedical Research Institute in Berlin. Instead, he identified his main contribution as *semantic*—the creation of terminology that in his words brought "some order" to the pile of aeromedical data he and others had accumulated to protect aviators reaching higher and higher into the atmosphere.

On the matter of space, Dr. Strughold pointed out that a new terminology is what finally brought spaceflight, as he put it, "down to earth."

"For a long time," he said, "when people thought about space or space travel, they always thought in terms of the moon or the planets. It all seemed so far off and visionary that it really wasn't quite respectable. In fact, at some of the early astronautical and rocket society meetings in Europe, the idea of *manned* spaceflight was almost unmentionable.

"But the truth of the matter was that as the airplane went higher and higher, we were reaching what I liked to call 'space equivalence.' For all practical purposes, beyond certain altitudes, we were already in space, as far as the support of

human life by the tenuous atmosphere was concerned.

"I presented this idea and used this expression at formal scientific meetings. And the term caught on.

"And you know," he went on, "once I had used the expression formally, it began to crop up in other papers. It helped both the popular and the scientific communities to accept the fact that spaceflight was a much more real thing than a trip to Mars."

This fascination with the significance of words and definitions is the key to Dr. Strughold's scientific method as practiced during a career that—judging from his present energy—has many a year to go.

The doctor believes that scientific data isn't of any real value unless it is clearly understood, in all its ramifications, by the people most affected. Half of the scientist's job is the clear and dramatic presentation of his data to others.

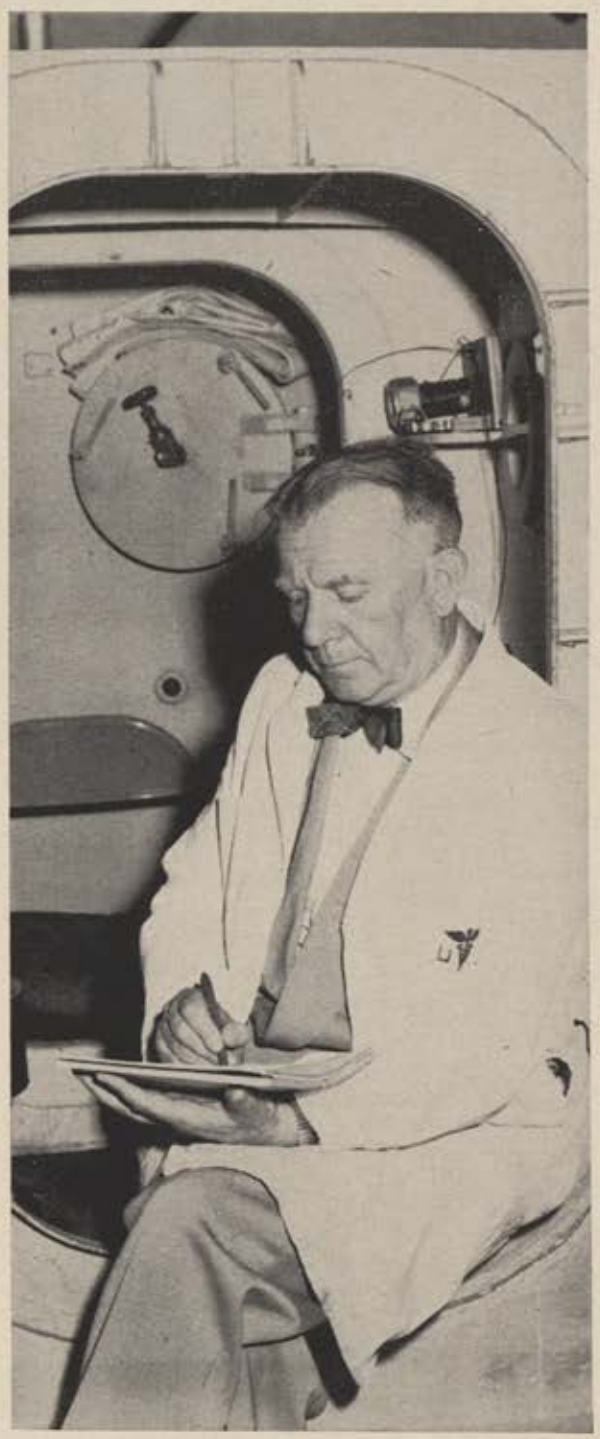
He recalls that in the early days of the pre-World War II German Air Force many pilots thought it unheroic to use oxygen at high altitudes. Part of his job as an aviation physiologist was to demonstrate what happened to high-flying airmen when they were deprived of the absolutely necessary oxygen.

He used two methods. So that the airman would remember the lesson, he exhibited motion pictures of hypoxia effects, showing a Chinese subject rather than just another German airman. Then to clinch the lesson, he persuaded high command officers of the Luftwaffe to appear in another film sequence illustrating hypoxia effects.

"The airmen learned the same lesson twice. They, of course, remembered the Chinese, because he was different. And they saw that even a high officer got sick when he needed oxygen. From then on, it was easy to make the use of oxygen in high-altitude flight mandatory. If top Luftwaffe officers had to use oxygen, it wasn't a matter of courage but of necessity."

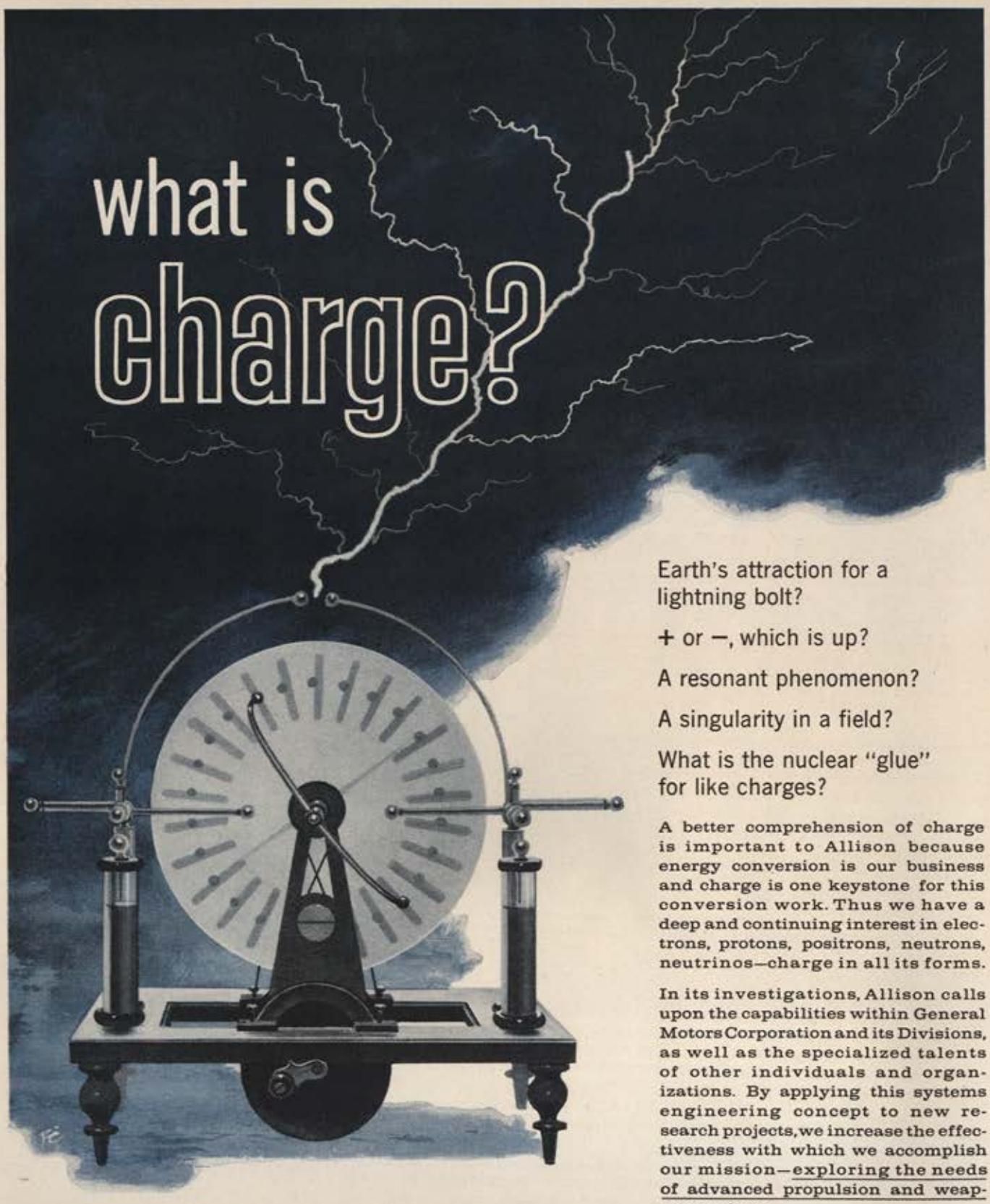
Dr. Strughold, a bachelor whose job is his home, is away from the laboratory these days, devoting most of his time to an exhausting schedule of meetings and conferences, including an itinerary of speechmaking across the breadth of the land that would tire most younger men. His desk is littered with invitations to appear at this meeting or that. There is a bright sparkle in his eyes as he recalls the lean days in the mid-fifties when he was the *entire* Department of Space Medicine at Randolph.

He remembers the early days when he first



*Dr. Strughold with the Air Force Division of Space Medicine's space cabin simulator at Randolph AFB, Tex. In 1958 A/1C Donald G. Farrell earned world headlines during his seven-day "flight to the moon."*

# what is charge?



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+ or −, which is up?

A resonant phenomenon?

A singularity in a field?

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came to the US Air Force, after having been invited, along with several other well-known German scientists, to come to the United States after the collapse of the Third Reich.

As Director of the Aeromedical Research Institute in Berlin, and in his earlier career as a physiologist who had performed such experiments as injecting his own buttocks with novocaine to see if there was anything to this business of "flying by the seat of your pants" (there was), he had earned a considerable reputation in international scientific circles.

The end of the war in Germany saw him a voluntary prisoner (he had worn a colonel's uniform in the Luftwaffe) of the Allied forces. With other researchers, he served at the American-operated Aeromedical Institute at Heidelberg, compiling the results of German aeromedical research as part of what was called "Operation Paperclip." This data was published later in the United States under the title "German Aviation Medicine in World War II."

After a brief postwar tour teaching physiology at the University of Heidelberg, he decided to start life over in America and accepted General Armstrong's invitation to come to SAM at San Antonio.

At Randolph he was at first mostly occupied with the finishing touches of the compilation of German research results.

When this was completed, Dr. Strughold and colleagues—including astrophysicist Heinz Haber, his engineer brother Fritz Haber, and Konrad Buettner, all brought here by the Air Force—agreed that aeromedics should be looking ahead to the preparation of man for flight beyond the appreciable atmosphere.

He recalls the careful discussions of what the new department's name would be.

"There were several candidates, and finally we made a list including such names as astro medicine, cosmic medicine, spaceflight medicine. . . . I thought that spaceflight medicine was somewhat redundant, and we finally decided to simplify the name to . . . space medicine."

Dr. Strughold gives great credit to General Armstrong—who had paralleled much of the aeromedical research in Germany with similar studies of his own here in the US—for his great foresight in promoting the establishment of the Department of Space Medicine.

One of the earliest Strughold-sparked projects in space medicine was the building of the sealed cabin that became famous when in 1958 A/1C Donald G. Farrell took his simulated moon flight.

Dr. Strughold and his colleagues had some years earlier pointed out that, beyond altitudes where air could be pressurized, a sealed cabin was going to be a necessity.

"We had one built, and eventually we began to run tests with volunteers . . . but there was something dreary about the name," he recalls. "How could people get enthusiastic about something called a sealed cabin?

"One day, I spent several hours thinking about it and decided that from then on we would call the sealed cabin a *space cabin simulator*. And that's what we called it. It was amazing to note the difference the new name made. People got much more interested and enthusiastic."

Dr. Strughold's preoccupation with space and the need for adequate terminology to describe it is reflected throughout his writings.

He talks about the ecosphere: the Venus-Earth-Mars system where conditions combine to make life possible—of spatiography: the geography of space—of the gravisphere: the effective reach of a planet's gravitational attraction.

But most of all, and after a lifetime of scientific study that began with experiments on his own body to determine the thresholds of heat, pain, and cold, he thinks about the great boons in human knowledge that space medicine will bring.

"Even if for one reason or another, we never get there, we will have learned so much about ourselves that it will have been worth all the effort."

But just as a clincher to unbelievers, he adds a little discussion of the theory among some astronomers that the sun, will some day expand enormously and draw first Mercury, then Venus, then earth into its fiery embrace.

"In fact," he says, "Jupiter, with an orbit much closer to the expanded sun will be the new earth; and, of course, we will have to be ready to move there before things get too hot here."—END

# Speaking of SPACE

## Meteorological Activity

Soviet advances in meteorology are the subject of growing concern by American experts in the field. In the areas of weather control and prediction, upper atmosphere research, meteorologic planning for economic development, and a wide range of meteorological R&D problems, Russian scientists are narrowing the Western lead. Their skill in mathematics and pure science, plus technical advances in dissemination of existing literature and improved physical equipment have enabled Russians to make remarkable progress in the past several years. Malcolm Rigby, in a speech to the annual meeting of the American Meteorological Society, cited the extensive work being done in Russia, as part of a massive subsidization of science and technology, to acquaint scientists and students with the literature in the field. Russian publications in this period increased sharply, to a point where the total about equaled the output in the US.

*GEORGE "MOON" MEYERS—By Jack Tippit*


*"We found most of the creatures up there very friendly and cooperative. . . . A group met us as soon as we landed and gave us chocolate bars and cigarettes."*

Similarly concerned with doing more than just talk about the weather, a number of universities and the National Science Foundation are organizing important meteorological centers.

The University of Chicago, the University of Chile, and the University of Texas have joined in a project to study the southern sky from an observatory to be built near Santiago. Dr. Gerard P. Kuiper, chairman of the Department of Astronomy at the University of Chicago, will head the joint effort as an extension of his work with the Yerkes and McDonald Observatories.

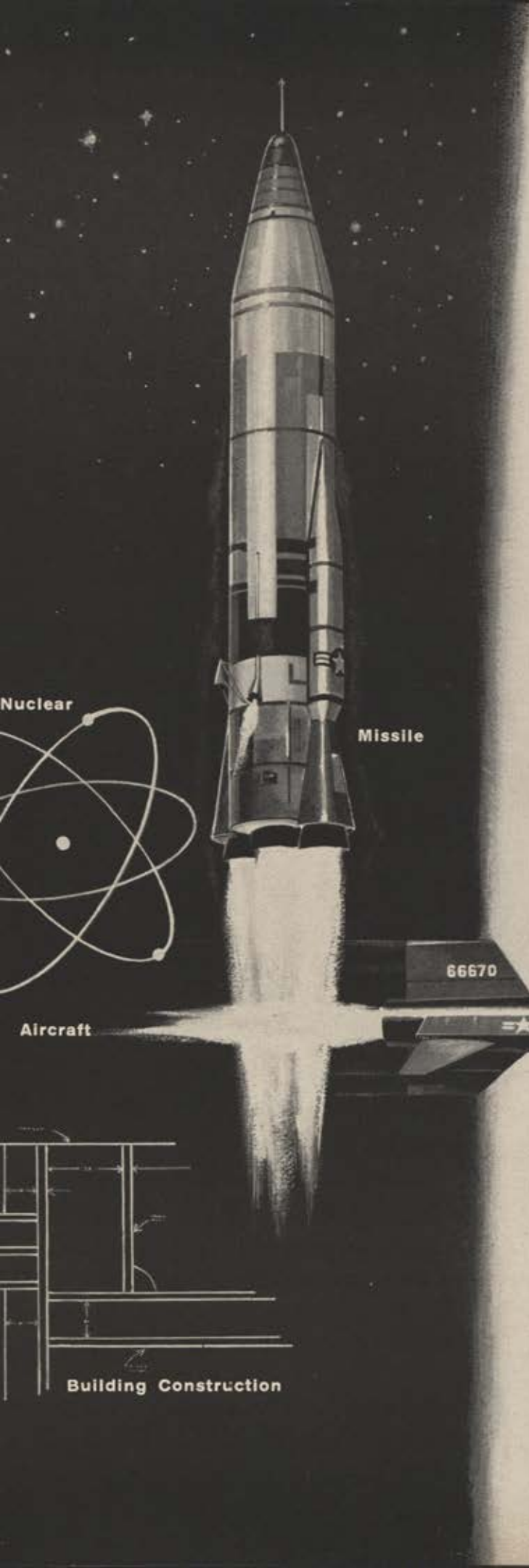
UCAR, University Corporation of Atmospheric Research, is a new organization of thirteen universities which have proposed a $71 million weather institute, with most of the money to come from the National Science Foundation. The proposal for the institute is a result of studies made by a panel of the National Academy of Sciences, headed by Dr. Lloyd V. Berkner, who found meteorology to be one of the most difficult, most challenging, and yet relatively one of the most neglected scientific problems of our times.

## Perfect Record

The third Martin SM-68 Titan ICBM was launched from Cape Canaveral on April 3 for a successful test of its first-stage Aerojet engine. The second-stage propellant tanks were filled with water as a ballast, as in the earlier tests.

## Brighter than Stars

NASA will launch a giant aluminum-coated 150-pound balloon this fall, and two more next year, following a program begun some time ago at the Agency's Langley Laboratory, Va. The 100-foot diameter ball will orbit about 1,000 miles from earth, reflecting about ninety-eight percent of radio waves from high-powered transmitters back to the earth. Propelled into space deflated, the balloons will be ejected into orbit and automatically inflated by a nitrogen gas cartridge. Energy reflected by the satellites will be diffused in all directions, but at 1,000 miles altitude, according to T. Keith Glennan, NASA administrator, they will be visible from the earth, and at night will be brighter than the North Star.

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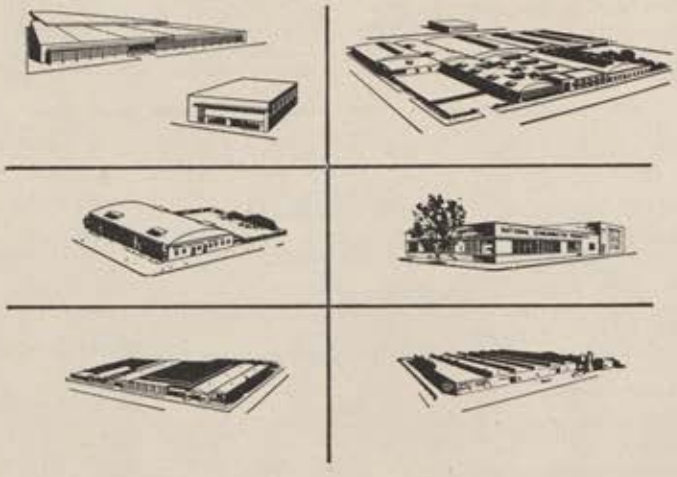

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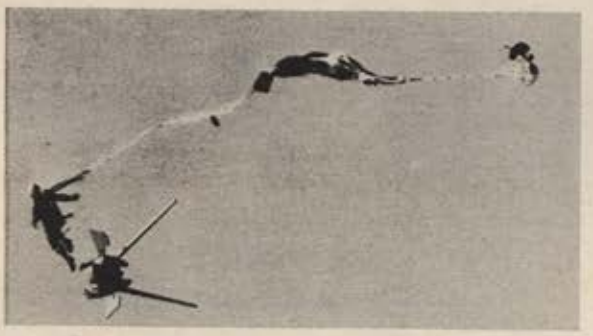
*Shots of X-15 dummy ejection from Edwards AFB rocket sled. Above, "Pilot" emerges, is on way.*

*Dummy is propelled to safe height for chute home.*



*Pilot breaks free from seat and the parachute opens.*

*Near ground, chute opens to cushion the landing impact as the dummy ejection experiment ends.*

## Outer Space Pool

A Moscow radio broadcast, reported in a recent issue of the British magazine *Flight*, suggests that international resources should be pooled to send an expedition of several dozen craft into outer space. Although this would be extremely expensive, the broadcast said, "If the whole world cooperated, not only in scientific work, but in bearing the cost, that would be a big help."

The broadcast added, "We can be sure that the difficulties connected with the mastery of outer space will be overcome much better and sooner if several countries—and especially the Soviet Union and the United States—pool their material and intellectual resources."

This fits in well with the plans of the United Nations Committee on the Peaceful Uses of Outer Space, which expects to hold its first meeting soon. It has not met so far because of a Soviet boycott resulting from the complaint that the committee has a pro-Western majority. The Western members want to elect officers and firm up the committee's role in outer space activities. Some delegates hope that the disagreement over the Soviet participation can be solved, perhaps at a meeting of heads of government.

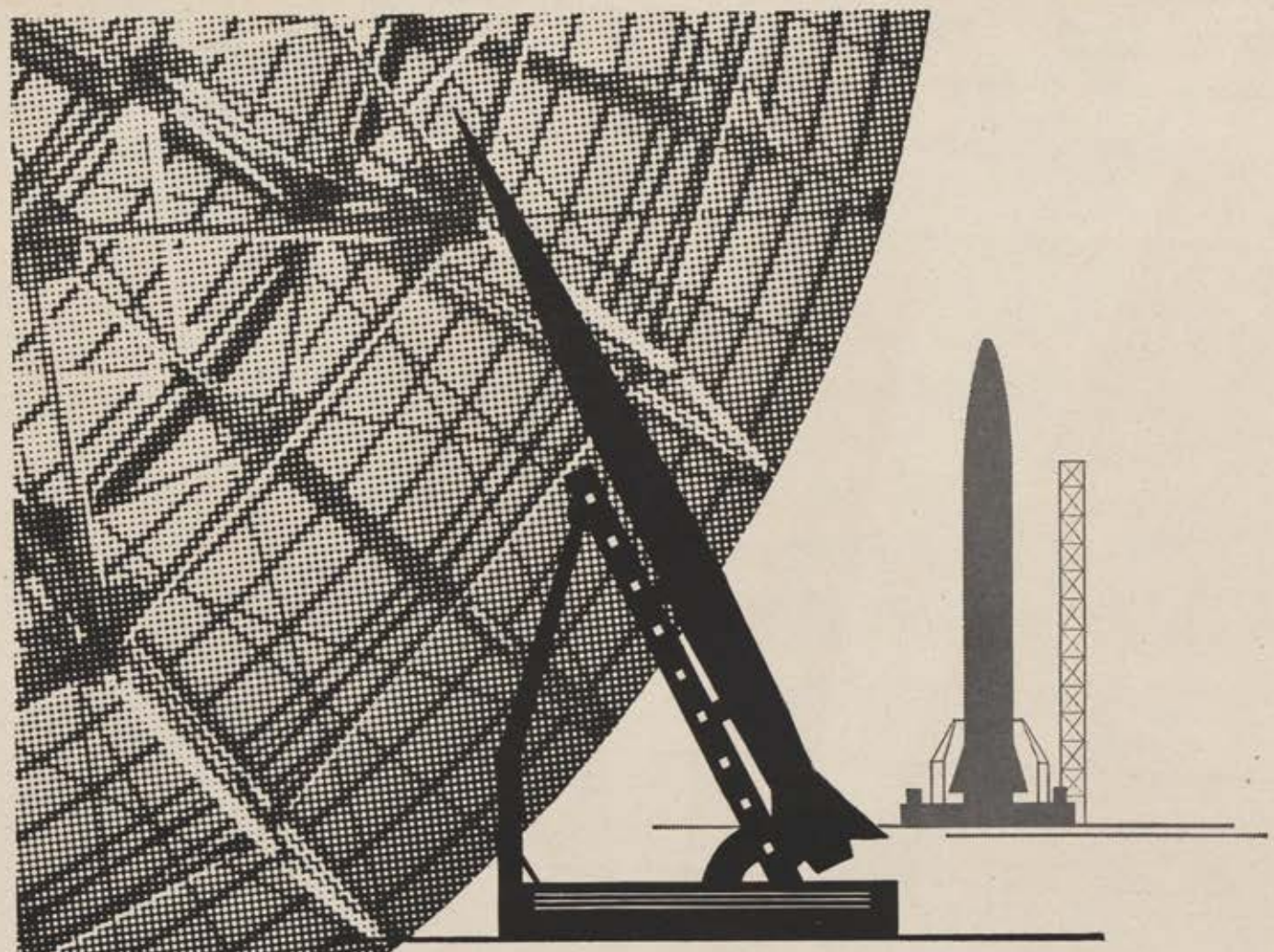
## Postscript?

Our friends at National Aviation Education Council tell us that the first pressure suit was worn in 1934 by Wiley Post. It made Post look like a deep-sea diver and was so heavy that he had to be hoisted into his plane.

## Speech Briefs:

*Dr. Willard F. Libby, commissioner, Atomic Energy Commission, to the Federation of Engineering Societies, Philadelphia, Pa.*: "The explosive rate at which the world's population is increasing at the present time is a dominant fact, and its bearing on our future is more important than almost everything else. . . .

"The probability of occurrence of great genius will increase proportionately with the population and the probability of having another Einstein or Pasteur or Enrico Fermi will double every fifty years or more. . . . Therefore, we can expect . . . that the rate at which knowledge increases will also be equally accelerated. . . . We must prepare and learn to expect that new discoveries will occur and that these discoveries are normal and are to be anticipated. . . ."



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*Resting comfortably, an Air Force researcher tests the prototype net system designed to support body in high-altitude acceleration during rocket-powered flight.*

*John Anderson, University of Minnesota's Institute of Child Development and Welfare, to the National Institutes of Health, in Washington, D. C.*: "The pre-Sputnik hypothesis that education should center around the needs of the child as a person has met a reversal. There is emerging a strong emphasis upon imposed standards, periodic checks, utilizing the resources of the gifted child for society's benefit."

## Fun in the Dark

Anyone with long arms or low ceilings will be able to create a chart of the sky in a few busy minutes with the set of 250 stars, four planets, the moon, and many unidentified round dots, made by Stars of North Hollywood. Just glue them on, or up, according to the star map included with the kit, turn out the lights, and the phosphorescent stars and planets shine down from your ceiling. Or try them in the kiddies' bedroom and let them count stars till they fall asleep. Excellent way to familiarize youngsters with stellar formations and the shape of the solar system.

## Versatile Thor

The Air Force retrieved a third Thor data capsule from the waters of the Atlantic missile range last month —an instrument package ejected from the missile in flight. In addition to its space-probe attempts, the Thor has made more than twenty-six ICBM trips to date and will be part of several space ventures this year. Expected are a June Venus probe shot and a 25,000 mile–high radiation–test.

## Appointments

DR. NANCY ROMAN of the NASA Office of Space Sciences is head of the new Orbiting Astronomical Observatories group formed by NASA to explore the X-ray, ultraviolet, and infrared regions of the electromagnetic spectrum. The NASA Satellite Iono-

## MOMENT IN HISTORY

*THIS IS THE "FIRST FLIGHT" of the new Air Force TITAN, America's most powerful weapon and our No. 1 challenger in the big-missile field. Time: 2/6/59—4:22 p.m. EST. The most important thing about this moment in history is not visible here—and it is this: Three years to the day from the breaking of ground at Martin-Denver, TITAN No. 1 roared into the sky. Those 36 months saw the creation of the free world's most advanced ballistic missile facility—and the development, production, testing, delivery and launching of the first of an entirely* new *generation of ballistic missile weapon systems, forerunner of the Global Ballistic Missile. TITAN is the result of an advanced engineering concept—developed by Martin under the direction of the Air Force's Ballistic Missile Division of the Air Research and Development Command—which provides the most extensive pre-flight testing of components, subassemblies and full scale missiles ever undertaken. This method in the TITAN development, and in the generations of space systems to follow, may well be one of the most important single factors in speeding America's bid for space supremacy.*

spheric Beacons group is headed by J. C. SEDDON of the NASA Space Projects Center.

DR. JOHN T. RETTALIATA, president of the Illinois Institute of Technology, has replaced DR. JAMES H. DOOLITTLE on the National Aeronautics and Space Council.

DR. JAMES R. KILLIAN, the President's Special Assistant for Science and Technology, is the chairman of the new Federal Council for Science and Technology created by President Eisenhower on March 13. The council includes the director of the National Science Foundation, the administrator of NASA, members from the Atomic Energy Commission, the departments of Commerce, Agriculture, Defense, Interior, and Health, Education, and Welfare.

## ECI Course 3111

For servicemen with space in their future, the Extension Course Institute of the Air University has a course in guided missiles, including history and aerodynamics, structure of missiles, guidance and propulsion. Also recommended to Reservists on inactive-duty status—worth forty-eight points.

## Stellar Evolution

Can we compare theories of the origin of the species with conjectures on creation of the stars? Otto Struve of the Leuschner Observatory, University of California, suggests that information about the stars today has increased to a point where an astrophysical Darwin could construct a science of stellar evolution.

Darwin's tremendous accomplishment, collecting and classifying an enormous body of facts about living creatures, might be duplicated for the cosmos, Dr. Struve suggests in an article in March *Sky and Telescope,* by a student of presently-known facts about the stars and stellar evolution. The raw materials, including S. Flugge's *Stellar Structure,* exist in many places, but await the scholars to collect them, resolve apparent and actual inconsistencies, and categorize the material into useful form. Dr. Struve feels that the astronomical *Origin of Species* is almost ready to be written. —MICHAEL B. MILLER

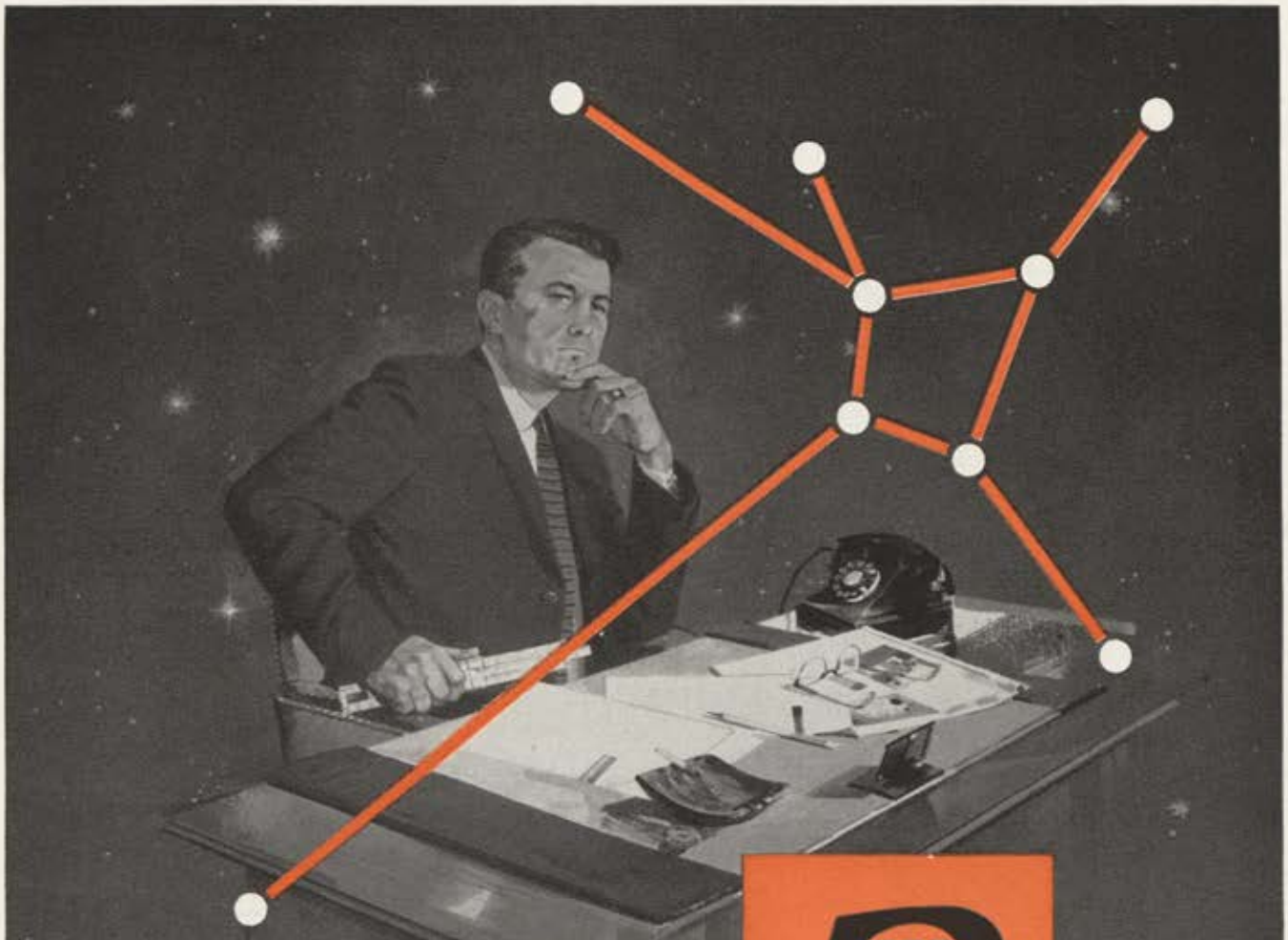
*SAFETY SPECIALISTS AT THE LAUNCH PAD*


*Wearing protective garb, technicians take samples of missile fuels, which are then taken to the laboratory for tests to check toxicity.*

# MISSILE MEDICINE

*Biochemistry-toxicology chief, Maj. Jack Meyer, runs tests on fume samples gathered at launch to determine their effect on the missilemen.*

WHEN someday you board a passenger rocketliner at New York for Paris or even the moon, your personal safety at the fiery launch will be due in great part to today's work by an unsung Air Force scientific team at the Air Force's Missile Test Center, Cape Canaveral, Fla. The Occupational Health Research Laboratory, a nine-man group of physicians, chemists, psychologists, and industrial-hygiene experts, commanded by Col. George W. Knauf, has the important mission of discovering and preventing operational hazards in missile operations. Their work ranges from analysis of the surrounding air after missile launches to the effect of toxic fumes on teeth, with a multitude of assignments in between. And busy as they are, because of the need to acquaint missilry people in all the services with potential hazards, the team finds time to run the world's first "Missile Medicine" school, offering an intensive two-week course in a new sub-branch of space medicine. END



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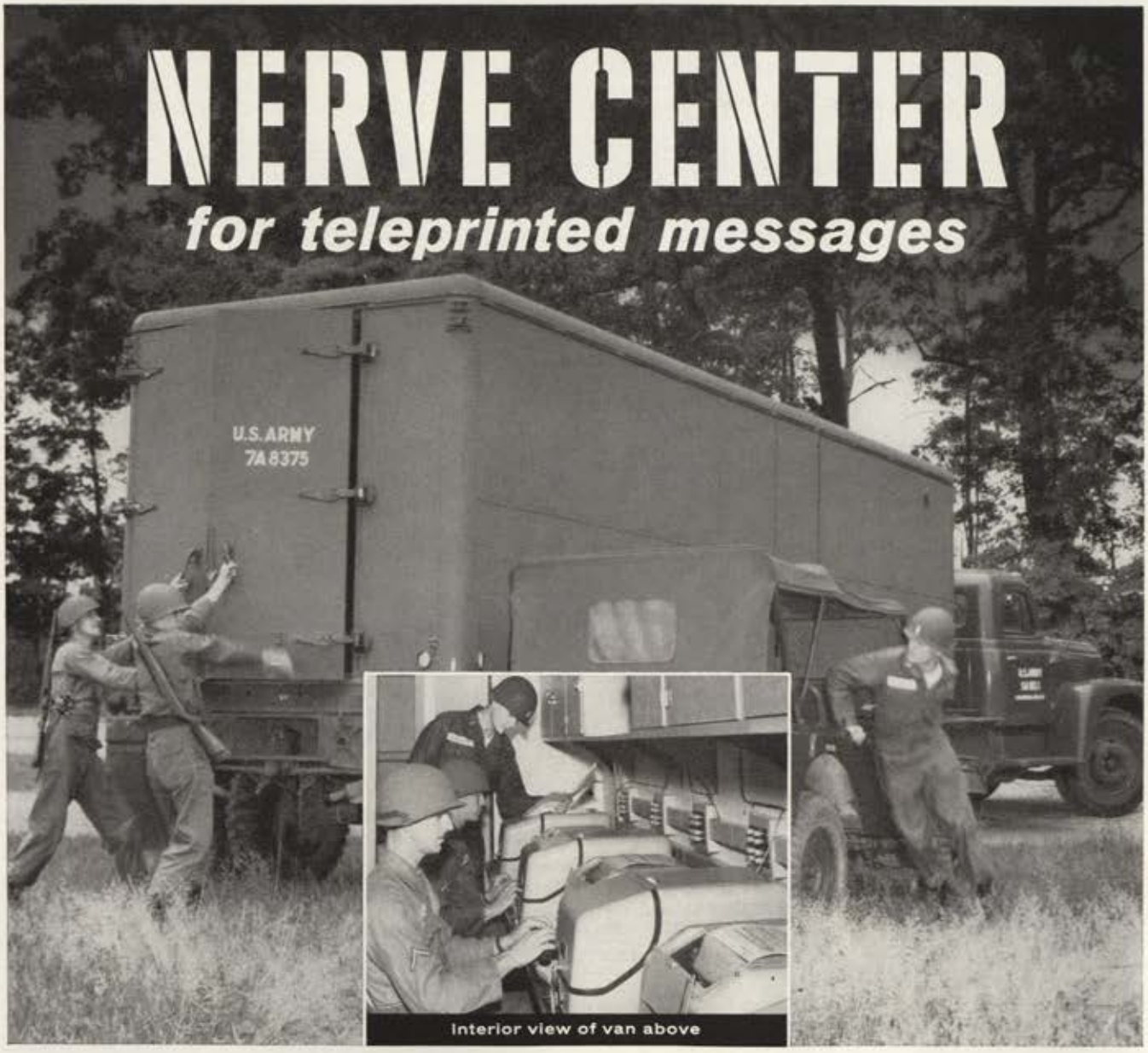


Interior view of van above

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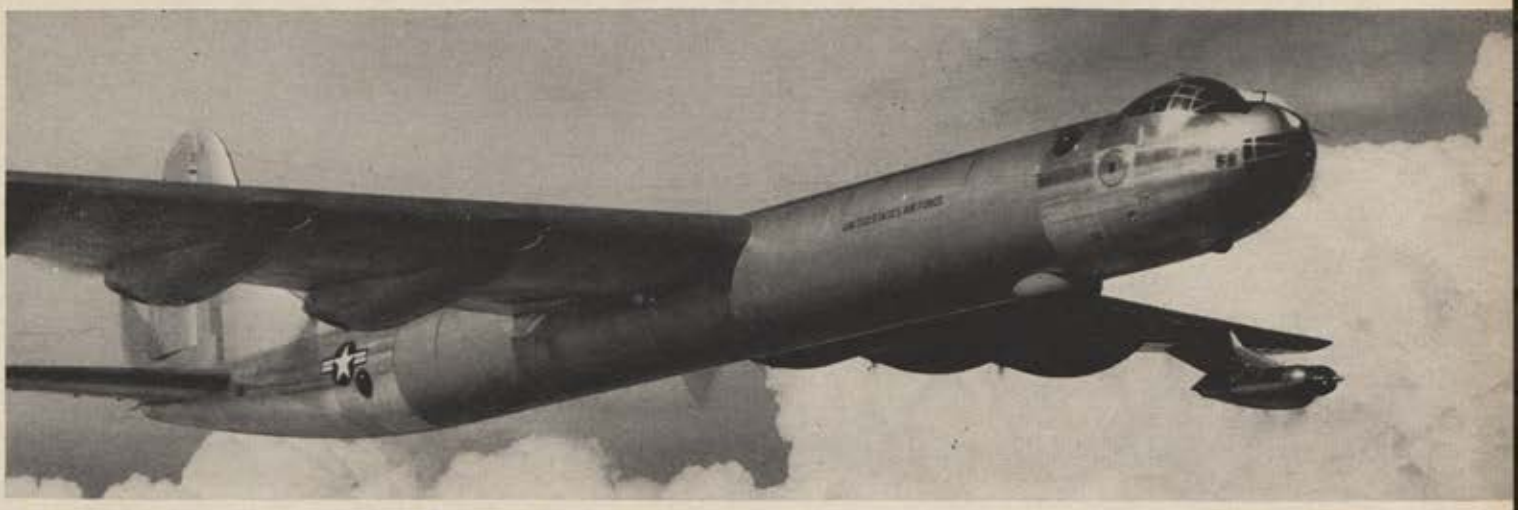


A principle and a weapon system: Now obsolete, B-36 served free world's policy of deterrence for an historic decade.

# B-36 Deterrence . . . YESTERDAY'S and TOMORROW'S

**Frederic M. Philips**
ASSOCIATE EDITOR

THREE central themes dominate our postwar military history: cold war, interservice controversy, and extraordinary technical development.

Externally, the end product of these interacting factors has been the grand deterrent – a principle with weapon systems to carry it out.

Internally, the composition of our military forces, and a shift in the balance of power among their components, have mirrored this revolution in our basic concept of how best to fight war and be prepared in peace.

A giant item of aerial hardware, now obsolete, played a transcendent role in shaping the events of these years. It profoundly influenced our world posture. It set the tone of the times insofar as a machine can affect the lives of men.

This globally significant airplane, the B-36 intercontinental nuclear bomber, flew out of the operational inventory early this year while current attention focused on its successors—among others, the Atlas, Titan, and Minuteman intercontinental ballistic missiles; the B-47, B-52, B-58, B-70, and (someday) the nuclear-powered bombers; the ALBM, air-launched ballistic missile, and the projected Polaris missile being developed for use by Navy nuclear submarines.

Some of these are in being, some at earlier stages of development. All have this in common in succession to the B-36. They could strike with immense destructive power at an aggressor's heartland; the threat of such a strike, it is hoped, deters any potential aggressor.

Now would seem an apt time, before it has faded too far into the past, to examine the life and times of the B-36, which appear to have established the pattern for the immediate future of this planet. The B-36 also has considerable symbolic significance because, in the words of an Air Force general, it was "the first major weapon system to come into the operational inventory, superbly perform its deterrent mission, and be retired without firing a shot in anger." And, in physical terms, it was an aviation phenomenon.

Two deadly mushroom clouds and the emergence of aggressive world Communism made the postwar B-36 a necessity.

The atomic bomb, as demonstrated over Hiroshima and Nagasaki in August of 1945, approached the "ultimate" in destructive power. It also raised strategic bombing to more overwhelming military importance than ever—a position, incidentally, that had been predicted by airpower leaders back through the decades.

Consequently, if the B-36 had not already existed in test stage in the a-borning postwar world, it would have had to be created. As it was, the plane was reaching maturity at the Fort Worth plant of Convair Division of the General Dynamics Corp., after a genesis stretching back to April 1941.

At the same time, menacing words and deeds from Moscow, and a picture of armed Communism on the move from Southeast Asia to Europe, contrasted sharply with our own speedy demobilization and return to what the free world hoped would be peaceful normality.

The B-36, greatest aerial delivery system ever produced in the world up to that time, thus approached its rendezvous with the cold war.

As a top SAC officer put it a few years ago, the postwar Air Force was faced with the need to "develop a powerful strategic force in being, able to deliver such massive retaliation

*(Continued on following page)*

that any aggressor nation would hesitate to launch an attack against our homeland. Part of the fleet had to be able to launch additional sizable strikes from our North American bases. The B-36 gave us this capability."

In the next decade Convair delivered 385 B-36s in a number of versions to the Air Force. The plane was variously known as the Peacemaker, the Big Stick, or, sometimes, "the Monster." Poised combat-ready at bases from Maine to California to Puerto Rico, it was the backbone of SAC in the organization's formative years.

Five years ago Sir Winston Churchill thus placed SAC and the B-36 in perspective for the ages. He was addressing the British Parliament.

"The United States Strategic Air Command," Churchill said, "is a deterrent of the highest order. . . . We owe much to their devotion to the cause of freedom in a troubled world. The primary deterrent to aggression remains the nuclear weapon and the ability of the highly-organized and trained United States Strategic Air Command to use it."

Churchill and others had observed, from the time the Iron Curtain itself came into being, that strategic air almost alone prevented new and overt Red aggression. In the final analysis it prevented attack on the United States itself.

The late James V. Forrestal, the nation's first Secretary of Defense, recognized this awesome fact soon after the war. He declared, "The only balance we have against the overwhelming manpower of the Russians, and therefore the chief deterrent to war, is the threat of immediate retaliation with the atomic bomb."

But, despite this widespread recognition of the "big picture," the B-36 experienced some rough going when it first began rolling off the assembly line.

First, it had almost inevitable technical bugs. SAC's first commanding officer, Gen. George C. Kenney, close to the B-36 from its inception, himself expressed serious doubts about the plane shortly after it entered the aerial testing phase. He feared the plane's performance and other characteristics were not good enough at that point for SAC and the nation to pin their hopes on it.

Others in high places disagreed. Gen. Nathan F. Twining, current chairman of the Joint Chiefs of Staff who was then head of the Air Materiel Command, argued that the B-36 was the best plane for its purpose available and would be subject to numerous improvements.

Gen. Carl A. "Tooey" Spaatz, who headed the AAF, agreed. The B-36 program continued in full swing. The plane was improved from stem to stern. General Kenney, convinced, then returned to his earlier position as one of its enthusiastic supporters.

A second major hurdle the B-36 program had to face came from outside the Air Force. Navy leaders and other military "traditionalists" leveled an attack on the B-36, the concept of strategic bombing itself, and the manner in which the plane's contract was awarded and administered.

An unofficial, anonymous, behind-the-scenes memorandum circulated in Washington and given to the press alleged "fraud" and "corruption" surrounded the contract. It also charged published performance characteristics for the plane were falsified.

The House Armed Services Committee conducted full-length hearings on the plane and the backstage charges in 1949. Top Army, Navy, and Air Force officers, civilian officials, military experts, and others were heard. The outcome was that charges of underhanded activity were dismissed outright and the Air Force got a green light to proceed with its B-36 plans.

In the next few years the plane came to rule the sky as the embodiment of the whole doctrine of deterrence. There remains today, in addition, a considerable body of opinion that a go-ahead for SAC's B-36s and then-operational B-29s to exercise their full potential would have brought victory in Korea in days, in contrast to the traditionally fought three-year stalemate. There were, of course, manifold complex issues involved, many of them not military.

Inclusion of the Polaris submarine missile on the above roll call of successors to the B-36 points up the 180-degree turn the principle of strategic deterrence has brought in traditional US military circles.

In its early days, when the B-36 and the strategic doctrine it served were brought under attack, Navy admirals almost unanimously spoke out sharply against it.

Adm. Arthur W. Radford, shortly to become chairman of the Joint Chiefs of Staff, called the plane a "billion-dollar blunder" during a typical Navy statement before the House hearing. Along with this much-headlined phrase, he and others suggested strategic bombing of population centers was both immoral and ineffective militarily.

But listen to Adm. Arleigh Burke, present Chief of Naval Operations, in a recent television interview. Asked how many Polaris submarines he thought this country needed, Admiral Burke replied:

". . . You can take from the number of Russian cities, the number of megatons it takes to destroy a Russian city, the reliability of the missile, the accuracy of the missile, and you can compute it pretty accurately yourself. And then you double it just to make sure and you come out somewhere in the neighborhood of thirty."

The Navy's top leader, a distinguished officer of the surface fleet, discussing the Navy's newest and proudest weapon system, spoke in the language of *strategic bombing*.

Later in this same interview, Admiral Burke observed, "We have more power at sea than the Russians do and we have more power in our SAC bombers. We have a tremendous SAC. . . . Russia has very few long-range bombers."

Admiring praise for SAC, from the nation's top naval officer. This does not seem really surprising today, but it would have a decade ago, at the time of the House hearings.

This change does not show Admiral Burke or the Navy in a bad light; long-term consistency is not an unmixed virtue in a rapidly changing world of weaponry. Nor is it intended to suggest that the Navy has necessarily chosen to abandon more traditional, and essential, missions.

But the simple fact is this: A decade intervened between charges such as Admiral Radford's and these views from Admiral Burke. That, roughly, was the period of the B-36's active life, the period in which the B-36 and SAC assumed their ascendant place in free world strategy—and all the armed forces realized, by and large, that nuclear weapons changed the facts of life.

Weapons and doctrines of former wars, including World War II, have been largely replaced, at least in theory. From the Polaris to the nuclear fox-hole spade, transition — sparked initially by nuclear-armed SAC — is the order of the day.

Not that everything changes. Recently, for instance, the present SAC commander, Gen. Thomas S. Power, vigorously rebutted opinions expressed by Army Chief of Staff Gen. Maxwell D. Taylor and Admiral Burke before the House Defense Appropriations Committee. Taylor and Burke had

told the congressmen in closed session that they believed this country already has too big a deterrent force for its purposes. This was the theory of "minimum deterrence."

General Power declared bluntly: "Many people are living in the past . . . they still think they will get warning, strategic warning. They still think they will get word of an attack, perhaps from Mata Hari, or that the courier will drop a piece of paper out of his pouch, or perhaps they will see troops marching onto ships or into planes."

So traces of things past have not been wholly swept away, either in the field of military doctrine or the nature of discussion before Congress.

Now let us look at the B-36 itself more closely.

The B-36 was big news from its very beginnings for reasons quite apart from matters of strategy or world affairs, so far as a major weapon can ever be divorced from its historic milieu. The word "big" deserves to be underlined. The B-36 was huge, its performance capabilities unprecedented, especially when viewed in circa 1941 comparative terms.

In April of that year, the Army Air Corps invited aircraft manufacturers to submit preliminary design studies for an intercontinental bomber capable of delivering a 10,000-pound bomb load on a target at 5,000-mile range—and returning safely to Western Hemisphere bases. These requirements, quite literally, seemed fantastic.

The B-17 Flying Fortress, the great standby of those years, could hardly be called upon to do the job. Its effective combat radius was no more than 1,000 miles.

The times dictated the new requirements. Nazi Germany held most of Europe. The London blitz was at its height in April of 1941. U-boats were slowly starving Britain's population and industry. The war party had control in Japan, and war clouds hung heavy over the western Pacific.

Might we be forced, if Britain fell, to go it alone against a victorious Axis? "Yes" to this question meant we would have to fight a global war without overseas bases, at least at the outset. And "yes" to this question appeared a quite reasonable answer.

Against this background President Roosevelt directed, in conference with Air Corps leaders, that an "intercontinental" heavy bomber, which could carry the war to the prospective enemy from this side of the troubled waters, should be developed.

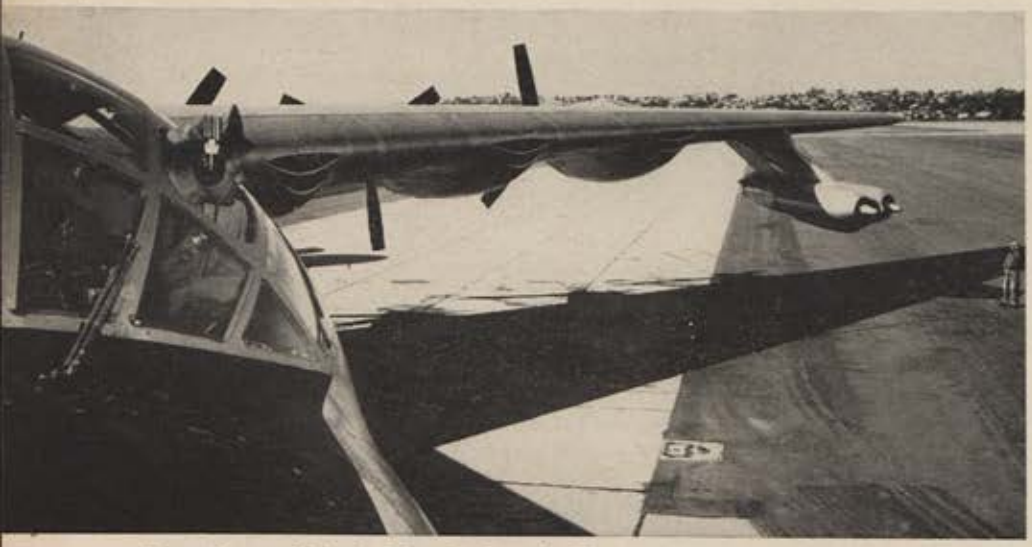
*(Continued on following page)*

**Champion weight lifter: the XC-99, cargo-carrying modification of early B-36.**

**Aerial aircraft carrier: GRB-36 "Ficon" carrying RF-84 "parasite" jet fighter.**

**Nuclear "first": NB-36H, test-bed for world's first airborne nuclear reactor.**

**Chip off the old blockbuster: XB-36 dwarfs World War II B-29 Superfortress.**



**One pilot said the B-36 made him feel he was "sitting in the bay window and flying an apartment house." But the monster was extremely safe, manageable.**

This is where the story of the B-36 begins, although men had dreamed of such a plane back through the years.

Four aircraft manufacturers took up the design challenge. The Air Corps, some four months before Pearl Harbor, chose Consolidated Aircraft's preliminary plans. These called for a swept-wing, twin-tail, pressurized giant that, it appeared, would be able to do the job. It was powered, at that stage, with six pusher-type engines on the trailing edges of its wings.

A few comparisons illustrate what manner of plane this was that the service specified and Consolidated said it could build.

The plane's wing-span was to measure 230 feet. The Flying Fortress, by comparison, was only 103 feet between wingtips. The planes' lengths contrasted similarly. The Flying Fortress' maximum loaded weight, a vital statistic, stood at 65,000 pounds; the B-36's was listed as a mammoth 278,000 pounds.

The contrast with Navy ships was even more staggering. From wingtip to wingtip, the B-36 was one-third the length of a *South Dakota* class World War II battleship, more than one-quarter the length of the flight deck of the aircraft carrier *Lexington* or the main deck of the giant battleship *Missouri*.

General Kenney, who then headed the Air Corps Experimental Division and Engineering School at Wright Field, took Consolidated's drawings to General H. H. Arnold. Arnold was chief of the newly designated Army Air Forces.

Kenney recommended "that we go ahead on that design. Our evaluation at the Materiel Division indicated it was the best of the lot."

Interestingly, Wright Field personnel, working independently of Consolidated's engineers, also had come up with a six-engine pusher-type bomber for the intercontinental mission. It was not vastly different from the firm's proposed design. Arnold, with this information and the recommended manufacturer's design before him, directed that a contract for two experimental aircraft be negotiated with Consolidated.

The full bag of requirements for the plane was forbidding: 10,000-mile range, 10,000-pound payload, 35,000-foot ceiling, cruising speed of 240 to 300 miles an hour. This performance was to be accomplished under conditions of the times—no aerial refueling, 5,000-foot runways. Refueling was a much later development, becoming "routine" during the tenure of Gen. Curtis LeMay as SAC Boss.

The experimental B-36 project was assigned by Consolidated to a new major plant in Fort Worth, history-making "home" of the globe-roaming B-36 throughout its life.

There was, at this time, little or no past experience with the structure-gross weight ratios dictated by the plane's size. The engines to power the plane were still on paper at Pratt & Whitney. The 3,000-horsepower promised for each of the R-4360 Wasp Major engines was unheard of.

The job progressed slowly. Pressure was on for high-priority production of other aircraft. Consolidated facilities were turned mainly to producing vitally needed B-24 Liberators, C-87s, and Navy patrol bombers.

In July 1943, with this developmental work grinding forward, the Air Corps awarded a letter of intent for 100 B-36 aircraft to Convair, which had by then been formed by merger of Consolidated with Vultee Aircraft Corporation. It was decided that as much as two years could be cut from developmental time of the B-36 if work were begun on production models even before the experimental planes had been rolled out.

(Here again, the B-36 left a legacy of experience for the future. Concurrent development of this sort was called into play once more to step up the pace in a life-or-death missile race fifteen years later.)

Roll-out of the first XB-36 took place a little over two years later, after V-J Day. A year later it was airborne on a successful thirty-seven-minute flight over the Texas countryside. Except for malfunction of a wing-flap system, the test hop went well and was accompanied by the cheers of 7,000 assembled Convair-Fort Worth workers and other folk from the vicinity.

This model was already somewhat revised from the original accepted design. During the preflight developmental period the AAF ordered a shift from twin to single-tail configuration and also revised armament requirements.

Its measurements, along with a 230-foot wing span, included a 162-foot length, a vertical stabilizer rising forty-six feet and nine inches above the runway, a high cantilever wing 4,772 square feet in area and seven feet six inches thick at its deepest point.

Flying this plane somewhat later, an Air Force pilot made the famous observation that he felt as if he were "sitting in the bay window and flying an apartment house."

One feature of the B-36 that especially caught the popular imagination was the pressurized tunnel crewmen had to use to move forward and aft. This connected the crew compartments at the two ends of an eighty-foot bomb-bay section. To move from one end to the other of the plane, a crewman had to lie on a cart on rails and pull himself along with the aid of an overhead cable—this at perhaps 40,000 feet over the surface of the earth.

Along the same line, a "crawlway" ran through the wings to provide access to the engines while the plane was in flight.

By the following summer thirteen production B-36s reached the final assembly line, and further modifications were in the works. A new four-

wheel truck-type landing gear made the plane operable from most heavy bomber fields. A bubble-type canopy improved pilot visibility. A further souped-up engine also was in the immediate offing, but the real revolution in the power plant remained in the more distant future.

The first of the operational planes was turned over to the Air Force in August of 1947. Then new and troublesome problems began to appear.

For example, engines on the rear end of the wing created unexpected vibration difficulties. Wing metal fatigue was the result. New materials, fabrication methods had to be used.

The fuel tanks leaked with use of new fuels. They had to be sealed with a substance specially developed for the purpose.

The supposedly improved, higher-horsepower engine was disappointing.

**B-36, flight engineer's eye view: World's largest bomber possessed one of the world's largest collections of dials, mechanisms, instruments as well.**

Nevertheless, in 1948 a B-36 dropped an impressive load of seventy-two 1,000-pound bombs over the open sea on a simulated mission. Another B-36 flew a little under 10,000 miles nonstop and dropped a 10,000-pound bomb load.

Then came a power modification of immense importance. The Air Force approved a Convair proposal to install four auxiliary jet engines in pods on the B-36's wings. The B-36D received the four additional engines and they were speedily installed on older models. New snap-action bomb-bay doors also were installed.

As a result, the B-36 top speed went up from 360 miles an hour to over 435. Maximum ceiling went up from over 40,000 to 45,000 feet. Almost doubled power gave the plane greatly increased "dash" speed over target. Greater thrust also meant shorter takeoff.

The powerplant improvement was in the nature of a technical "breakthrough" for the B-36. New Air Force orders for the plane were awarded following it.

In 1949, the first year of General LeMay's period as commander of SAC, a B-36 powered with ten engines gained what may be the all-time record for bomb load. It loaded two 42,000-pound "grand slam" bombs and dropped them over Muroc Dry Lake, now Edwards AFB, Calif.

This bomb load actually weighed more, at 84,000 pounds, than a wartime B-24 bomber fully loaded, a fact which belongs in the believe-it-or-not category with such other data as this:

At high speeds the B-36's ten engines developed more than 44,000 horsepower, roughly comparable to that of nine locomotives or 400 average passenger cars.

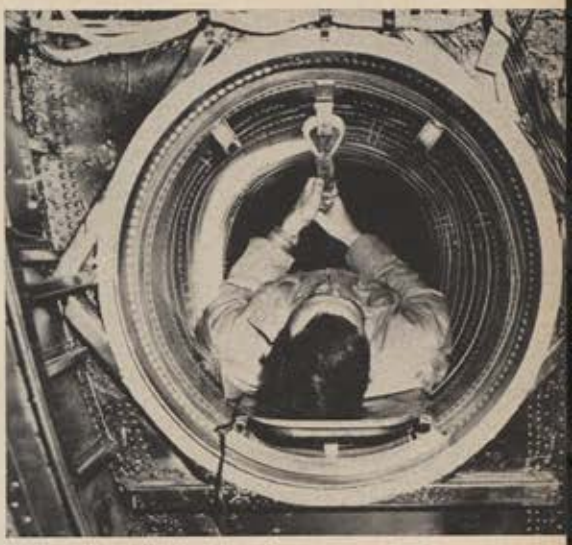
Volume of the B-36 bomb bay, 12,300 cubic feet, was equivalent to the capacity of three railroad freight cars.

An automobile could circle the globe ten or more times with the quantity of fuel in the B-36's wing tanks.

A B-36's deicing gear could have heated a 600-room hotel.

Such a list could continue almost endlessly, a statement that further characterizes the plane. Still another prime characteristic of the B-36 was that it readily lent itself to modification and experimentation.

In 1949 and 1950 the RB-36 was born. A long-range strategic reconnaissance modification of the basic plane, it carried fourteen cameras and an airborne darkroom.



**Subway in the sky: Crewman flat on his back at 40,000 in B-36 tunnel.**

In 1951 the novel "Ficon" GRB-36 was developed. This incorporated a fast jet fighter, the RF-84, into the B-36 weapon system. The plane was carried partially withdrawn into the bomb bay and launched and retrieved by means of a retractable boom.

The NB-36H was a B-36 converted to serve as a test-bed for the world's first airborne nuclear reactor. The plane was conventionally powered but employed the "hot" reactor to test radiation effects on equipment and crew shielding. First flight was made on July 20, 1955.

The C-99, cargo-carrying version of the B-36, was perhaps the champion weight lifter of all time.

Two YB-60 heavy bombers of modified B-36 design were also built in test-configuration, but this project was discontinued.

Throughout, the B-36 "family" of aircraft were safe planes, generally considered easily manageable for pilots and comfortable for crews. The B-36 compiled one of the best safety records of any bomber ever built. Under conditions that prevailed on most missions, crewmen had plenty of room to get up and move around, change stations, sleep if they wished. Crews ranged from fifteen to twenty-two men, depending on the configuration.

Today the B-36 no longer exists, so far as the operational Air Force is concerned. Actually, two B-36s will be preserved, one at the Air Force Museum, Wright-Patterson AFB, and one as a memorial at Amon Carter Field, Fort Worth.

In reality, however, the B-36 will be with us so long as the policy of deterrence remains in force or in the history books of a free and peaceful world.—END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TRANS WORLD AIRLINES
UNITED AIR LINES
WEST COAST AIRLINES
WESTERN AIR LINES

# The READY ROOM

## RESERVE AND AIR GUARD NEWS

When **North Salada** is threatened by an aggressor late this month, the **Air Reserve Forces** will spring into action in their biggest military operation since the Korean War.

The operation is **DARK CLOUD/PINE CONE II,** which combines active Army troops of the **82d STRAC Airborne Division** with **air forces** made up **principally of Air Reserve and Air Guard equipment and personnel.** Actually, the exercise will take place in the **Fort Bragg-Pope AFB area of North Carolina,** but according to the "scenario," North Salada is a fictional small country in the **Middleland** part of the world. When an unnamed big nation, working through its satellite, **Mountainia,** puts pressure on the North Saladians to give up an economically valuable section of their country, they call on the US for help.

Some **20,000 personnel and 350 aircraft** are involved in the exercise which will begin May 23 and end on June 7.

**Two air aces, with 63½ "kills" between them, met at the recent Air War College Orientation Course for Air Force Reservist and Air National Guard general officers, held at Maxwell AFB, Ala. Left, Brig. Gen. J. J. Foss, former South Dakota governor; right, Col. J. C. Meyer of the AWC faculty.**

Exercise Director is **Lt. Gen. Clark Ruffner,** CG of the Third Army. His Air Force deputy is **Maj. Gen. Henry Viccellio,** commander of TAC's Nineteenth Air Force. Under General Viccellio are two Reserve Forces commanders—**Brig. Gen. Ramsay D. Potts, Jr.,** of the Reserve's 459th Troop Carrier Wing, Washington, D. C., and **Brig. Gen. Charles H. DuBois** of ANG's 131st Tactical Fighter Wing, St. Louis, Mo.

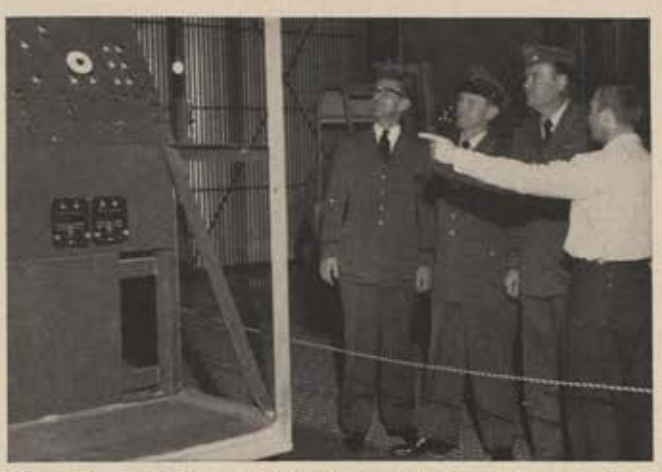
General Potts's troop carrier forces, using **C-119s and C-123s,** will deliver **6,000 paratroopers**—four battle groups—into North Salada during the assault phase June 2-3, after the battle area has been isolated and air superiority established by **General DuBois' F-84F and F-100 tactical fighters.** General DuBois' force will also include **RF-84Fs** for tactical reconnaissance and **SA-16s** for clandestine operations.

Air operations, staging out of **four bases in the Carolinas,** will be as realistic as possible, consistent with safety. TAC fighters, for example, will use **live ammunition in interdiction missions** and will make **simulated nuclear weapon deliveries.** Part of General DuBois' force will be **aggressors;** in fact, when squadrons receive their operational orders each day, they **won't know whether they're friendly or aggressor.**

One by-product of the exercise will be a color film, **"Two Hats: The Air Reserve Forces in Action,"** being produced by USAF's Air Photographic & Charting Service (MATS). **Lt. Col. Hal Friedman,** an independent TV producer and a member of New York's Reserve ISO squadron, has been called to active duty as technical adviser. Plans call for the **half-hour film** to be premiered at the **Air Reserve Forces Seminar in Washington** in September, after which copies will be available for military and public showing.

* * *

USAF's announcement last month that it has **canceled plans to build a new Air National Guard base at Bethel, Minn.,** brought on new **waves of protest** from citizens' groups in the Twin Cities. They have voiced strenuous and repeated objections to jet aircraft operated by the **Air Guard's 109th Fighter-Interceptor Squadron** from the Minneapolis-St. Paul International Airport (formerly Wold-Chamberlain). Public criticism, intensified by a **pair of accidents** three years ago which killed several civilians, prompted the Navy to close its Reserve training facility, and the Air Force deactivated an air defense group there when the 109th moved over from cramped quarters at St. Paul's Holman Field.



**Viewing machinery at North American Aviation-Atomics International facility near Los Angeles recently were Lt. Col. Robert F. Davies, CO of 9356th Air Force Reserve, Van Nuys, Calif.; Lt. Col. Lockwood Albright; and Capt. Glenn Clark of his staff, all getting firsthand atom views.**

The city reluctantly approved a **short-term lease** for the 109th, on the understanding that the squadron would move to Bethel **as soon as that base was completed.**

Hence the storm that broke with news that the Bethel project had been abandoned.

The Air Force's decision to cancel the Bethel base hinged on the fact that by 1962, when Bethel would have been completed, **Bomarc missiles will be poised to defend that area.** In addition, the newer Century series interceptors will be more effective, so fewer aircraft are required.

The Air Force also announced—and this should still protests—that the 109th will **switch from jet fighters to aircraft comparable to commercial types now serving the Twin Cities.** It's not definite yet whether they'll be airlift or tanker aircraft.

* * *

A committee to prepare recommendations on a **separate budget for the Air Force Reserve** was to convene in Washington **April 20** for two weeks—in time to report on its de-

*(Continued on following page)*

**In what may be the only such activity at an Air Reserve Center, teen-agers enjoy Dance Club activities currently sponsored by the 2686th Air Reserve Center at Jacksonville, Fla. Here Linda Horst and Bruce Hibel, both high schoolers, get a gift record from Ed Bell, Jacksonville deejay.**

liberations to the **Air Reserve Forces Policy Committee's** twenty-eighth meeting in Washington beginning May 4.

Chairman of the *ad hoc* committee is **Brig. Gen. James H. Howard** of Washington, D.C., a mobilization assignee in the office of the Deputy Chief of Staff, Operations, at Hq. USAF, who heads an engineering firm in civilian life. Committee members are all inactive-duty Ready Reservists or Section 8033 officers on duty with the Air Staff.

The group was to **review previous data prepared on the subject of a separate Air Reserve budget** and was authorized to call witnesses from the active establishment and the Reserve Forces in developing its recommendations. **Full support** was promised the committee by **Brig. Gen. R. J. Friedman,** USAF budget director.

Air Reservists have been pushing for a budget system **similar to that of the Air National Guard,** whose funds are separately identified in USAF's budget. At present, the Air Force Reserve operates with funds **allocated by USAF from its appropriations.**

But the committee's conclusions are far from cut and dried. Critics of the present system claim the Air Force Reserve **cannot develop a stable continuing program** because USAF may choose to **divert funds** to other urgent needs. But others argue that such a view is **shortsighted,** that Air Force should be **free to use available funds** to best effect in accomplishing its mission. If the Air Reserve Forces really want to be part of the team, the argument goes, they should **pool resources with the active Air Force** and leave it to the Chief and the Air Staff to determine how those resources should be used.

Two committee members available to provide expert advice on how the Air Guard's system works were **Col. Joe Meis,** comptroller in the Guard Bureau's Air Force division, and **Col. Art Smith,** a Wisconsin Guardsman serving as a Section 8033 officed in General Friedman's budget directorate.

• • •

**Length of the basic training program** for Air Reserve Forces personnel at Lackland AFB, Tex., was cut from **eleven to nine weeks** in April. Without eliminating essential training courses, the new schedule—arranged by **Lt. Col. Bill Ceely,** Lackland's director of operations—bypasses the period spent by Air Force recruits in **aptitude testing, career counseling,** and **other processing** not required of Reserve Forces basics.

Other changes in the program are being studied as a result of a recent **educational survey** which showed that Reserve Forces personnel in basic training average **two years of college,** and fully **one-third are college graduates.** Without discounting the benefits of a standardized training program, Colonel Ceely believes it may be possible to telescope elementary aspects of training for Reservists and perhaps use the time thus saved in presenting more advanced material.

• • •

**Three Air Guard colonels** take on new four-year EAD posts this summer. **Col. I. G. Brown** of Arkansas, who has been ANG liaison officer at ADC headquarters in Colorado Springs, will become **executive secretary of the Air National Guard Policy Committee** on July 1, succeeding **Col. Ben Lichty,** who left last December to become base commander at Turner AFB, Ga. Replacing Colonel Brown at ADC is **Col. Paul Fojtik** of Wisconsin, who is completing a tour in a Section 8033 slot in DCS, Operations, at Hq. USAF. Colonel Fojtik's replacement in DCS/O will be **Col. John J. Pesch,** Wing Executive in Maine's 101st Air Defense Wing.

• • •

The **Colorado Air National Guard,** formerly a tenant at **Buckley Field just outside Denver,** turned landlord when the Navy moved out last month. ANG will take over operation of the entire base, with prospects of gaining several Air Force boarders to help meet expenses. **One prospective tenant is the Ballistic Missile Division,** which may take over some warehouse space to support its **growing Titan program.** The Titan ICBM is being built by the **Martin Company** in Denver.

ANG has also agreed to handle **transient jet traffic at Buckley**—with USAF manning the tower and crash equipment. **Lowry AFB,** hemmed in more and more tightly by suburban housing, will be closed to transient jets. But Colorado Air Guardsmen make it clear that their transient services will run more to gas and hamburgers than to VOQs and "wheels."

Meanwhile the Air Guard is moving to **curtail transient services at some of its other installations,** because of the personnel squeeze. Newer aircraft entering the Guard program **require more maintenance man-hours.** Already up to peak authorized strength on full-time technicians, Air Guard units just don't have men they can assign to take care of transients.

Some bases in key locations will remain **open to transients.** Just which ones they'll be is now being worked out between ANG and Air Force operations.

• • •

**SHORT BURSTS** . . . The **Fourteenth Air Force Policy Committee,** headed by **Colonels Charles Opiel (Reserve)** and **Joel B. Paris III (ANG),** will convene at the USAF Records Center in Denver on May 21-23 to combine a tour of the Center with their other business. . . .

The **Air Force Academy** has scheduled its **first annual Academy Liaison Officer Training Conference** for September 14-16 at Colorado Springs. Hq. CONAC is arranging **airlift, training points, and reimbursement for expenses** of Air Reserve liaison officers. National Guard Bureau is expected to authorize attendance by **one ANG liaison officer per state,** on military training status. Included in the conference will be a **tour of the Academy,** visits with cadets, and a banquet at which **football coach Ben Martin** will be the featured speaker. . . .

Virtually **all Air Reserve troop carrier wings will go to summer training intact at six major bases—Bakalar,** Ind.; **Boise,** Idaho; **Clinton County,** Ohio; **Ellington,** Tex.; **Grenier,** N. H.; and **Memphis,** Tenn.—END

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# AFA NEWS

## SQUADRON OF THE MONTH

*Greater Miami Squadron, Fla., Cited for*

*combining community activity with international interest to emphasize the importance of civil aviation in the Aerospace Age.*

The **Greater Miami Squadron** played a major role during the "dedication week" for a great new terminal building at Miami's busy civil airport. The field, **long known as Miami International Airport,** has been **renamed Wilcox Field** for aviation pioneer Mark Wilcox.

Representatives from across the United States and Latin American dignitaries were on hand for the ceremonies, which took place in March. The Squadron, in **conjunction with the Ryder Transportation System,** sponsored a luncheon program and took part in varied activities throughout the week. The luncheon featured presentation of a commemorative plaque to Mrs. Mark Wilcox, widow of the famous aviator (*see cut below*).

Spark plugs of the Squadron program were **Ted Koschler,** Florida Wing Commander; **Alan Cross,** AFA National Director; **Alex Morphonios,** Vice President for the Southeast region; **Bill Enwright,** Miami Squadron Commander; and **Bunny Steward,** Squadron Secretary.

We tip our cap to this fine unit. It has been most active for several years and has been increasing its tempo of activity recently in gearing itself to serve as **host to the 1959 National Convention.**

* * *

**Howard T. Markey** of Chicago, Vice President of AFA's **Great Lakes Region,** has been working with **congressmen and Air Force base commanders** in his region on an important project.

As an outgrowth of a discussion at the December 5 meeting of **AFA's Board of Directors,** Howard contacted every one of these gentlemen with an offer to assist in any possible way to **meet problems in the general field of airpower.** He met with base commanders to discuss **mutual problems** and sent the senators and representatives **information on AFA,** with letters offering assistance.

Replies from the legislators were **most gratifying;** most indicated interest in the program. Some sent back laudatory statements regarding AFA. **Rep. J. Edward Roush** of Indiana, for instance, declared in his answer that "Your Association is doing a fine job." **Rep. Earl Hogan,** another Indianan, wrote, "I am familiar with AIR FORCE and find it worthwhile reading . . . your Association is certainly doing a valuable service, and you are to be commended."

Projects such as this one are a **vital part of the AFA mission.** We congratulate Howard on the manner in which he carried it out.

* * *

Seventy enthusiastic **Detroit high school seniors** were guests of the **Detroit Squadron** on a day-long tour of **Selfridge AFB** last month, the fourth such program that has been sponsored by AFA in the area. **Al Lewis,** Squadron Commander, was in charge of the group, which received a briefing on the **Air Defense Command mission**

*(Continued on page 99)*

**Mrs. Mark Wilcox holds plaque presented to her by Miami Squadron *(see text)*. With her are Ted Koschler, Bill Enwright, Alex Morphonios, and Alan Cross.**

**Harry Crutcher, center, presents awards to outgoing Dallas Squadron officers George McMorries and Carr Collins, Jr.**

**New Dallas officers, M. L. "Bo" McLaughlin, Jim Rose, Commander, and Francis McGinnis, discuss future plans.**

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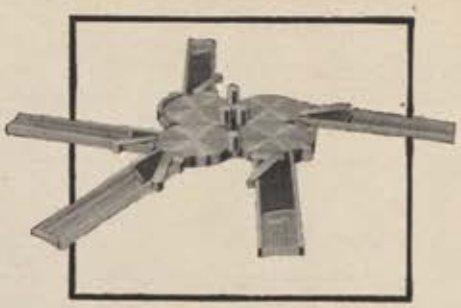

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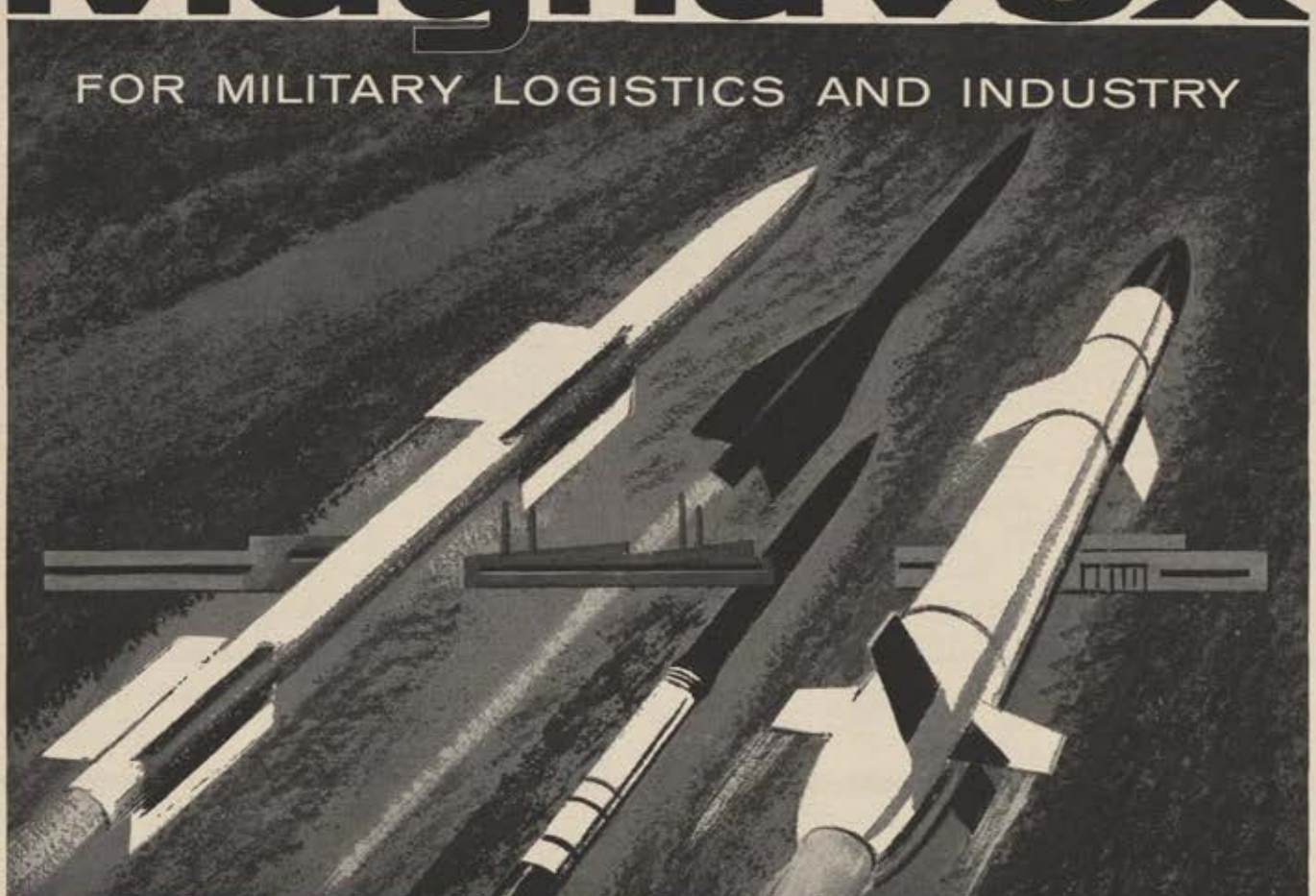

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# DYNA-SOAR

Dyna-Soar (for dynamic soaring) is a joint project between the Air Force and the NASA, and is an attempt to solve the technical problems of manned flight in the sub-orbital regions. Advance knowledge on the project indicates how a boost-glide vehicle can operate from the outer fringes of the atmosphere where it can maneuver and be recovered undamaged. Studies show that by varying the original rocket boost, and thus the velocity, and with the control available to the pilot, the Dyna-Soar aircraft can circumnavigate the earth, followed by a normal and controlled landing. Boeing Airplane Company, one of the competing companies for the development contract for the complete boost-glide system, has delegated to RCA the responsibility for the development of important electronic components of Dyna-Soar.

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CAMDEN, N. J.

Executive Committee of the Cleveland Squadron is shown as it accepted responsibility for 1959 Armed Forces Day Celebration. Standing are Ken Vetter, Ray Saks, Marti Elmore, Charles Hallett, Tom McCleaster, and Ron Karpinski. Seated are Grant Wood, Erwin Cooper, and Will Dougherty, Squadron Commander.

and the role of Selfridge AFB in that mission. The youngsters were then introduced to **GCA operations.**

Lewis advises that this is one of a series of educational programs to be sponsored this year (*see cut*).

**CROSS COUNTRY.** . . . **Art Storz,** a member of AFA's Board of Directors, has just been named Chairman of the newly created Omaha, Neb., Airport Authority. Plans were immediately announced for a study on construction of a terminal. . . . **Dallas Squadron,** 1958 Convention host, reports results of its elections for the current year. **Jim Rose,** the new Commander, advises us of ambitious plans. A total of sixty Squadron members have agreed to serve on nine committees.

—Gus Duda

Seventy area high school seniors are briefed on details of F-102 all-weather interceptor during the annual Detroit, Michigan, Squadron "Seniors' Day."

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| SHORE CLUB | $7-8 | $7-8 | $15 | $22 |
| RONEY PLAZA | $8-12 | $10-16 | $30 | $45-60 |
| ALGIERS | $9-11 | $11-13 | $26 | |
| SEVILLE | $10-12 | $14 | $28 | $42 |
| SEA ISLE | $8-10 | $12 | $20 | $36 |
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To the left are the official hotels for AFA's 1959 Convention in Miami Beach September 3-6, listed according to their distance from the Auditorium, with the di Lido nearest. Few hotels have single rooms—most are twin rooms (two beds). The rates refer to single or double occupancy. Hotels with lower rates may also be requested with the coupon below. There are many low-rate, good-quality hotels in the area of AFA's hotels, both on and off the beach. This will interest those making the Convention a family affair.

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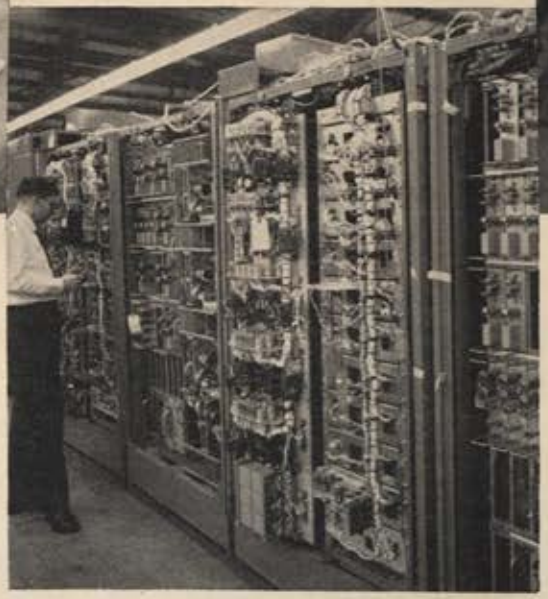
Raymond Jamieson, (center), Traffic Manager of Link Aviation, Inc., Binghamton, N. Y., discusses shipping with NAVL agent and representative. BELOW: Part of the complicated electronic equipment shipped in padded vans.



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NOTE: There are some conditions and exclusions that affect your coverage under the Flight Pay Protection Plan. They are designed primarily to protect your investment in the Plan—restrictions that you'd normally expect.

For instance, you're not indemnified for illness or accidents which originate before the effective date of your coverage. Your coverage for accidents begins with the effective date of your policy. Your coverage for illness starts 30 days *after* the effective date of your policy. All policies become effective on the last day of the month in which the application is postmarked.

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Most claims are routine. Where a difference of opinion exists, the Air Force Association has the right to request a review of medical records and other claim evidence by appropriate medical authorities—normally the Office of the Surgeon General, USAF.

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The insurance under the policy shall not cover loss to any Member resulting in whole or in part from or due to any of the following:

1. Criminal act of the Member or from injuries occasioned or occurring while in a state of insanity (temporary or otherwise).

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3. Caused by intentional self-injury, attempted suicide, criminal assault committed by the Member, or fighting, except in self-defense.

4. Directly or indirectly caused by war, whether declared or not, if act of an enemy in such war is the direct cause of loss insured hereunder, hostile action, civil war, invasion, or the resulting civil commotions or riots.

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*Signature of Applicant* *Date*

Application must be accompanied by check or money order. Send remittance to FLIGHT PAY, Air Force Association, Mills Building, Washington 6, D.C. 5-59

# RETIREMENT THINK BEFORE YOU JUMP!

**Capt. Edwin A. Gere, Jr., USAF Reserve**

RETIREMENT. To many, the word seems to read "promised land." It can turn out that way. But not necessarily.

If you are looking toward retirement, from any point on the career road, you must ask yourself two critical questions:

When?

What happens afterward?

As an active Air Force Reserve officer, I have heard a great deal of nebulous "retirement talk" from active-duty personnel over the years. I have also, in my civilian profession as a university researcher, taken a rather careful look at social security and retirement systems in general.

The contrast between fancy and fact in the matter of retirement is often quite sharp. It appears to me that some serious, realistic thinking on the subject may be in order for a whole lot of people—especially for many who decided somewhere along the line, almost automatically, that they would head out the main gate for the last time after "twenty."

I hope my observations can help in this direction. Let me say before going further that I do not presume to set up "rules" applicable to all in making the wholly personal decision to retire or not from the service at a particular stage of the game. Neither, it might be added, am I expressing anything but one man's considered opinion on the retirement picture.

I wonder, first, how many career military men realize they have one of the most liberal public employee retirement systems in the world. The various laws covering retirement of military personnel, which in general grant benefits ranging from one-half of base pay for twenty years of service to three-quarters of base pay for thirty years of service, are among the finest ever written. A retired military man's pension is based on a formula which most other people would gladly use in computing their own retirement benefits. What's more, men and women in uniform are never asked to contribute a cent to this plan. Stack this up against other pension systems, say that of civilian federal employees, who kick in six and a

half percent of their salaries to a retirement fund, and you will begin to appreciate the military plan.

State, county, and municipal employees, all public servants, are generally members of retirement systems calling for regular employee contributions of from four to six percent of salary, while at the same time offering more modest benefits than the service system.

They are usually penalized, too, for calling it quits "too soon." In many such cases length of service is not the only requirement for full retirement benefits. Persons who retire after the necessary number of years, but before the established retirement age of sixty or sixty-five, receive decreased pensions. Often this amounts to one percent for every year the employee is shy of the established age. Those one percents can mount up. Here's an example.

Let us say the established retirement age in a particular federal, state, or municipal agency retirement system is set by law at sixty years. Joe Eversweat, faithful employee, completes twenty-five years of service at age fifty and wishes to retire. In accordance with the law his monthly pension, quite likely modest at best, is ten percent less than normal because he is retiring ten years "too soon." This ten percent can really hurt; it may prevent his retirement.

To the youthful soldier, sailor, or airman, of course, the excellent military retirement system may be a factor in the decision to "re-up" or "ship over." To more mature officers and men, extremely generous pension rights also would seem, logically, a decisive personal consideration.

Yet, from what I am able to gather, a great number of service people take only partial advantage of their pension plan by getting out too soon—and thus very distinctly sell themselves short in terms of dollars and cents.

As I see it, "oldtimers" who consider retiring at the twenty-year point should take a hard look at the ten-year period immediately following retirement and painstakingly figure out what comes next, financially and occupationally.

The quite obvious question that such a man must ask himself, then, is this: If I am going to continue working, why not work at a job in which I have attained high professional stature, competence, seniority, and salary? In other words, why not think about remaining in the Air Force for thirty years?

Right there he might compare the positive features of ten years of further Air Force service, bringing him to thirty service years in all, with ten years of civilian employment after retirement at "twenty." In ten additional years of military life he would add twenty-five percent of base pay to his pension. Even if he remained active for less than thirty years, he would still add two and a half percent of base pay per year to his benefits, a tremendous boost to any pension.


**Taking too early a jump out can mean having to take on work of a less than pleasurable and remunerative nature.**

**When you think about the joys of life outside, keep in mind the facts that mortgages, taxes, and financing the wedding of daughters are monumentally expensive business.**

The difference between fifty and seventy-five percent of base pay can well mean the difference between true retirement and merely swapping military for civilian life at a new job.

The man who stays in not only will have the larger pension, but also will probably retire at a higher rank —and therefore still higher pay.

In addition—and I believe this to be most important financially—a thirty-year "retiree" is ten years older. So what? Just this. Retirement age for the twenty-year people is roughly between forty and forty-five. These are the high-cost years when fixed expenses are orbiting at a high level. Living expenses may even be on the increase. These are the years when children may still live at home, or are in college, or are about to enter college. This means high expenses.

And how many people have their home mortgage paid off by the time they are forty years old? Not very many. Or perhaps during his Air Force career a man has never owned a home and wishes to retire after twenty years and purchase one for the first time. Well, how about the mortgage? If a bank lends mortgage money in the first place to a person forty to forty-five years of age, it's going to be on a short-term basis, which means much higher monthly payments than for the usual twenty or twenty-five year mortgage. Higher expenses again.

In all likelihood, further, at this stage a family will still have insurance premiums and other large block dollar commitments to worry about. Daughters may not yet be married off. Those weddings can be expensive.

All in all, a man retiring at forty to forty-five years of age just doesn't find himself in as good a financial position as does a man fifty to sixty years old who no longer faces large-scale living expenses like these. An older man can navigate rather well on a reduced income.

Now to inquire into a theory that appears on the surface to have a good bit of validity. It is often supposed that, by taking his pension at twenty years and working full-time on top of it, one can enjoy greater gross earnings during this ten-year period and really save money.

*(Continued on following page)*


That post-retirement venture can blow up in your face.

Let's see. Certainly this man's gross earnings might be higher than if he stayed in. However, in ten years' time it is most unlikely that one can qualify for any civilian pension. If you retire from the Air Force at quite an early age, you may still get in twenty years or so of civilian work to qualify for an additional pension.

On the other hand, military pension benefits for each additional year of service beyond twenty will normally accrue at a greater rate than would any pension benefits in civilian work. And why retire from the Air Force after twenty years if you still want to work for twenty years after that to earn a second pension?

Now let us turn from the specific twenty-year situation to a more general view of retirement. Air Force people, in common with a major segment of their countrymen, are accustomed to an active life. So it is probably a much better thing to plan some type of work or activity following retirement.

We all know well enough about those who work a happy life, retire to the shuffleboard court, and are dead in six months because their hearts can't stand the leisure. We have to continue being active in the same degree to which we have always been accustomed, or we will be endangering both our health and our happiness.

Perhaps in planning for retirement you see yourself setting up your own business. Or you may wish to take a part-time job to augment your pension. Whatever your plans may be—self-employment, full-time work, part-time work—let's agree on a few points here.

Not everyone leaving the service can expect to become a corporation executive. Not everyone forty-five years old or older can even expect to find the job he wants in labor market competition. Not everyone is going to make a killing on land speculation in Phoenix or assume possession of an orange grove in Florida. Give what you choose a try, but be realistic about it. You may thus be in a better position to get where you really want to go.

And let's not oversimplify the dream of going into business for one's self. Success in business still requires capital, good planning, hard work, a business sense, willingness to take a gamble, and luck. A man's chances aren't any better with an Air Force pension in his pocket. That makes little difference. Hundreds of small businesses fail each year because the necessary ingredients for success are lacking.

Perhaps in considering retirement you aren't quite sure how you wish to plot your future. You needn't feel alone, for so many people, both military and civilian, approaching optional or mandatory retirement have only hazy ideas of what they want to do after that. But here are a few things to keep in mind.

In many ways, military and civilian life are similar. A man's professional competence is generally recognized and rewarded in all walks of life. What he gets out of life, in work or leisure, is measured largely by his own efforts. He should be confident of his own abilities but should also be most realistic about them.

So work out your decisions before and after retirement very seriously. Use the old checklist. Get a pencil and paper; do some figuring, paying particular attention to the crucial ten years immediately following retirement or eligibility for retirement. Be fair with yourself, your family, and your future.

If you are torn between twenty-year and thirty-year retirement, keep in mind that you are faced with one of the most important decisions in your life. Just because the law says you may retire at twenty, and just because you've had a few bum assignments lately, you shouldn't hasten into your decision with the careless attitude, "The heck with it; I'm getting out." Compare the benefits of continuing military service to thirty years (or even a portion of these years) and what you honestly believe you can accomplish as a civilian during the same time. If after doing all this—and no fair juggling the figures—you decide to head out that main gate, good luck to you. Just remember, though, that it's like the "go-no go" takeoff plan; once you've committed yourself, it's too late to reconsider.

Unfortunately, it might be noted parenthetically, military policy at any one time can well determine the length of one's career, particularly if he is a Reservist. Current Air Force planning calls for forceout of most Reservists at the twenty-year point, with retention of only a few thousand nonregulars having over twenty years of service in the Air Force of the future.

But should you decide to continue on for thirty years of Air Force life and are able to, you will, in my opinion, have made a sound decision. You will have a long, useful life ahead. You will have carried yourself over the hump of high-living-expense years to the time when living costs will bear a closer relationship to the size of your pension check. And don't forget those social security benefits which you'll be picking up at age sixty-five.

As strongly as I have made this point, however, let me make completely clear that I do not feel on this or any other matter regarding retirement that any particular course of action is advantageous for every individual. This is not so and never can be. My entire approach here has been economic, for one thing. An infinite number of special personal factors may, of course, enter the picture.

One point I can state unequivocally. If you have been in the Air Force long enough so that this article holds real personal meaning for you, you will be a man used to responsibility and reasoned decision. This very significant background, coupled with recognition of the host of issues involved, should prepare you more than satisfactorily to deal with the problems of happily timing—and living—your retirement from uniformed service.—END

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*Now an assistant professor of government research at the University of Massachusetts, Amherst, Mass., specializing in taxes and retirement systems, Mr. Gere is a captain in the Air Force Reserve. His M-day assignment is to the University of Massachusetts' AFROTC detachment. He flew combat as a B-24 pilot with the Seventh Air Force in the Pacific during World War II, and during the Berlin Airlift was on the "coal run" into the beleaguered city from Fassbert in the British Zone. During the Korean War Mr. Gere was in the Air Force psychological warfare program.*

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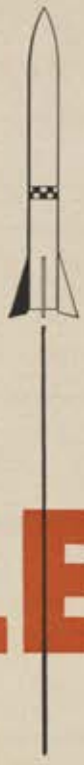

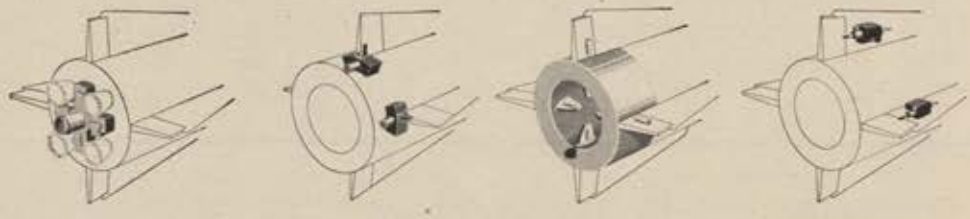

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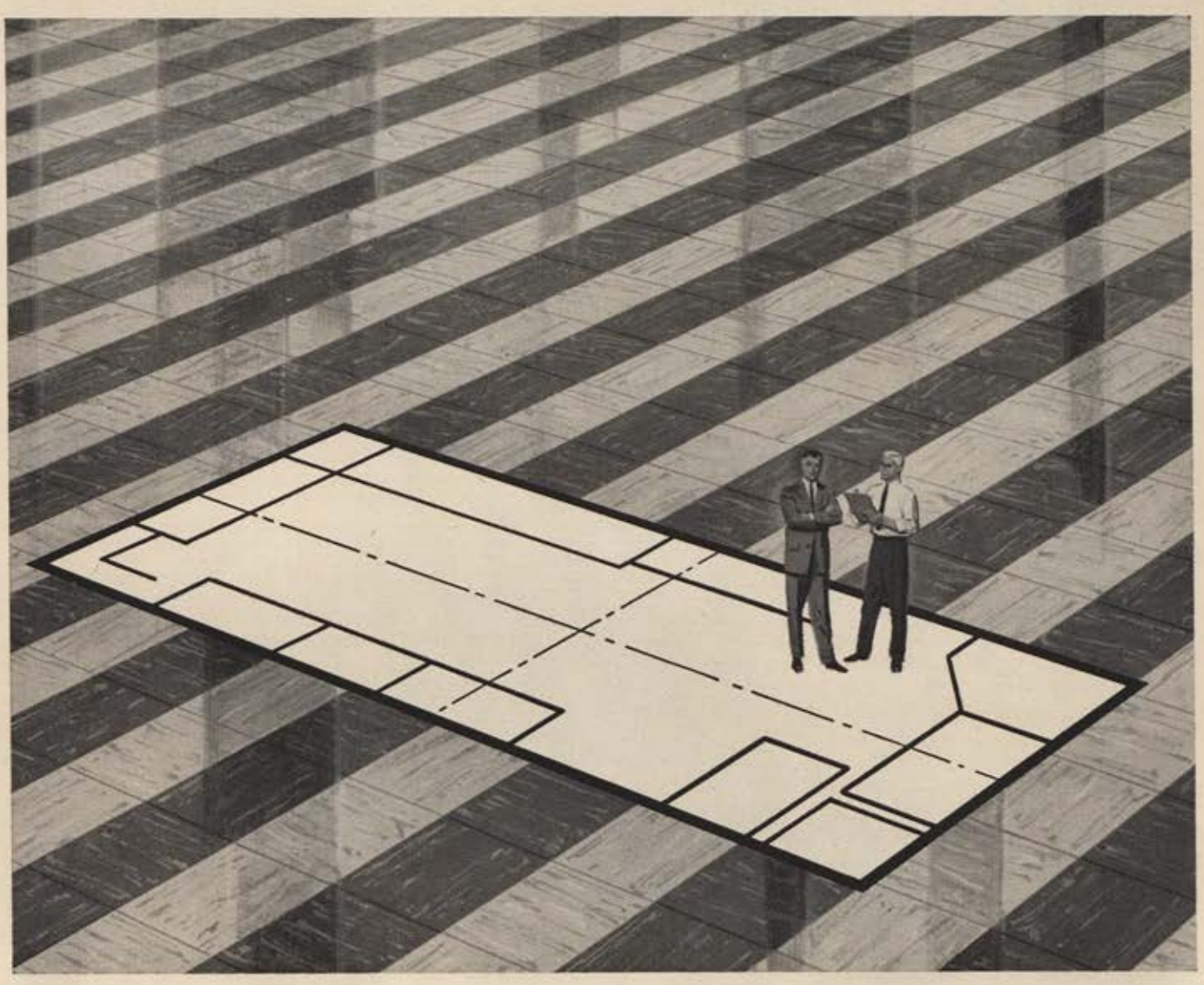

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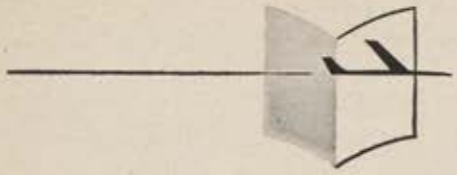

# airman's bookshelf

## Soviet Nuclear Doctrine

***War and the Soviet Union: Nuclear Weapons and the Revolution in Soviet Military and Political Thinking*, by Dr. Herbert S. Dinerstein (Praeger, $5.50)**

Reviewed by Dr. Stefan Possony

This excellent analysis of Soviet military doctrine is in a class by itself. The author, a RAND Corporation specialist on Russian studies, demonstrates a thorough and intuitive grasp of modern warfare. He is also a first-rate historian.

Long-outmoded Red combat doctrine expounded during Stalin's last years was not genuine, according to Dinerstein, but in the nature of a command performance to extoll the leader. This professed doctrine was little related to reality in those years; the Soviets moved as fast as they could in acquiring nuclear air weapons in spite of their tradition-tied dicta. After Stalin's demise the more searching Russian military writers began to publish an increasing number of critical commentaries on the old shibboleths until a full-fledged discussion of military doctrine broke out for the first time since the early twenties.

The broad result of this "thaw" was an official recognition of the facts of modern war. Soviet military doctrine no longer disputes the crucial role of airpower or of strategic bombardment at intercontinental ranges; it recognizes the importance of aircraft, of air-defense warning systems, and of missiles of all categories with varying types of warheads for offense and defense; it is fully aware of nuclear weapons and holds that these weapons will have to be used in future war for strategic and other objectives. It has retained, however, its emphasis on the "combination-of-all-arms" principle and still maintains that wars can be decided ultimately only through occupation, which is why the Kremlin asserts that the US cannot defeat them (and by the same token Russia could not defeat the United States).

Within this framework the Soviets recognize that in modern conflict the role of surprise has become crucial. This new emphasis on surprise constitutes the most significant departure from beliefs professed in Stalin's time. Given the possibility that the course of conflict may be decided through a massive surprise blow – the Soviets rightly do not believe that this *must* be the case–they face the problem of how surprise attack can be warded off. Their answer is simple; the defender must be capable of launching a preemptive strike before the attack force leaves the ground. In other words, the danger of surprise attack should be nullified by "striking back first."

The practical difficulties of preemption have not been clarified by the Soviets. It is quite possible that they are considering strategic rather than tactical preemption, i. e., a "preemptive" counterattack launched weeks or months before the original attacker intended to strike. This would obviate the difficulty of catching him within minutes before take-off, for many reasons impractical. Soviet doctrine makers deny that they are working toward a preventive war concept, but they do not provide exact definitions of this and other terms. We must assume that in this connection they would not deny themselves the use of "surprise." Soviet strategists obviously wholly perceive the enormous value of the offensive in nuclear warfare.

Dinerstein's most significant finding was that this debate on military doctrine spilled over into the political arena. Dinerstein demonstrates that the military dispute was a major factor in the struggle between Premier Khrushchev and former Premier Malenkov. Malenkov argued that modern nuclear war would be catastrophic for all belligerents, that strategy should aim at deterring war, with deterrence the basic concept underlying armament programs.

Khrushchev, on the other hand, is said to have considered this a defeatist attitude and postulated that a nuclear war should aim to destroy the capitalist system (meaning the US) and armament programs should be undertaken to fight a war which the Soviets could win conclusively. Thus, Khrushchev served notice to the world that the Communists intend to *win the next war*, a statement that should influence heavily our current free-world discussions on this subject.

The book is packed with additional insights into related problems: the Soviet tactic of creating military alarms (like Berlin), the impact of technology on Soviet thought, Soviet intent to acquire a "retaliation-proof" military posture, and others.

Dinerstein has produced the best estimate of the current situation and of predictable strategic trends yet produced in the United States.

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**About the reviewer:** *Dr. Possony is an authority on Communism and modern military strategy. He has been a professor of international politics at Georgetown University's graduate school since 1946. He is the author of* Strategic Air Power *and* A Century of Conflict *and has written for* Air Force *and other magazines.*

## In the Mood of the Times

***In Every War But One*, by Eugene Kinkead (Norton, $3.75)**

Reviewed by Lt. Col. James L. Monroe, AFRes.

Eugene Kinkead, in a new study of American prisoners of war in Korea, presents a neatly fabricated, speciously convincing argument that Korea demonstrated a new weakness in American youth.

Airmen and Marines will feel modestly gratified by compliments from Kinkead, at the same time dismayed by discredit heaped on the Army. Kinkead attributes the burden of his views to high-ranking military and civilian authorities of the Army and implies that the book had their approval. But it completely disagrees with official reports issued in 1955 and subsequently.

Kinkead's thesis charges: (1) an unprecedentedly high POW death rate through "give-up-itis," (2) no escapes, (3) wholesale collaboration with captors, (4) lack of discipline, (5) moral dissolution exhibited through acts of cupidity and stupidity, (6) the US troops' performance compared unfavorably with that of the Turks.

Fairness demands a look at some of the evidence Kinkead handles so carelessly. Mortality in POW camps of the American Revolution, the Civil War, and in the Pacific in World War II compared closely with Korea. POW mortality has always come as a direct result of inadequate medical care, food, clothing, and shelter. This was the situation in Korea. Over ninety percent of American POW deaths in Korea occurred during and after a forced march to the Yalu in subzero temperatures. Much of the Americans' clothing had been stolen. No medical care was available. They subsisted on

*(Continued on following page)*

a vitamin-poor diet of less than 1,300 calories. It is surprising that *any* survived to be repatriated. But sixty-two to sixty-five percent did.

As to POW behavior, the Army initiated court-martial proceedings against only twelve of 192 men who had been accused of misconduct by other returnees. Eleven of the twelve were convicted, and some forty or fifty others among the accused were dealt with administratively in accord with what the facts in each case warranted under our system of justice.

At the same time, 165 POWs were recommended for decoration for meritorious conduct. In other words, ninety-three percent of the Army captives behaved acceptably, five percent heroically, and fewer than two percent in a manner which appears to merit Kinkead's harsh criticism.

The author seems much more tolerant of the Turks—who were left as integrated units by the Chicoms and underwent minimum interrogation and coercion. Yet, one percent of the Turks were charged with collaboration.

Security still prevents detailed comment about the "no escape" charge. However, two books have been published, *Beyond Courage* by Clay Blair and *Valley of the Shadow* by Maj. Ward Millar, USAF. Both volumes recount dramatic escapes made by USAF airmen. The Korean escape record probably compares favorably with that of past wars.

Kinkead says moral dissolution and abandonment of military discipline among POWs indicate failure of America's educational system, home teaching, and religious institutions. Kinkead denies Red Chinese "brainwashing" (garbling a definition in the process) and declares that our youths are vulnerable to "conversion," have weak loyalties and commitments. He decries the Uniform Code of Military Justice, the inspection systems of the services, and the Doolittle Report, holding that these undermine discipline and detract from the vital status and prestige of rank.

There is little either in the experience of Korea or in the behavior of the vast majority of American POWs to warrant the abject self-criticism and hopelessness displayed by Kinkead.

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**About the reviewer:** *Lt. Col. James L. Monroe, AFRes., served as staff officer in the Psychological Warfare Branch of DCS/Plans, Hq. USAF, and as Department of Defense POW officer from 1954 until he left active duty in 1957. He is now with the Human Ecology Society in New York where he is engaged in research in the behavioristic sciences.*

## Big Man in a Big Sky

***Flying Tiger: Chennault of China*, by Brig. Gen. Robert Lee Scott, Jr., USAF (Ret.) (Doubleday, $3.95)**

Reviewed by Marvin W. McFarland

This biography of "the greatest Flying Tiger of them all" is related with lucidity, compassion, indignation, and love.

The author, General Scott, himself an ace in the famed Flying Tigers, wrote the classic *God Is My Co-Pilot* during the war.

Claire Lee Chennault, who at a desperate moment in the history of China and the world conceived, organized, and led into battle his American Volunteer Group, was a late-comer to aviation. He was an old twenty-seven in 1917 when he got his wings—too late and too old to see anything of World War I except training centers. At that, he was nearly washed out, not for lack of flying ability but for allegedly flouting the rules. The narrow squeak was prophetic in kind: All Chennault's life it would be a question whether he was greater as a flyer or as a rule-flouter—and he was a past master at both.

In the twenty years between wars Chennault became the pursuit man par excellence in the long debate over the relative merits of fighters and bombers. Chennault had his own ideas of how fighters should be employed and was among the first to envision the broad potentialities that fighter aircraft were to demonstrate spectacularly in the second world war. His militarily nonconformist views led ultimately to retirement "for disability" in 1937 when he was forty-seven and a captain.

Scarcely had Chennault withdrawn to his Louisiana home when he received an invitation from the Nationalist Chinese government to go to China as a civilian adviser on air training in the "undeclared war" with Japan.

The rest of the story is widely familiar. But the retelling is more than worthwhile reading: how Chennault fought the services to get competent flyers released for volunteer jobs with his AVG; how, after Pearl Harbor, he had to fight, not so much the War Department as his flyers, to get them back into service harness after their

*(Continued on page 113)*


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strange, wild civilian fling at war in their shark-mouthed, beat-up P-40s over the steaming, crawling jungles; how Chennault fought with his perennial bete noire, Clayton Bissell of the Tenth Air Force, with "Vinegar Joe" Stilwell of the CBI, and even with Hap Arnold, the AAF's boss, to preserve and expand his mission in China and to get the men, planes, and materiel that produced his incredible successes against the Japanese.

Most of these fights he won. His handful of "Tigers" became the Fourteenth Air Force, with Chennault as CG and two stars on his shoulders.

But as a final victory over Japan approached, in July 1945, he was "voluntarily" retired for the second time, and went back to the States after a touching series of farewells from the grateful Chinese people. He would return again to form and head China Air Transport, but the great days—the best and the worst—were behind him.

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**About the reviewer:** *Mr. McFarland, a prominent air historian, is head of the Library of Congress' Aeronautics Section, Science Division, and holder of its Guggenheim Chair of Aeronautics. He edited* The Papers of Wilbur and Orville Wright.

## Aerospace Books

Aside from a few years during World War II, glider flying has received no official recognition in American pilot training schools. Recently the Air Force Academy has instituted a course for cadets, but even this is mainly flight orientation. As a sport, gliding is unexcelled. It is extremely popular in European countries where it is also included in military flight training programs. A new British original, *Gliding: A Handbook on Soaring Flight,* by Derek Piggott (Macmillan, $5), is a thorough flight instruction guide by England's top glider pilot. It ranges from basic flight techniques to advanced skills like instrument, acrobatic, and cross-country flying.

° ° °

The history of the helicopter goes back almost as far as that of powered flight. The 'copter did not come into its own until after World War II. Some believe it holds perhaps the greatest future of all heavier-than-air craft as far as general aviation is concerned. *The Helicopter,* by Jacob Shapiro (Macmillan, $4.50), reviews the history, design principles, operation, capabilities, utilization, and structure of helicopters through the years.

° ° °

Increased public interest in the earth's atmosphere is a welcome by-product of the beginnings of space exploration. Clyde Orr, Jr., Georgia Tech professor of chemical engineering, writes a popular, nontechnical, authentic profile of the air around us clearly, entertainingly, and informatively. *Between Earth and Space* (Macmillan, $4.95) explains, analyzes, describes, and speculates about the atmosphere and the science of meteorology in terms of what they mean to mankind. Climatic variations, storms, and weather of all types, jet streams and other aerial currents, aerial life and air pollution, air travel and air phenomena, weather detection, prediction, and control—all come alive under Orr's well-guided pen. This volume presents a portrait similar in kind to the one Rachel Carson created in her study of the oceans, *The Sea Around Us.*

## Books of General Interest

*Beyond the Planet Earth,* by Konstantine E. Tsiolkovsky (Pergamon

*(Continued on following page)*

Press, $5)—Translation of one of the old classics of Russian science fiction by a pioneer space scientist.

*Runway Zero-Eight*, by Arthur and John Castle (Doubleday, $3.50)—A novel filled with suspense about a passenger-loaded airliner in trouble over the desolate country between Winnipeg and Vancouver.

*In Love With Wings*, by Abel Desaulniers (Exposition Press, $2.50)—The personal story and experiences of a lightplane pilot.

## Related Subjects

The highly classified operations of World War II have been coming to light in sporadic doses. *The Secret Invaders*, by Bill Strutton and Michael Pearson (British Book Centre, $3.95), is a story of the British Combined Operations Pilotage Parties (COPP), a counterpart to the US Navy Frogmen.

COPP operated in all parts of the world, gathering military intelligence and doing advance beach reconnaissance. In many ways it added up to the toughest and loneliest duty there was. Two-man COPP teams worked from submarines which left them several miles off enemy shores. From there they slipped to shore by canoe or skin-diving rig, mostly under cover of darkness, often in adverse weather. The variety of their tasks included determining beach suitability for invasion, sketching land contours, finding dangerous shoals and beach exits, and casing enemy positions. Sometimes, because of enemy naval or air interference, the submarines could not rendezvous at the appointed time and place for pickup, and COPP men, rather than be captured, swam into the open sea to perish with their secrets. In the Far East teams occasionally fled into the jungles, pursued by the Japanese until death or rescue. Casualties were high but so was esprit de corps. COPP performance was effective and brilliant. Strutton and Pearson's treatment does it justice.

• • •

In a 1945 Luftwaffe raid a stick of light fifty-kg. bombs tumbled down on Haywards Heath, Sussex, England. After the raid, authorities noted a clear bomb ricochet mark on the paving stones near the railway station. It led to a hole through both walls in the station buildings with further skid marks on the platform beyond. The bomb, or evidence of its explosion, could not be found. Two days later it was discovered in a railway yard in Paisley, Scotland. The tricky device had skidded through the buildings and lodged in the box car of a train moving through the station. This is one of hundreds of "believe-it-or-nots" told in *Unexploded Bomb*, by Maj. A. B. Hartley (Norton, $3.95), the story of bomb disposal crews in World War II. The bomb disposal boys worked heroically from 1939 well into the postwar years, hunting, digging, disarming unexploded bombs and sea mines. One out of every ten bombs dropped on England failed to go off. Some penetrated as deep as sixty feet, others followed weird underground paths, defying human ingenuity to detect and disarm them. Occasionally probings yielded live pieces of ordnance of first world war vintage, dropped more than twenty years earlier during the Zeppelin raids on London. Casualties were high in bomb disposal work. One of the main qualifications for this service, it is said, was "preparedness for after life."

*(Continued on page 117)*

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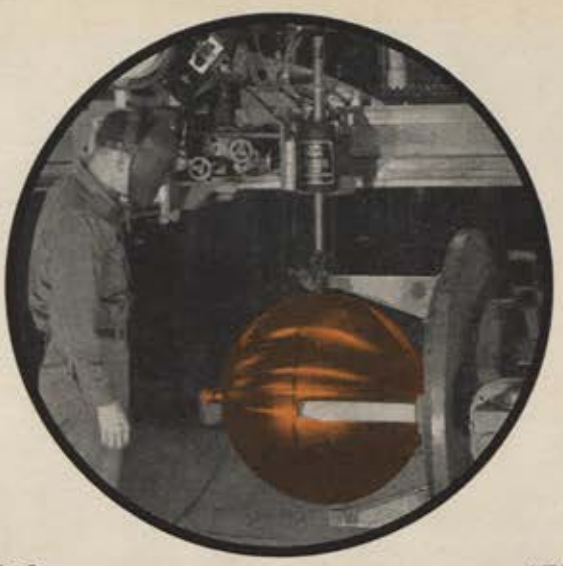

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The first of two special volumes to mark the fifteenth anniversary of D-Day this spring has now appeared. Author of this one is David Howarth, wartime combat correspondent in the ETO and author of the best seller, *We Die Alone.*

*In D-Day: The Sixth of June, 1944* (McGraw-Hill, $4.95), Howarth's approach to the historic twenty-four-hour assault on Fortress Europe is in terms of about thirty individuals whose experiences are used to represent human activity set in motion by the invasion orders.

Unhappily, Howarth's account assigns but a small role to airpower in the giant operation. Thousands of airmen fought in the frightful channel skies that day. Their missions ranged from the beaches deep into the continent, where they carried their war to the Nazi reserves and materiel concentrations. Allied control of the air assured safety of the landing fleet. Airmen played no less a dramatic, vital role than their comrades on the ground. Proper recognition of this fact would make this book more complete.

° ° °

Few areas hold greater strategic, military, and political significance for America and the West than the Near East. Here is a list of some recent books dealing with this critical area:

*Iraq: Its People, Its Society, Its Culture,* by George L. Harris (Press Taplinger, $7).

*Islam and the Modern Age,* by Ilse Lichtenstadter (Bookman Assoc., $4.50).

*Ben-Gurion: The Biography of an Extraordinary Man,* by Robert St. John (Doubleday, $4.50).

*The Reconstruction of Iraq: 1950-1957,* by Fahim I. Qubain (Praeger, $6).

*The Middle East: A Political and Economic Survey,* edited by Sir Reader Bullard (Oxford Univ. Press, $9).

*Saudi Arabia,* by K. S. Twitchell (Princeton Univ. Press, $5).

*Egypt in Transition,* by Jean and Simonne Lacouture (Criterion, $7.50).

*Sinai Victory,* by S. L. A. Marshall (Sloane, $5).

*Arab Unity,* by Fayez A. Sayegh (Devin-Adair, $4).

*Egypt's Liberation: The Philosophy of Revolution,* by Premier Gamal Abdel Nasser (Public Affairs Press, $2).

## Also Recommended

*Arms Control and Inspection in American Law,* by Louis Henkin (Columbia Univ. Press, $5.50).

*The Social Impact of Bomb Destruction,* by Fred Charles Ikle (Univ. of Oklahoma Press, $3.95).

*The Causes of World War III,* by C. Wright Mills (Simon and Schuster, $3.50).

*A Guide to Naval Strategy,* by Bernard Brodie (Princeton Univ. Press, $6).

*Major Governments of Asia,* by Harold Hinton, edited by George MacTurnan Kahim (Cornell Univ. Press, $7.25).

*The Hunters and the Hunted,* by Jochen Brennecke (Norton, $3.95).

*They Fought Alone: The Story of British Agents in France,* by Col. Maurice Buckmaster (Norton, $3.95).

*Friendly Enemies: What I Learned in Russia,* by Adlai E. Stevenson (Harper, $2.95).

*The Face of War,* by Martha Gellhorn (Simon and Schuster, $3.75).

*American Foreign Affairs,* by William Schurz (Dutton, $4.50).

*Hope for South Africa,* by Alan Paton (Praeger, $2.50).

*The Prerequisites for Peace,* by Norman Thomas (Norton, $2.95).

*The United Nations,* by Leland M. Goodrich (Crowell, $7.50).

*Our Earth: The Properties of Our Planet, How They Were Discovered, and How They Came into Being,* by Arthur Beiser (Dutton, $3.25).

*American Diplomacy,* by Robert H. Ferrell (Norton, $6.50).

*The Founding of the Federal Republic of Germany,* by John Ford Golay (Univ. of Chicago Press, $5).

*The Black March: The Personal Story of an S.S. Man,* by Peter Neumann, translated by Constantine Fitzgibbon (Sloane, $4).

## New in the Paperbacks

*The Air Force Blue Book* (Military Publishing Institute, 95¢)—A complete reference guide to the USAF. AF major command organization and operation described in photos and narrative with almanac section of statistics on AF history and current status.

*Face of a Hero,* by Louis Falstein (Popular Library, 35¢)—New edition of an epic war novel about gunners on B-24s. Vivid portrayal of air war.

*Satellites, Rockets, and Outer Space,* by Willy Ley (Signet Key, 35¢)—New edition of this illustrated survey of rocket, missile, and space-flight research and development.

*I Flew for the Fuehrer,* by Heinz Knocke (Berkley, 35¢)—Luftwaffe pilot gives personal accounting of his combat career in World War II.

*The Damned Wear Wings,* by David Camerer (Crest Books, 35¢)—The destruction of the Ploesti oilfields by B-24s of the Fifteenth Air Force.

*The Red Knight of Germany,* by Floyd Gibbons (Bantam, 35¢)—The personal story of Baron von Richthofen and his "Flying Circus" of World War I.

*Battling the Bombers,* by Wilhelm Johnen, translated by Mervyn Savill (Ace, 35¢)—A true story of combat in World War II by one of the great night fighter pilots in the Luftwaffe.

*Hiroshima,* by John Hersey (Bantam, 35¢)—Reissue of this great documentary.

—MAJ. JAMES F. SUNDERMAN

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