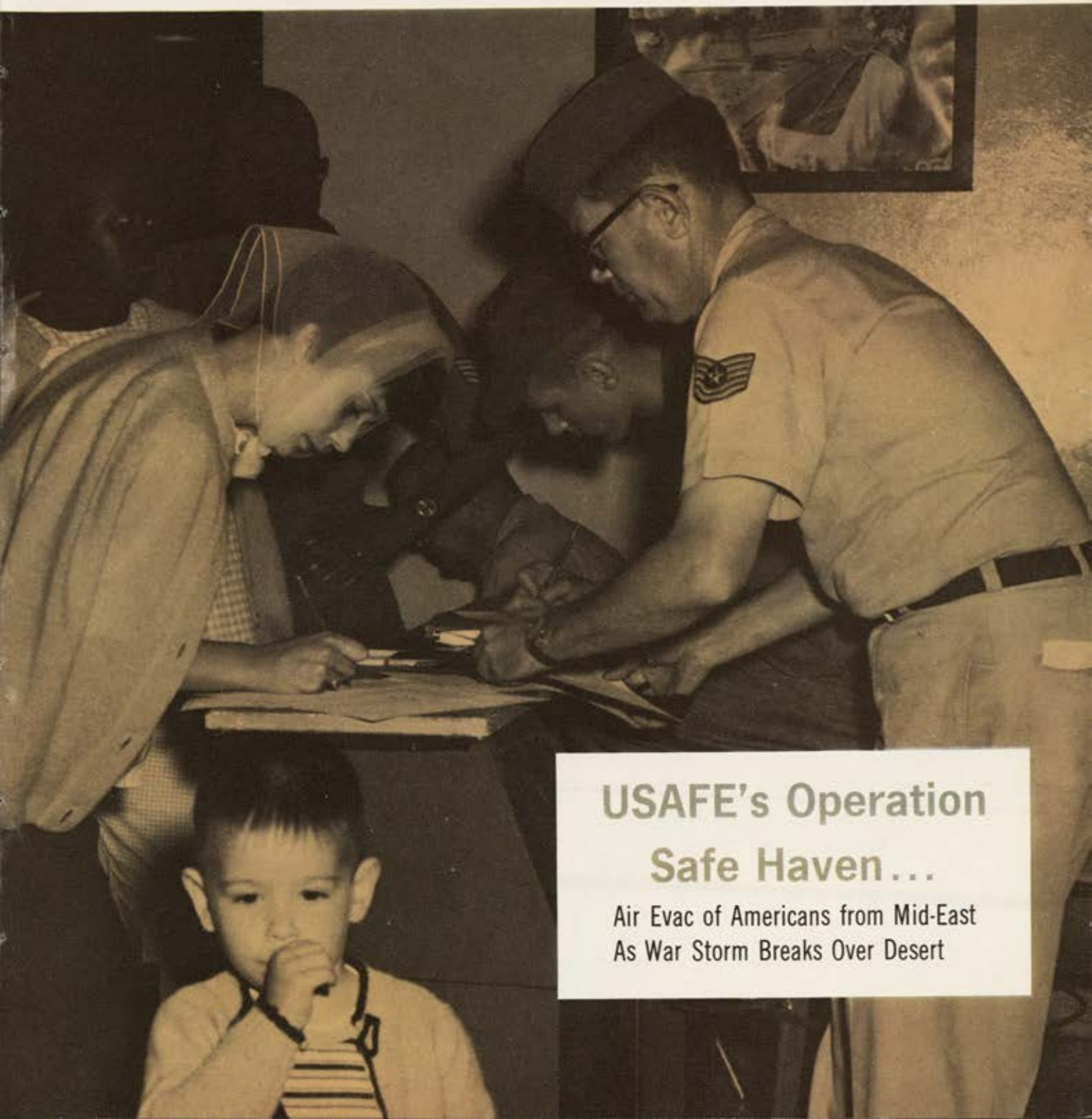


AIR FORCE

and **SPACE DIGEST**

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



USAFE's Operation Safe Haven...

Air Evac of Americans from Mid-East
As War Storm Breaks Over Desert



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U
A



Loop with roll

Loop

Immelmann turn

The expanding role of helicopters is creating new demands for stability and controllability. Flying in gusty winds, hugging rough terrain, setting down on hillsides and flying in IFR weather are very sticky problems. Training green pilots is also a tough proposition.

Responding to the need for significant improvement in helicopter safety, Lockheed developed the Rigid Rotor. As its name implies, the Rigid Rotor's blades are fixed rigidly to the mast—instead of teetering or flapping. This way the entire mass spins as a unit. The result is a gyroscopic action that

makes the Rigid Rotor helicopter vastly more stable—without black boxes.

This stability also means controllability. Together, they provide a margin of safety far superior to that of ordinary helicopters. Superior even to fixed-wing craft.



Helicopter safety takes a new turn*

Cuban 8

Hammerhead stall

Slow roll

*These complex maneuvers—demonstrating safety and controllability—have been performed repeatedly by Lockheed test pilots.

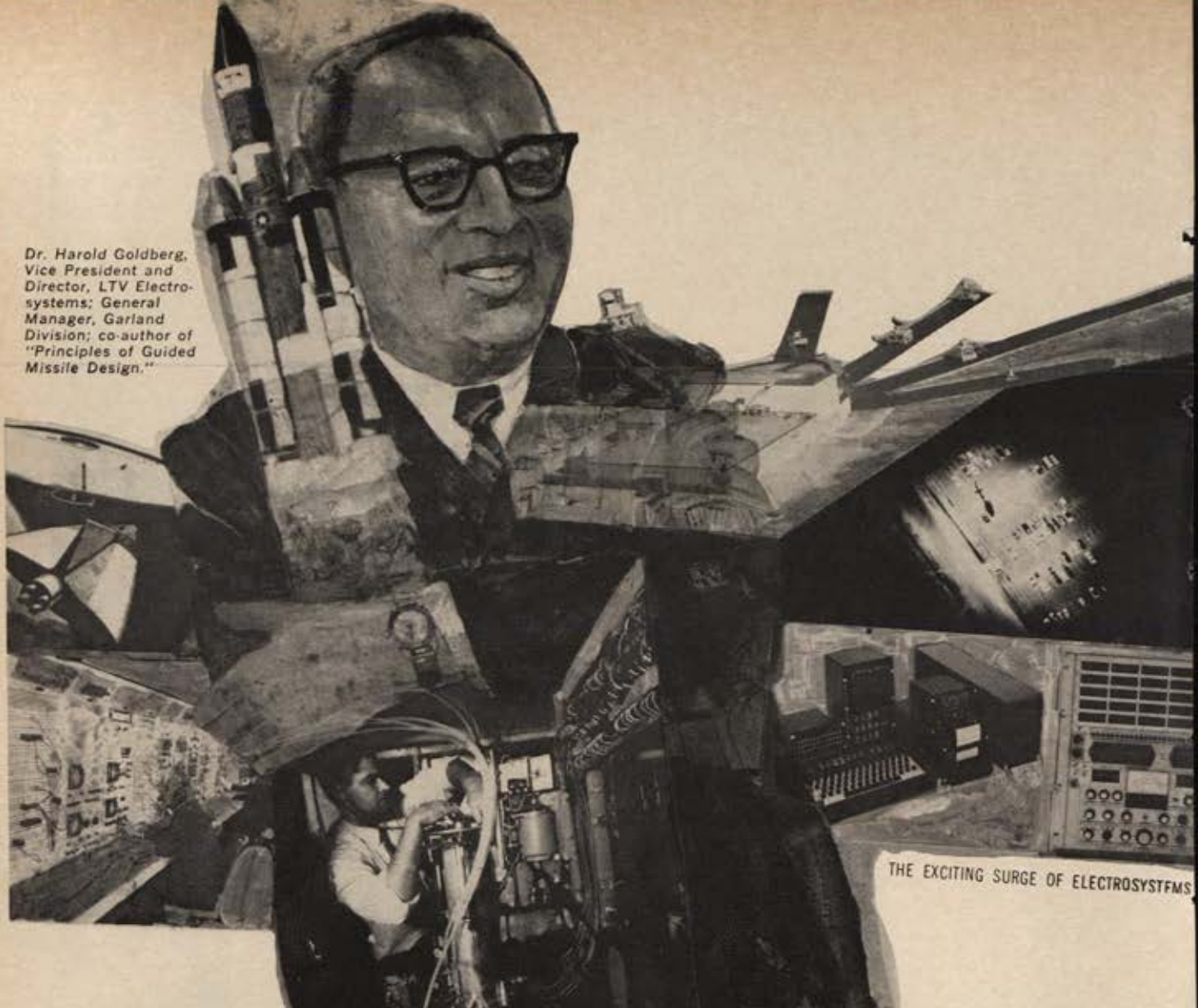
A demonstration of safe, stable, controllable flight was given by the Rigid Rotor Model 286, performing a series of complex maneuvers. Included was a slow roll—never before accomplished by any other helicopter, as far as is known. The 286, which has flown these maneuvers a number of

times, is produced by the Lockheed-California Company, Burbank.

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Dr. Harold Goldberg,
Vice President and
Director, LTV Electro-
systems; General
Manager, Garland
Division; co-author of
"Principles of Guided
Missile Design."

THE EXCITING SURGE OF ELECTROSYSTEMS

CREATIVE SYNTHESIS: TECHNOLOGY IN MANAGEMENT

Dr. Harold Goldberg, IEEE Fellow, weapons systems specialist, scientist and manager, typifies both the first-rate management capability of LTV ElectroSystems and the shape of things to come: a whole new generation of electronics systems for military and civilian applications.

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AIR FORCE Magazine • August 1967

AIR FORCE

and SPACE DIGEST

The Magazine of Aerospace Power
Published by the Air Force Association



VOLUME 50, NUMBER 8

AUGUST 1967

The Changing Military Strategic Balance

AN EDITORIAL BY JOHN F. LOOSBROCK

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The Vietnam conflict apparently overshadows the issue of the US-Soviet nuclear arms race, which is no less imperative for its lack of attention. In fact, the turning point of that race is near at hand.

The Air War in the Middle East / BY J. E. DAWSON

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The remarkable demonstration of air-strike power by the Israelis in early June was a classic demonstration of the use of tactical airpower in modern warfare.

Tomorrow's Strategy—Out of the Jungles and Into the Lab

BY COL. STEPHEN J. SALTZMAN, USAF (RET.)

32

A stagnation of US military strategy, responsible for shortsightedness in a war we could have ended by now, may eventually cost us our own defense system unless more priority is allotted to technological development.

Showcase for World Aerospace / BY STEFAN GEISENHEYNER

38

More varied and complex than any former exhibition, the Paris Air Show 1967 presented an unequalled opportunity for nations of East and West to compare, exchange, and integrate new developments in the field of aviation.

Rebirth of Aviation's Top Challenge: The Nuclear-Powered Airplane

BY EDGAR E. ULSAMER

43

Another look at the advantages of nuclear-powered aircraft indicates that they could be cost-effective for specialized uses, despite difficult modification problems.

SPACE DIGEST

ANSER—USAF's "Short-Order" Think Tank / BY WILLIAM LEAVITT

51

Cost/effectiveness is the name of the game in today's Pentagon, and helping the Air Force play the game is Analytic Services, Inc., the smallest and least known of USAF's not-for-profit advisory firms.

Needed—One and Only One—National Manned Orbital

Laboratory Program / BY COL. RICHARD C. HENRY, USAF

59

In the face of wartime money pressures and the priority of defense requirements, why shouldn't there be a single national manned orbital laboratory program, managed by DoD with cooperation from NASA?

Europe Reacts to US Troop Cuts / BY STEFAN GEISENHEYNER

66

A major change in Europe's defenses will be effected next year when troop withdrawals are scheduled by the US and England. AF/SD's Editor for Europe suggests that regrettable headaches are already developing, and worse ones will result as the practical impact of this decision is felt.

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The Changing Military Strategic Balance

By John F. Loosbrock

EDITOR, AIR FORCE/SPACE DIGEST

ONE of the hidden prices of the war in Vietnam is the way it has preempted both official and public discussion of other important strategic and technological problems. More and more it is taken for granted that the US is in good shape in its strategic power relationships vis-à-vis the Soviet Union, that our margin of superiority will continue to be sufficient over the foreseeable future, and that, in any case, the extent of that margin becomes less and less important as we move toward political, economic, and even military accommodations with the Soviets. The official position over the past several years has been that a state of mutual deterrence is beneficial to both sides. More importantly, it has been assumed that the Soviets agree with this estimate of the strategic situation.

Arguments against this line of reasoning have been, to a great extent, emotional and intuitive rather than analytical. The official position, on the other hand, has been weighted with persuasive statistics of the type and quantity available only within the inner circles of the government.

In this context, the appearance of a sober, balanced, "loyal-opposition" point of view takes on great significance. Such a view is presented in a slim pamphlet issued in mid-July by the House Armed Services Committee. Entitled "The Changing Strategic Military Balance—USA versus USSR," the report is the work of a special subcommittee of the National Strategy Committee of the American Security Council. The report is signed by Gen. B. A. Schriever, USAF (Ret.), as Chairman, along with a number of other high-ranking retired officers of all services, including Air Force Generals LeMay and Power, the Army's Gen. Paul D. Adams (until recently head of Strike Command), and the Navy's Vice Adm. William A. Schoech (formerly Chief, Office of Navy Material).

Using nuclear weapon megatonnage as its main yardstick, the report concludes that:

"The preponderance of evidence points to the conclusion that the Soviet Union is succeeding in its massive drive toward strategic military superiority and that the United States is cooperating in this effort by slowing down its side of the arms race.

"In 1962 the United States had a total megatonnage delivery capability ranging between 25,000 megatons and 50,000 megatons. The corresponding figures for the Soviet Union ranged between 6,000 megatons and 12,000 megatons.

"The year 1967 falls in a crossover period with the USSR estimates ranging between 16,000 and 37,000

megatons, to equal or exceed the US estimated range of between 8,000 and 29,000 megatons. . . .

"For 1971, it appears that a massive megatonnage gap will have developed. US delivery capability is estimated to range between 6,000 megatons and 15,000 megatons, whereas the estimated high for the Soviet delivery capability is 50,000 megatons, and the projection of the established Soviet range-curve indicates a low figure for the Soviets of approximately 30,000 megatons.

"On the basis of this projection, the US and USSR will have reversed their roles in a ten-year period."

If one takes only the highest estimate for the Soviet Union, the report's chart indicates a parity-point in mid-1968 at approximately 23,000 megatons apiece. Using the same measurement, by 1971 the Soviet Union will have a clear two-to-one advantage of 30,000 megatons against 15,000 megatons for the US.

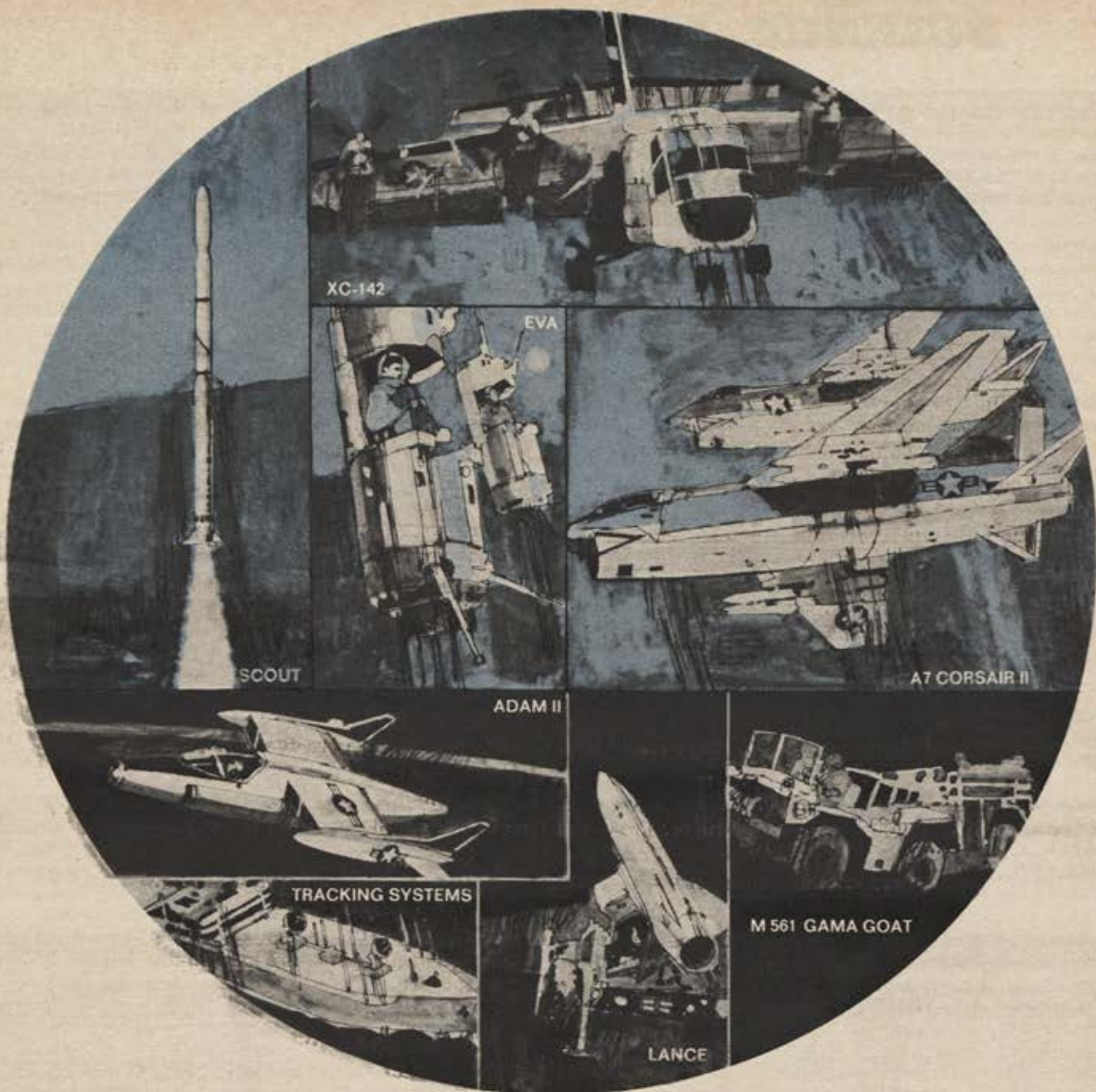
The report draws these figures from a series of examinations of specific major weapons areas, including intercontinental ballistic missiles, intermediate- and medium-range ballistic missiles, antiballistic missiles, submarine-launched missiles and antisubmarine warfare forces, strategic bombers, and space weapons.

Quite wisely, the group chose to base its analysis on unclassified published information. But in view of the very recent active service of some of the signers of the report it is difficult to believe that any conclusions were reached that would be significantly different from those which might have been based on classified information.

The predictable Pentagon response has been that sheer megatonnage is not the sole, nor even a very reliable, guide to comparative military strength. The report, however, cites payload as "the best single measure of the strategic military balance" (*emphasis supplied*) and cites Secretary McNamara's posture statement of January 23, 1967, in which he said: "... We should bear in mind that it is not the number of missiles which is important, but rather the character of the payloads they carry; the missile is simply the delivery vehicle."

One may quibble over details, but the fact is that the report represents a fresh and disturbing look at a facet of national security which is increasingly obscured by the shadow of the war in Vietnam.—END

(Copies of the report are available on request to the Committee on Armed Services, Room 2118, Rayburn House Office Building, Washington, D. C. 20515.)



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LTV Aerospace Corporation traces its aeronautics history back to 1917, when its first aircraft was produced—a marvel of wood, wire and canvas with an "unbelievable" top speed of 116 miles an hour.

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SCIENCE/SCOPE

A new communications satellite for use in 1969 by the International Telecommunications Satellite (Intelsat) Consortium is now in the design-study stage at Hughes, under contract with Comsat. The new Intelsat IV would have 10 times greater capacity than the Intelsat III generation scheduled for 1968, and would be employed for intercontinental telephone and TV traffic.

Advanced naval combat data systems will give commanders of 30 NATO ships a complete picture of the combat situation -- enemy and friendly aircraft, surface ships, submarines -- enabling them to make quick, sound decisions and suggesting countermeasures. Hughes has licensed SEMS (Societe Europeene de Materials Speciaux) to produce the computer-displays for the French and Federal Republic of Germany Navies, and Selenia S.p.A. for the Italian Navy.

A communications experiment with the ATS-1 satellite recently demonstrated the practicability of VHF communications via synchronous satellite for commercial ships and airliners. Using a simple, compact terminal Hughes developed for the experiment, the crew of a Coast Guard cutter 1200 miles off the Pacific Coast talked by two-way radio with NASA ground stations in North Carolina and California and with airliners over the mid-Pacific. Entire terminal fit into a standard six-foot rack and utilized slightly modified VHF equipment.

The brilliant white paint on Surveyor spacecraft is so stable it retains its reflectance through the intense heat and ultraviolet radiation of the lunar day. The best white house paint would soon have turned dark brown, subjecting the TV camera and shovel to such high temperatures their success would have been endangered.

The Navy's new air-to-air Phoenix missile has scored a hit in every airborne test, and Hughes engineers feel that its on-board telemetry equipment deserves some of the credit. It enables them to monitor the missile's condition prior to launch and its performance throughout flight, resulting in significant time and cost savings over conventional test bench methods.

If micrometeoroids puncture a manned spacecraft during lunar or interplanetary journeys, the holes could be plugged instantly by a new self-sealant developed by Hughes. The single-component chemical material, put between the spacecraft's double walls, would provide thermal insulation as well as protecting against penetration by micrometeoroids. It worked perfectly when tested in a space-simulating vacuum, sealing holes made in a variety of materials by 1/8-inch projectiles traveling 22,000 feet per second.

A 37-pound satellite receiver for military use has been developed by Hughes communications engineers in a company-funded program. The solid-state receiver fits into a small water-tight metal box. A still smaller fiberglass package contains its concave parabolic antenna. Only 12 inches in diameter, it can be swiveled in any direction to lock onto a communications satellite. Both units fit into a small overnight bag. Set has received coded messages, voice, and music from a simulated satellite ... can be powered by 28 flashlight batteries.

Creating a new world with electronics

HUGHES

HUGHES AIRCRAFT COMPANY

Immorality of War

Gentlemen: Re "The Ethics of Bombing," by Air Marshal Saundby (June '67 issue), may I add my small accolade to the Air Marshal on his studied work on aerial bombardment. More precisely, I applaud the following excerpts:

"These irrational feelings . . . are almost always directly proportional to their ignorance of the subject."

"... the war waged by North Vietnam . . . is wrong and immoral."

"... the defensive war against the attack from the North . . . is right and proper. No twist of argument, . . . no emotional outcry against bombing can controvert those two plain facts."

I would suggest that our "Enlightened Intellectuals" and self-styled moralists take an objective look at history and reexamine the ethics they supposedly dedicate their outraged cries toward. In addition, an examination of national policy objectives would hopefully moderate if not quell their injudicious protests.

In addition, let me congratulate you on your fine magazine. I find it not only rewarding and stimulating, but very readable. Lastly, Bob Stevens' "There I Was . . ." adds just the spice to a thoroughly enjoyable magazine.

LT. ROGER R. KLAGES
Keesler AFB, Miss.

Part-Time Warriors

Gentlemen: We are very pleased with your handling of "Weekend Warrior" story in the June issue.

The support being given the active-duty Air Force by Air Force Reservists as a by-product of their training is not well understood, either by service people or the public in general. Your story will go a long way toward correcting that situation.

... This pattern of productive use of training time also applies to non-flying units and individual Reservists. There might be another story in the nonflying aspect.

COL. GLEN W. CLARK
Chief, Office of Information
Hq. CAC
Robins AFB, Ga.

Gentlemen: . . . I noted the story "A Weekend Warrior's Vietnam Diary,"

written by Grover C. Tate, Jr. This article chronicled the account of Air Force Reservists flying airlift missions in C-124 aircraft in support of the Vietnam effort on the part of the United States. I think it is a fine article and the Air Force Reservists that participate in these flights are to be commended, but unfortunately, in publishing this article you give the impression that the weekend warrior's support of Vietnam is exclusively the province of the Air Force Reservists flying C-124 aircraft.

To the Air National Guard aircrews flying C-121s and C-97s for almost two years now in support of Southeast Asia, this is a very significant oversight, and I certainly would recommend that in any article relating to the effort of the Reserve Components of the Air Force that you include the contribution of the Air National Guard. I believe that Guard crews have flown many more missions and airlifted much more tonnage than the Air Force Reserve has, although I do not in any way wish to depreciate their important efforts. I think that it would be more accurate for all concerned to place the subject in proper perspective.

COL. RICHARD B. POSEY
Chief of Staff
Hq. Pennsylvania Air National
Guard
Annville, Pa.

Justified Disappointment

Gentlemen: For almost twenty years I have been a member of the Air Force Association and have aspired to getting my picture in your excellent magazine. This finally happened in your June 1967 issue (page 100). The only problem involved is that after finally realizing my aspiration, my last name was misspelled and the middle initial used was not my own!

I am sure you can do better than this.

COL. ROBERT B. NOWELL
Chief of Staff
Alaskan Air Command
APO Seattle 98742

• Our sincere apologies. We certainly can, and will, do better.—THE EDITORS

Telling the Truth

Gentlemen: If you trade journals did not work so hard trying to help the services in their little political war against their boss with that "technological gap" nonsense, they might not like you so much; but they sure would respect you a lot more. So would the public.

Do you dare tell the public this truth: that setting off bigger nuclear devices has never been the pacing item in the nuclear weapon club after Trinity? Russia can do it, so can Britain, France, China, and probably even little Israel. The limiting capability has always been the operational payload wedded to a delivery system of sufficient accuracy. In the ABM problem several new requirements must be added to this, including early warning and enormously fast response of the delivery system. Such a problem staggers the propulsion arts available to us today.

So, all of a sudden the Reds whip out a bunch of obvious mockups in their parades and point with pride to "operational, solid-propellant ICBMs"; and while they are at it, they know that a big lie can be told as cheaply as a small one, so they talk about the solid-propellant ABMs they have hidden in those cans. If you look at their releases and the flood of lectures after each parade, you will see that this is aimed less at us than at the Warsaw Pact nations, who are to be reassured that the USSR can still protect itself and them from Polaris and Minuteman and anything else we may be cooking up. It is for China's benefit, too.

When the Reds really have something they never fail to demonstrate it, because their system of power politics is based on terror. When they do not yet have it, what's to be lost by claiming it, especially if gullible people outside the US government—with votes—are willing to spread the story?

Or, maybe you actually do believe it.

V. R. GUTMAN
Saratoga, Calif.

Brave Men All

Gentlemen: I resent Generals Westmoreland and Wheeler saying that the
(Continued on following page)



the new avionics by Collins **LORAN C/D**

Collins' LR-104 C/D Navigation Receiver System automatically searches, locks-on and tracks—with no knob twisting—in a fraction of the time other systems require.

The system's precision permits repeatability in navigation fixes for tactical operations.

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Contact your nearest Collins representative for additional information on this system and other new avionics by Collins.

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AIR MAIL

CONTINUED

American soldier and airman in Vietnam is superior in every way, including courage, to the soldier and airman of World War II.

The survivors of Corregidor, Bataan, Tarawa, Guadalcanal, Omaha Beach, Anzio, the Bulge, Ploesti, Schweinfurt, and a thousand other battles, would like to contest the statements of our leading general in Vietnam and the Chairman of the Joint Chiefs of Staff.

WHITNEY CUSHING

(A three-time rider to Ploesti)
Palm Beach, Fla.

Great Invention

Gentlemen: I concur with Mr. James B. Misner's letter to the Editor indicating the B-24 Liberator bomber needs a good publicity agent. I take exception to the Editor's note implying the B-24 was responsible for the confusion encountered during the August 1943 Ploesti raid. The B-24 performed its part of the raid well. It did so on all missions. The celebrated Ploesti raid was not the responsibility of the inanimate B-24. The miscues were conducted by the human element involved.

The B-24 was the backbone of the air war in the Southeast Pacific area during World War II. It labored hard and long on its many island-hopping missions. Late in the war the B-29 Superfortress came to the Pacific area and gathered all the laurels and publicity, which continue today. Had it not been for the earlier years of work by the B-24s, the B-29s would not have had an island to land on.

The confidence of the powers then directing the Army Air [Forces] in the ability of the B-24 can be shown by the fact that in excess of 18,000 Liberators were produced. This quantity was far in excess of any other aircraft manufactured and used during World War II.

WILLIAM L. LASHLEY
Wright-Patterson AFB, Ohio

• *Reader Lashley should take another look at the Ed's note—he's misinterpreted us. In fact, we figure the B-24 was one of the greatest inventions since the wheel. The "inanimate" B-24 certainly wasn't responsible for the error in navigation which took the bombers to the outskirts of Bucharest, to the south of Ploesti. Thus, the enemy's whole air defense system was alerted—the B-24s were greeted with a heavy concentration of flak over their target—and they were clobbered. As for the Pacific area, the Liberators rate the Hall of Fame there, too.—*
THE EDITORS

Rescued Ploesti Raiders

Gentlemen: Obrad Egic, a retired Yugoslav general, wishes to reminisce with former members of the aircrew of an unidentified four-engine bomber which crashed in Yugoslavia (in Montenegro near the village of Brocanac) in August of 1944. General Egic commanded the 2d Proletarian Dalmatian Brigade (a World War II Yugoslav Partisan Formation), which picked up the flyers and arranged for their evacuation to Bari, Italy.

The aircraft was returning from a mission over Ploesti, Rumania. A total of seven crewmen were evacuated unhurt. One crewman gave his watch to General Egic as a gift. Interested persons may write to

GEN. OBRAD EGIC (Ret.)

Put Monarice 27

Zadar, Yugoslavia

or

Office of the US Defense Attaché

Attn: Lt. Col. R. T. Woodman

American Embassy

APO New York, N. Y. 09695

P-51 Photos

Gentlemen: I am a Japanese aviation historian and a member of the Air Force Historical Foundation. I am very interested in hearing from anyone who can lend me private photographs of the North American P-51 Mustang which was flown by the 5th, 7th, and 14th Air Forces' fighter groups in the Pacific, China-Burma-India theater, and Japan from 1944-1949.

These photos are for use in a book, and I would appreciate any from readers' old war albums. All photos will be returned to the sender.

TADA0 SHIBUSAWA

No. 2 of 7, 3 chome

Akabanenishi

Kita-ku, Tokyo, Japan

UNIT REUNION

36th and 50th Tactical Fighter Wings

The annual reunions of the 36th and 50th Tactical Fighter Wings will be held at the Riviera Hotel in Las Vegas, Nev., on October 6, 7, and 8. All former officers of these wings are urged to attend. Those desiring reservations and/or further information should contact

36th Reunion (or)

50th Reunion

Riviera Hotel

Las Vegas, Nev. 89109

780th Bomb Squadron Association

The third national reunion of the 780th Bomb Squadron Association will be held in Dallas, Tex., on August 2, 3, 4, 1968. We're scheduling it in '68 to celebrate our twenty-fifth (silver) anniversary. All members of the 465th Bomb Group, 55th Bomb Wing, or 15th Air Force are invited to attend. Contact

C. R. Dannelly, Pres.

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Dallas, Tex. 75206

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Bandito, friend or foe, is now in production at Sperry Utah Company. Let us give you all the details on Bandito... and we'll show you how to "love your enemy."

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Division of Sperry Rand Corporation
322 North 21st West
Salt Lake City, Utah 84116



Friend and Foe

4,270 miles nonstop **that's two world records for helicopters**

Lockheed Hercules HC-130P tankers refueled the Sikorsky HH-3Es nine times during the transatlantic crossing. Average speed during refueling was 125 mph; average speed for total flight 131 mph.



Besides enabling long overwater ferry flights, air refueling permits helicopters to stay aloft for hours near combat areas, ready to rescue downed aircrewmembers in minutes.

Two Sikorsky U.S. Air Force HH-3E "Jolly Green" helicopters made aviation history on May 31 and June 1, 1967, when they flew non-stop from New York to the Paris Air Show. They also claimed two helicopter speed records: New York to London in 29 hours, 13 minutes and New York to Paris in 30 hours, 46 minutes.

The Air Force and Sikorsky Aircraft pioneered the helicopter in-flight refueling techniques that not only made these flights possible, but also gave these Air Force rescue helicopters worldwide deployment and recovery capability.

In-flight refueling of the Jolly Greens greatly enhances their rescue and recovery capabilities in Southeast Asia.

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At Paris, a crewman steps out. The history-making HH-3Es are part of the U.S. Air Force 48th Aerospace Rescue and Recovery Squadron. They cruise at 154 mph, carry a useful load of approximately 10,000 pounds, and with external fuel tanks have a range of 748 miles.

The touchdown at Le Bourget Field, Paris, after nonstop flight from Naval Air Station, Brooklyn, New York.





AIRPOWER in the news



By Claude Witze

SENIOR EDITOR, AIR FORCE/SPACE DIGEST

Showdown for Airpower

WASHINGTON, JULY 12

Defense Secretary Robert S. McNamara is in the White House today, reporting on his ninth trip to Vietnam. Dispatches from Saigon make it clear he has no intention of supporting Gen. William C. Westmoreland's plea for an additional 100,000 to 140,000 troops. The Secretary is concerned about the effectiveness, and possibly the cost, of the American and South Vietnamese soldiers already in the theater. He is reported to feel that US troops in Vietnam—more than 460,000 of them—are involved in too many chores away from the battlefield. And that the native manpower is poorly mobilized and inefficiently used.



Senator
Stuart
Symington

It is up to President Johnson to make the decision. He has heard General Westmoreland's argument. Facing a difference of opinion between his Secretary and a competent military officer is not a new experience for the President, yet there is no record that he ever overruled Mr. McNamara in this type of conflict. Pentagon regulars can recall that another four-star man, the Commandant of the Marine Corps, once hazarded the guess that 750,000 men will be needed to win in Vietnam. In a press conference that came close to being a humiliation, Gen. Wallace M. Greene, Jr., was forced to fuff this one up and testify there was no Department study calling for such a requirement. Now the fact is that General Westmoreland's projection is getting closer and closer to the one offered by General Greene.

On his trip, Secretary McNamara was flown over some of the bloodiest battlefields of the conflict, an area south of the demilitarized zone where 9,000 of General Greene's Leathernecks have been killed or wounded since January. It may be that the Secretary missed the point, which is that this has degenerated into a war of attrition. Unlike the recent two-day conflict between Israel and its Arab neighbors, there is no prospect of a shortened war.

This point is not being missed in some Washington circles. On June 23, in a speech in his home state of Missis-

sippi, Senator John Stennis looked at this contrast and concluded that wars, large or small, must be won, and, when diplomacy fails, "the best way to win them is to apply the necessary military force as vigorously and quickly as possible."

Mr. Stennis said "the time has passed for half measures and piecemeal actions in Vietnam. We should remove the arbitrary restrictions and limitations and do whatever is necessary to win, including, if necessary, deployment of more forces, stepping up the air war against North Vietnam, and closing the ports through which war goods and material flow."

The Senator went on to report there is a new effort to have President Johnson halt the air war against the North. He said this would be tragic, that it will be opposed by the Joint Chiefs of Staff, and "would literally be a death warrant for additional Americans." That statement, no doubt, is on the President's desk as he studies the problem in the light of Mr. McNamara's report.

Mr. Stennis, in addition, declared that "General Westmoreland's requests for additional forces in South Vietnam have been deferred or denied because of our inability to supply them without mobilization." The alternative, he made it clear, is a determination to win as soon as possible.

A few days later, on the floor of the Senate, Stuart Symington, a former Air Force Secretary, grew more specific. He charged that "untruthful and dangerous reports" are being made, presumably by a "central source" in the Administration, denigrating the effectiveness of airpower. Press speculation is that the central source is the Office of the Secretary of Defense.

Mr. Symington, arguing that this viewpoint is contrary to testimony received in closed session by the Armed Services Committee, called for an investigation. Senator Stennis responded, announcing that his Preparedness Investigating Subcommittee will hold complete hearings on the subject, and "the information will be made public to the greatest extent possible." At the moment, two Stennis staff members are in Vietnam, due back July 21. The hearings will start soon after that date.

While civilian spokesmen in the Pentagon are quoted as saying "we have almost no important targets left in North Vietnam," the Joint Chiefs of Staff are known to favor hitting more lucrative ones and repeated assaults where the enemy has rebuilt. Here is a recent example of a report brought out of North Vietnam:

"Increased US air activity in the Hanoi area is causing a deterioration of morale in the city. There have been fourteen air raid alerts from 29 April to 2 May, several of them at night.

"During the night alerts, citizens could be seen running wildly toward shelters. There is a definite breakdown in order, and the air raid wardens have difficulty in controlling the people. For the first time, it could be noted that people were making no attempt to hide their fear or fatigue.

"The Gia Lam Railway Depot was 100 percent destroyed during a recent raid. One freight car was blown

over the wall surrounding the rail yard. One bomb fell on the road leading past the yard, and it is now necessary to make a detour in going from Hanoi to Gia Lam. There is no electrical power in the area from Gia Lam Railway Depot to the Doumer Bridge.

"The bombing was very accurate, and almost no bombs fell on civilian houses in the area. The Pont des Rapides, north of Hanoi, is no longer usable, and rail traffic has ceased."

If Mr. McNamara is prepared to come before the Stennis subcommittee and argue that the scene in Hanoi and Gia Lam does not impede the North Vietnamese war effort and therefore save American lives, the Senators will listen with interest. The chairman, at least, is convinced that the cost/effectiveness of airpower in this situation is good; he has looked at the swift results achieved by Israel and legitimately raised the question: Why not do likewise?

There is a genuine apprehension among military men that the Secretary may favor a reduction or halt in the bombing. They are convinced that previous suspensions—such as the Tet truce period—have been costly in terms of our casualty lists and contributed nothing to the prospect for peace.

Senator Stennis has reiterated that the war in Vietnam is the third largest in our history and still growing. The responsibility for this is not a military one.

Where Is the Cold War?

Jerome B. Wiesner, a former science adviser to the White House and now Provost of Massachusetts Institute of Technology, believes that the cold war is dead. He has an essay in the June issue of the *Bulletin of the Atomic Scientists*, presumably written before the Chinese exploded



Dr. Jerome
Wiesner

a hydrogen bomb and before Russia's rather indecent performance in the United Nations debate about the Middle East.

The burden of Dr. Wiesner's complaint is that, the cold war being concluded, "the arms race rumbles on," and there is no reason to believe he will change his opinion because of anything said or done by Communist powers. If there is an external threat, he does not recognize it.

However, he does detect an internal threat, here at home.

Looking at Russia and the United States, Dr. Wiesner finds "strong forces in both countries which are acting to intensify the arms race." They are doing this, he finds, by "pressing for the deployment of ballistic missile defense systems." And, if they succeed—which the Russian "strong forces" have done already—"there will certainly be further large increases in military expenditures for new and more sophisticated weapons as both sides jockey to maintain a credible deterrent to try to protect their citizens from the horrors of nuclear war."

Dr. Wiesner does not speculate much on who applies the pressure in Russia, except to mention the "military establishment." In the United States, he finds it easy to identify the proponents of the ABM system and why they want it. He cites, at once, the "pernicious pressures" of a "military-industrial-technological coalition." He is grateful to President Eisenhower for having warned President Kennedy about this evil complex. With that warning, he says, President Kennedy "was braced to withstand the enormous, well-coordinated campaigns that were waged to force him into large procurement programs for new weapon systems of tremendous cost and little value."

Dr. Wiesner then goes on to discuss "distortions which arise because vested interests have a great stake in selling their point of view." For the most part, his argument is based on statements that range from outright lies to blunt insults, thrown at industry, Congress, and the press.

He says, for example, that national periodicals carry advertising "peddling a mixture of military security and economic benefit." And that "investigation brought out the fact that most of these expensive advertisements were charged to the government contracts of the companies involved, contracts which supported the development of the weapon systems being considered."

As every industry representative and procurement officer knows, it is illegal to charge such advertising to government contracts as an allowable cost. As far back as 1948, the Armed Services Procurement Act banned the allowability of institutional or product advertising in "national periodicals." There was an exception for institutional advertising in scientific and technical journals. As a result of complaints made in the Eisenhower years, the rules were further tightened in Fiscal 1962. Since then, advertising is an allowable cost only when it is directed at employee procurement, the location of scarce materials, and the disposal of surplus. Advertising of the type Dr. Wiesner has in mind is paid for out of company profits.

A scientist himself, writing for scientists, Dr. Wiesner then charges that "scientists and engineers from companies and governmental laboratories having a special stake in the decisions being made take their views to the Congress and the mass media." And, he adds, "too often there are not equally well-informed and dedicated spokesmen to present the reasons for not procuring a new weapon systems."

The record, of course, is replete with examples of scientists, including Dr. Wiesner, who hold forth on Capitol Hill and in the press to oppose technological advance. At the last Air Force Association Convention in March, Dr. Harold Agnew of the Los Alamos Scientific Laboratory lamented the amount of influence these men are exercising.

Dr. Agnew said we are inhibited in the use of our technological advantage and that we fail to innovate when we should. He was specific:

"I believe that there is reason to be concerned over certain minority views which seem to be prevailing, to the effect that innovation is provocative, destabilizing, or results in premature obsolescence which means unnecessary defense spending. I believe that this feeling will lead the US into a force posture that is second best. . . ."

(Continued on following page)

Quotation, without Comment



Vice Admiral
Hyman G. Rickover

Vice Admiral Hyman G. Rickover, in his testimony before the House Defense Appropriations Subcommittee on May 1, 1967, made the following comments on cost-effectiveness:

"Cost/effectiveness suffers from a philosophical weakness. It holds that one factor—the economic—is fundamental, and that all other factors—the social, cultural, and political—are derivative. This is a fallacy known to students of philosophy as the fallacy of reductionism; it reduces the complexity of reality to one of its elements, and offers that one as sufficient reason for the whole.

"No value can be considered as a separate isolated entity. Every single value forms part of some coherent system of valuation. This is why the cost-effectiveness method, by itself, is not capable of giving us a true measure of value. It concerns itself with but a single facet of a complex issue. The cost-effectiveness studies emphasize dollar cost, but the true resources are not dollars. What is ultimately scarce in human existence are life, time, and

energy because of human fortitude, aging, and mortality.

"One may even grant the pure efficiency of cost-effectiveness studies, but one must question their value. No so-called 'science' of economics can measure the worth of a nuclear ship in war and compare it with the worth of a conventional ship in peace.

"Our society is threatened by any man who knows method but not meaning, technique but not principle—any man who tries to operate in a professional field in which he is unqualified, any man who depreciates wisdom, experience, and intuition.

"I am convinced that the cost-effectiveness syndrome is not going to last forever. Realities will inevitably intrude themselves. Many 'isms' have lasted in this world for periods of time, but finally man outgrows them and absorbs their good features.

"At one time the Pagan Gods ruled the world. Later the Kings. Then the Warriors, followed by the Lawyers. Now it is Cost Accountants. Ultimately some measure of common sense comes into play. Events tame them and relegate them to their proper place.

"The cost analysts live in a world of immutable abstractions; they recognize only that which suits them. Remoteness from firsthand factual experience carries the danger of getting lost in fiction. They forget that the difference between what people think is going to happen increases in direct proportion to the interval between wars.

"But here, in my opinion, is the most damning thing you can say about cost-effectiveness studies:

"They don't—and the types of studies they make render it impossible to—take account of human life. They do not believe that the good is as valuable as the profitable. Human life is not 'quantifiable' in a cost-effectiveness study, and therefore cannot be considered.

"Cost/effectiveness has become the modern superstition. The Christian notion of the possibility of redemption is incomprehensible to the computer."

It is here that Dr. Wiesner and Dr. Agnew come to grips, a fact recognized by the latter when he named Dr. Wiesner as the father of the thought that the perfection of ABM would tend to upset the "balance of terror." He could have continued to point out that Dr. Wiesner and Dr. Harold York authored the concept that weapons technology has reached a plateau, and there is nothing to innovate.

So far as Congress is concerned, Dr. Wiesner's welcome on Capitol Hill, where he once was a frequent witness, may be dampened in the future by this evaluation:

"Too often, the armed services committees and other committees dealing with national security problems, such as the Joint Committee on Atomic Energy, have allied themselves with the military-industrial complex and against the President."

Well, there are some members of the House and Senate who will take exception to the charge that they are motivated by less patriotic factors, or more ignorance, than other parties. The history of the ballistic missile program; the Polaris submarine system, and some of our aircraft programs stand as testimony to the sagacity of certain members of Congress. Anyone familiar with the annual transcripts of testimony before the Armed Services and Appropriations Committees knows the detail with which the members and their staffs go into weapon proposals

and follow them from concept to combat operations. There is nothing in these volumes to support the Wiesner contention that Congress hears more arguments in favor of a procurement "than they do about a weapon's shortcomings."

On the subject of the press, Dr. Wiesner's case is more cautiously offered. He still finds a "strong bias" and an unflattering reason for it. Here, he says, "writers who specialize in military affairs are dependent upon officers and civilians in the Department of Defense and upon congressmen who sit on the committees dealing with defense matters for most of their information."

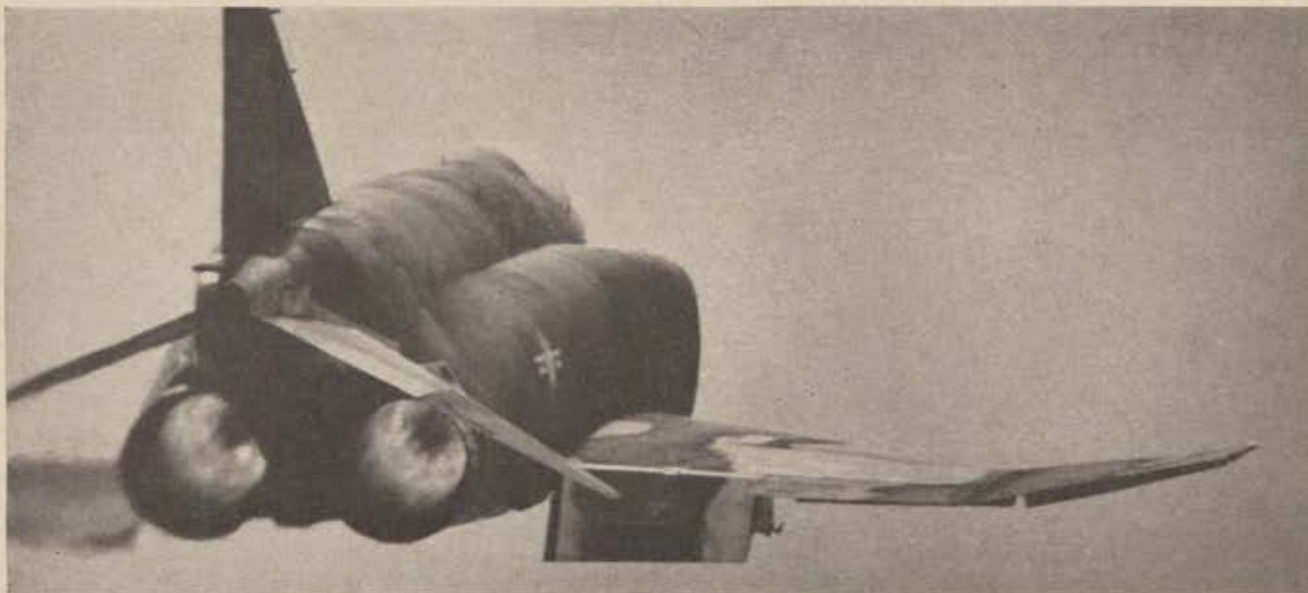
It is not difficult to imagine the reply this would draw from Hanson Baldwin of the *New York Times*, Charles Corddry of the *Baltimore Sun* or George Wilson of the *Washington Post*, to name three of the most widely read military writers. If Dr. Wiesner can support his charge from their newspaper copy, he did not cite the specifics.

As for the scientists' assumption that the cold war is dead, this is one that both military and political reporters of experience would refute, and they do it daily with their news from the Pentagon, the White House, the United Nations, the Middle East, Vietnam, Moscow, and Peking. Any attempt to trace the pressure for an ABM system to sources other than the conduct of our possible enemies is a disservice to both technology and the country.—END

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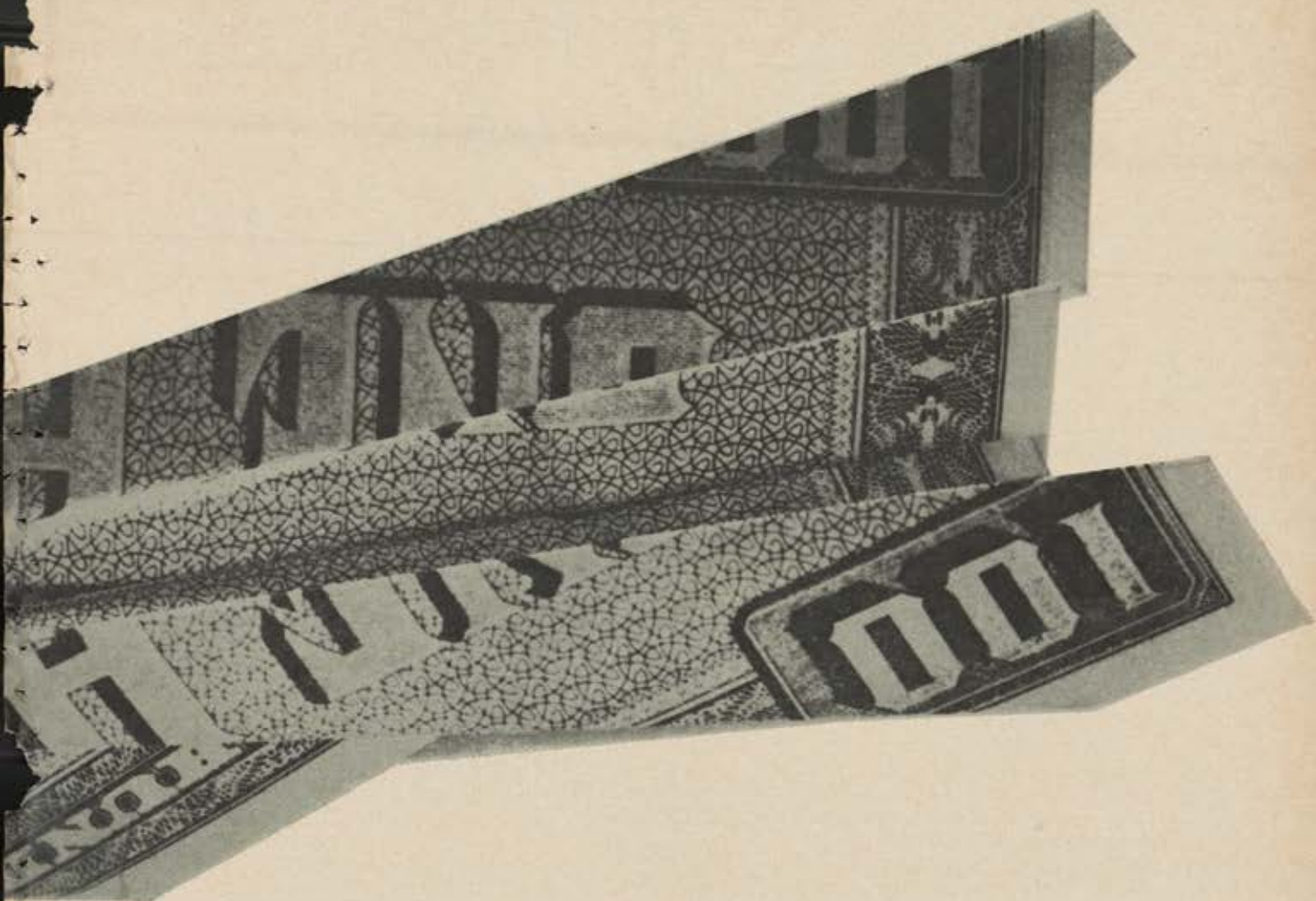


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AEROSPACE WORLD

By Allan R. Scholin

ASSOCIATE EDITOR, AIR FORCE/SPACE DIGEST

WASHINGTON, D. C., JULY 11

Russia showed off two versions of swing-wing aircraft and a V/STOL fighter in an Aviation Day flyby July 9, the USSR's first major air show in six years.

Western observers weren't given an opportunity for close examination of the planes, nor did the Soviets release many details, but at least one of the swing-wing aircraft had two engines and appeared comparable in size to the General Dynamics F-111. Announcers at the show said it was a multipurpose plane, capable of serving as an interceptor, fighter-bomber, or strategic bomber carrying nuclear weapons. Top speed was given as 1,800 miles per hour, with supersonic capability on the deck. The second variable geometry plane may have only one engine. Neither manufacturers' nor model designations were given for any of the new planes.

The V/STOL fighter didn't take off vertically during the show, but made extremely short takeoff and landing rolls, employing auxiliary engines for downward thrust. Soviet leaders claimed the plane is more advanced than any in the West. The only V/STOL fighter being produced in non-Communist countries is the British P.1127 Harrier, expected to enter operational service late next year. It employs a 19,000-pound-thrust engine

and can carry up to 5,000 pounds of weaponry.

Also shown in the flyby were four twin-tailed fighter-bombers, which the commentator described as having top speeds of 2,000 miles per hour. Only the US has flown planes of that speed, the North American XB-70 bomber and the Lockheed SR-71 and YF-12A.

The Soviets exhibited no new long-range bombers, although Marshal Konstantin A. Vershinin, chief of the Soviet Air Force, said in a *Pravda* article published on Aviation Day that one Russian plane, which he did not identify, had intercontinental range and could fire missiles while hundreds of miles from the target.



The Commander of Strategic Air Command's 3d Air Division on Guam, Maj. Gen. William J. Crumm, was one of six men killed in a midair collision July 6 between two B-52 bombers en route to a target in South Vietnam.

The forty-eight-year-old general was the airborne commander aboard the lead B-52 from the 22d Bomb Wing, March AFB, Calif. Four men were rescued and three lost from General Crumm's aircraft. Three men were rescued and three killed from the second B-52 of the 454th Bomb Wing, Columbus AFB, Miss.

Lost in addition to General Crumm

were Maj. Paul A. Avolese, radar navigator; and Capt. David F. Bittenbender, electronic warfare officer, of the 22d Bomb Wing; and Capt. Charles H. Blankenship, radar navigator; 1st Lt. George E. Jones, navigator; and MSgt. Olen B. McLaughlin, gunner, of the 454th Bomb Wing.

General Crumm, who had been scheduled to report to the Pentagon in August as director of aerospace programs at Hq. USAF, was leading one of a record nine B-52 strikes within twenty-four hours. The massive bombing effort was principally aimed at enemy forces concentrated in the A Shau sector about thirty miles south of the demilitarized zone.

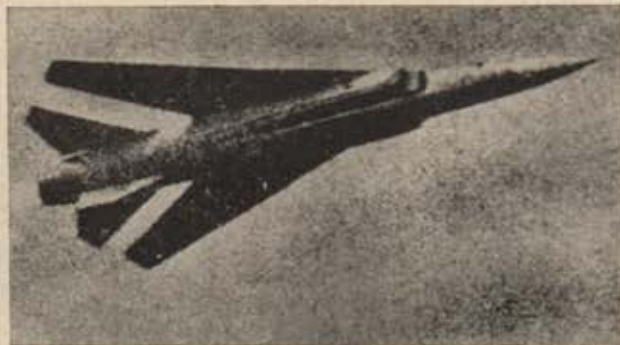
The accident was the second involving B-52s since the eight-jet Stratofortresses began flying Vietnam strikes in June 1965. Two B-52s were lost in a midair collision during that first mission. Another B-52 crashed and burned while attempting an emergency landing at Da Nang Air Base in Vietnam after a bombing mission on July 8. Of the six-man crew, only the tail gunner survived.

Before the July mishaps, the giant bombers had logged more than 10,000 sorties delivering 190,000 tons of bombs without loss to accidents or hostile forces, operating all but the first month under General Crumm's direction. At AFA's National Convention in Dallas, Tex., in March 1966, General Crumm had accepted a Citation of Honor in behalf of 3d Air Division B-52 crews.

General Crumm assumed command of the 3d Air Division July 16, 1965. His twenty-six-year career spanned combat flying in both European and Pacific Theaters during World War II, and key assignments at SAC Headquarters and the Pentagon. General Crumm's replacement, Maj. Gen. Selmon W. Wells, was en route to Guam at the time of the accident.

Shown here with wings in swept-back position is one of two swing-wing fighters displayed by the Soviet Union in its first major air show since 1961. Equipped with two engines, it is apparently comparable to the F-111.

—Wide World Photos





Mariner 5, shown here having its solar panel array checked by technicians before launch from Cape Kennedy, Fla., June 18, is reported working well en route to Venus flyby on October 19.



SAC's wing of SR-71 strategic reconnaissance aircraft has embarked on supersonic training flights across the US, with warnings to residents of the corridors over which they fly to expect sonic booms.

The major population centers over which the 2,000-mile-per-hour planes are flying, the Defense Department announced, are New York, N. Y.; Philadelphia, Pa.; Richmond and Norfolk, Va.; Greensboro, N. C.; Charleston, S. C.; Jacksonville, Fla.; Atlanta, Ga.; Chattanooga, Tenn.; Huntington, W. Va.; Dayton, Ohio; Louisville, Ky.; Indianapolis, Ind.; Chicago, Ill.; St. Louis, Mo.; Little Rock, Ark.; Shreveport, Baton Rouge, and New Orleans, La.; Waco, Ft. Worth, and Dallas, Tex.; Omaha, Neb.; St. Paul, Minn.; Cheyenne, Wyo.; Denver, Colo.; Phoenix, Ariz.; Salt Lake City, Utah; Los Angeles, Sacramento, and San Francisco, Calif.; Portland, Ore.; and Seattle and Spokane, Wash.

Because the SR-71's normal operating altitude is about 80,000 feet, the sonic booms it produces resemble distant thunder. Impact should be only about half that generated by the supersonic B-58. However, DoD points out that the SR-71 must descend to 30,000 feet for refueling, and that booms may be more pronounced during descent and climbing back to altitude. Actual refueling runs will be subsonic.

Refueling patterns will be flown, insofar as possible, over sparsely settled areas, DoD said, adding that notification has already been made to the

people residing in these remote areas.

Flights over US land areas are essential for crew training, DoD pointed out, since the SR-71 must train on a variety of targets similar to those it would be called to work against in time of war.



After months of indecision, France has pulled out of the Anglo-French variable geometry fighter project, leaving Britain with a gaping hole in what was to have been "operationally and industrially the core of Britain's aircraft program for the 1970s."

British Defense Minister Denis Healey had thus described the AFVG project last fall in insisting before the House of Commons that Britain would need only fifty US F-111 fighter-bombers to meet its Commonwealth defense commitments until the Anglo-French fighter became operational in the early 1970s.

Now France has backed out, ostensibly for budgetary reasons. But the project has been on the rocks for months, first because France wanted primarily an interceptor while the British needed a long-range strike fighter, and secondly because France already had an acceptable alternative for its purpose in the Dassault Mirage G, a homegrown variable-sweep V/STOL fighter.

Britain's first reaction has been to seek to persuade West Germany to pick up France's share of the project rather than continue with the US in joint plans to develop a more ambitious swing-wing V/STOL fighter. Failing that, it looks as though Britain will again have to turn to the US, either to buy more F-111s or to join in development of some later design. Neither alternative is likely to assuage the British aircraft industry. A fourth possibility would be to proceed on its own with the AFVG project, but that may have to be ruled out for cost reasons.

The French decision is all the more embarrassing to Britain because it had recently placed orders for fifty Sud SA.330 helicopters from France and indicated an interest in buying some SA.340 light observation helicopters as well, motivated at least in part by hoping thus to persuade the French to stick with the AFVG. Britain might have preferred the Agusta Super 205—Italian-built counterpart of the Bell UH-1D—to the SA.330, particularly since it would have employed several British components. Anyway, it's a safe bet now that Britain won't buy the SA.340.



One of the highest priority projects in both the Navy and the Air Force this summer and fall is the development of a new cargo and rescue aircraft (CARA) capable, as the name indicates, of performing both cargo and search and rescue missions.

Helicopters are doing an extraordinary job in finding and rescuing downed airmen, even well inside North Vietnam. But they are slow and vulnerable to ground fire or enemy planes, requiring their own fighter escort. The Air Force and Navy want an aircraft able to speed to the rescue zone, hover to retrieve downed aircrews, and defend itself against ground or air attack.

Such a plane may be expensive, but whatever it costs it will pay for itself quickly in terms of rescued pilots. A recent DoD study shows it costs from \$400,000 to \$700,000 to train a combat-ready pilot.

V/STOL capability is essential, and the services are reviewing all existing vertical takeoff designs—among them the LTV XC-142, Canadair CL-84, Bell X-22, and Lockheed XV-5B—as well as compound helicopters including modified versions of the Bell UH-1, Kaman UH-2, Lockheed AH-56A, and Piasecki 16H. More than a dozen

(Continued on following page)



SAC SR-71s have initiated supersonic training flights over continental US. At normal 80,000-foot operating altitude, booms of triple-sonic plane will be muted, but they'll be more severe as it drops to be refueled by KC-135 tankers.



Soviet SA-2 anti-aircraft missile is photographed in flight as it passes harmlessly by an Air Force RF-101 Voodoo reconnaissance jet. The pilot, from the 432d Tac Recce Wing, was on a photo mission over North Vietnam when the SAM was aimed in his direction.

manufacturers have been invited to submit proposals.

Under the CARA concept, the planes would be employed on cargo missions when not required for rescue, but would be able to respond instantly to calls for help.

Indicative of the high priority DoD attaches to the project, it isn't insisting on a joint Air Force-Navy program. Each service is proceeding independently to stimulate competition in speed and costs—though they are constantly swapping progress data.

The two services aren't so far apart on requirements that they might not eventually get together on a common design. But, in general, the Air Force wants a bigger plane than the Navy. The latter's combat aircraft seldom carry more than two men, while several USAF planes carry a multimanned crew.

The Air Force estimates it may need as many as 100 CARA, while the Navy foresees a need for fifteen to twenty-five.



Heroic saves that would be hard to believe in a Hollywood movie were pulled off by two KC-135 tanker crews, both of the 902d Air Refueling Squadron, Clinton-Sherman AFB, Tex., on temporary duty in Southeast Asia.

One involved a pair of F-105 Thunderchief fighters returning from a bombing mission over North Vietnam. They had remained in the area to cover a rescue team picking up a downed pilot until they ran critically low on fuel. Col. Jacksel M. Broughton, the flight leader, had made several calls for an emergency refueling with no response. His wingman had just declared "zero fuel," and Colonel Broughton was about to order him to bail out when a KC-135 crew led by Maj. Alvin L. Lewis radioed they were within fifteen miles "and closing fast."

When he caught sight of the fighters, Major Lewis put his KC-135 into a diving bank so the F-105 could make

a rapid hookup. The boom operator, TSgt. Walter Baker, realizing he had only one chance to spear the fighter with his boom, had just made a successful hookup when the F-105 ran out of fuel. Major Lewis increased the KC-135's dive to hold the Thunderchief in place long enough to receive some fuel, and soon its engine restarted.

By this time Colonel Broughton's tanks were running dry. Once again, Sergeant Baker made a successful hookup.

"That tanker crew didn't have room for a single mistake, and they didn't make one," Colonel Broughton said later. "My element was saved from certain disaster by an outstanding and distinguished bit of flying by this crew under the most severe stress."

In the other incident, a crew led by Maj. John H. Casteel wound up being credited with saving six Navy carrier-based aircraft and participating in the first three-deep tanker lineup in history. Major Casteel's KC-135 was on a mission to refuel two F-104 Starfighters when it was advised that two Navy A-3 Skywarriors serving as tankers were themselves low on fuel, though each had several thousand pounds remaining for transfer to other planes. The two F-104s remained to fly cover for the KC-135.

When they reached the A-3s, one had only three minutes of usable fuel remaining. Major Casteel's crew transferred a small amount to the A-3 to keep it from flaming out, and had shifted to the second when another emergency call reported two Navy

(Continued on page 24)

NEW BOOKS IN BRIEF

The Denuclearization of Latin America, by Dr. Alfonso Garcia Robles. No longer able to ignore involvement with larger nuclear powers after the Cuban Crisis, Latin American nations set about to eliminate such an arms race among themselves. One of the most militant crusaders for this cause here presents his conviction of the necessity and urgency of such a pact. Taplinger Publishing Co., N. Y. 167 pages. \$3.95.

A Handbook of Model Rocketry, by G. Harry Stine. Second Edition. Hobbyists will welcome this revised version of the guide officially adopted by the National Association of Rocketry. Important information on engine series, rocket glider additions, and new illustrations in the same clear, concise style update this reliable guide. Follett Publishing Co., Chicago, Ill. 304 pages. \$4.95.

Mosquito, by C. Martin Sharp and Michael J. F. Bowyer. The product of a good deal of research, this comprehensive study gives details of the Mosquito aircraft of World War II from the drawing board to D-Day. Illustrated with photos, sketches, maps, and charts. Faber and Faber Ltd., London. 494 pages. \$11.

Pilot Your Own Plane, by Robert Scharff. Why not? This is a fine primer on the delights and mechanics of

flying, with helpful information on licenses, expenses, regulations, and vacation spots. Recommended for anyone who needs that last ounce of incentive. Sterling Publishing Co., N. Y. 156 pages. \$3.95.

The Taste of Power, by Ladislav Mnacko. This satiric attack on party bureaucracy by a Czech Communist was suppressed in his own country but was released in Europe, where it caused an equally strong, though different, reaction. It is his first work published in America. Frederick A. Praeger, N. Y. \$5.95.

Winged Warfare, by Lt. Col. William A. Bishop. This time it's "the Hun" instead of the Red Baron, and our hero is World War I Canadian ace Billy Bishop, flying his single-seater on impossible missions. This exciting combat journal should be regarded as a classic of early flight. Doubleday & Co., N. Y. \$5.95.

With Prejudice, by Lord Arthur Tedder. The Supreme Commander of the Allied invasion of Europe here offers his observations on policy and personalities with a mixture of reserve and candor. The book is of particular interest from a historical viewpoint, but can prove imposing for a nonmilitary reader. Little, Brown & Co., Boston, Mass. \$10.

—MARIA T. ESTEVEZ



Merton-Smith casts a Little Light on the Subject

The tiny yellow light cut its way from the cabin window through the night like some giant Argus. Unseen, but just yards away, was the deep crystal lake and, behind, an enormous stand of yellow pine.

Inside the cabin, Burton Merton-Smith, his red beard filling the collar of his Pendleton shirt, and the Colonel were putting the finishing touches to four delicately browned caught-that-morning trout. The cabin seemed full to the aged rafters with fly rods of every description, flies, creels, shotguns and rifles.

The Colonel gazed out the window and saw absolutely nothing. "That's what I call dark," he mused.

Merton-Smith smiled. "Nothing is really all that dark if man puts his mind to it. A bright man that is."

The Colonel laughed. He had played poker with Merton-Smith at Fort Benning, gin rummy in Washington, hearts at Cape Kennedy and a few more dangerous games in Southeast Asia. He knew something was coming. It was.

"Let me show you something we cooked up at Electro-Optical," Merton-Smith said. "It'll just take me a minute. You do the dishes."

The scientist, who looked more like a movie version of the great white hunter, rummaged under a pile of hunting equipment, found a flashlight and went outside where he opened the trunk of his big black and silver Bugatti.

"Come on out," Merton-Smith roared, and when the Colonel got there he found the night pierced by a powerful beam of light emanating from a small apparatus the scientist was holding in his hand.

"Great gods, what have you got there?" "A searchlight obviously," the answer came back. "Nothing more. Nothing less."

The beam flickered high through the pines and then skittered across the surface of the lake and lit on the face of a mountain cliff.

"I'd say that's about a thousand yards away," Merton-Smith guessed. The beam width is about 10 or 12 feet across which is, say, less than one degree and she's delivering about 25 foot candles out there."

"Copters," the Colonel said. "Copters, landing lights, search operations. She's a beauty. Let me take a crack at that."

He grabbed the 150 W searchlight's pistol grip expecting a heavy weight and almost threw the device into the sky.

"What in deuce does this thing weigh, anyway?"

"Bout three and a half pounds. Of course, this battery-electronic pack is a little heavier. Seventeen. But she's got everything you need. Nickel-cad battery that'll work for an hour without a charge, charger and a really unique converter system that makes 45 volts out of 24. And if you're interested she also operates in the IR mode."

The Colonel was playing the beam through the stand of trees. "Hey," he hol-

tered. "Grab a gun and pot that possum."

"You're going to pot a possum at a 1000 yards," Merton-Smith smirked. "Sure you are. Oh, by the way, if you're thinking about choppers, how about using it for a distress signal light. You can see the thing for about twenty or thirty miles, I'd figure."

"When did you EOS smithies start turning out real hardware like this?" the Colonel asked.

"Why not?" Merton-Smith said. "We've got the production techniques down pat in optics, electronics, light sources, mirror electroforming and systems integration. It's a natural."

"And if you like that baby, you should see our 1 KW combat vehicle mounted job. That one's a real beauty. You know those 2.2 KW tank-mounted lights. Well this one puts out 1000 more lumens, weighs about 140 pounds less, has over 50 million peak beam candle power and a total beam power of about 7000 lumens. To say nothing of the fact, of course, that we can shape the beam into a horizontal oval so that you can light up the target and not everybody in front of you."

"How in deuce do you get all that out of 1 KW?" The Colonel scratched his head with his free hand. "That 2.2 model always seemed the greatest."

"Genius my friend, genius. We put all the energy into the beam and not into heat. It's merely a question of efficiency. Plus, she operates in two IR modes—near and very near—and, in case you get into trouble, she even works under three feet of water."

"Electro-optics, the Colonel said, as though he had suddenly discovered something.

"That's the name of this night vision game," Merton-Smith said. "Once you get onto this thing, there doesn't seem to be an end to it. We've got an airborne 20 KW light that can really light up enormous areas of the ground from airborne platforms up to 12,000 feet. And, turning the whole thing around, we've been making light amplification gear like crazy." He paused a moment. "One really can't define armed conflict in terms of safety. But believe me, I'd rather have this stuff working for me than not."

The Colonel seemed to be unhearing. The narrow beam of light had fallen on the opposite shore of the lake where, sitting in front of a chic yellow tent, were two rather startled but exceptionally pretty young women.

"Hey," Merton-Smith roared. "Think they'd like some of that hard cider I brought along? Let's go pay a visit."

"I haven't finished the dishes yet," the Colonel said. Merton-Smith looked at him with a fish eye. "First things first."

THE FREE OFFER—Electro-Optical Systems would like to send you a complete descriptive brochure on its capabilities in night vision. A note on your letterhead will get it to you immediately. Also—if you're interested in employment on long term, on-going projects in ion propulsion, space instrumentation, space power, advanced electro-optics and electroforming, send your resume to Burton Merton-Smith, Electro-Optical Systems, Inc. (the place it's going on), 300 N. Halstead St., Pasadena, California 91107. Employment opportunities are equal.

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AEROSPACE WORLD



Martin-Marietta has delivered to the Air Force its new X-24A rocket-powered lifting-body experimental craft to be used in AF/NASA reentry research. X-24A is powered by an 8,000-lb.-thrust rocket engine to boost it to 100,000 feet and Mach 2 speeds after air launch from a B-52. Lifting-body idea may be used for manned reentry from orbit.

F-8 Crusaders almost dry. The second A-3 was still hooked up to the KC-135 when they met the Crusaders. One was so low on fuel it couldn't wait for the A-3 to disengage. Instead, it slipped in to draw fuel from the Navy tanker still hooked up to the KC-135. The second F-8, meanwhile, drew fuel from the other Skywarrior.

In the midst of that transaction, a Navy ship relayed another emergency call involving two F-4 Phantoms and vectored the entire cell to that rendezvous while the SAC tanker topped off the A-3 and F-8 tanks.

By the time the three tankers, with their fighter escort, had refueled the Phantoms, Major Casteel's own plane was so low on fuel that it had to land at an alternate base. But all nine Air Force and Navy aircraft involved—the KC-135 and two F-104s and the two Navy A-3s, F-8s, and F-4s—landed safely.



NEWS NOTES—A combat test of the Cessna A-37 lightweight jet attack plane is scheduled in Vietnam this fall, similar to the Skoshi Tiger evaluation of the Northrop F-5 Free-

dom Fighter last year. The 604th Air Commando Squadron has been activated at England AFB, La., to prepare for the operation. It will be joined by a team of analysts from the Tactical Fighter Weapons Center, Nellis AFB, Nev., which will gather information on supply and maintenance procedures, manning requirements, and operational effectiveness.

Another Cessna product, the twin-engine O-2, has arrived in Vietnam for forward air controller and psychological warfare duties. The O-2A augments and will eventually replace the O-1 Bird Dog on FAC missions, while the O-2B is employed to drop leaflets and broadcast messages to friendly and enemy personnel. More than 200 O-2s are on order.

Military Airlift Command has awarded contracts totaling \$485 million to twenty-two US commercial airlines to fly military passengers and cargo in Fiscal Year 1968. It spent more than \$600 million with airlines in FY 1967. Commercial airliners are currently carrying about thirty-five percent of routine MAC cargo and ninety percent of passengers worldwide, while MAC's military transports

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carry priority equipment and supplies, and evacuate sick and wounded to hospitals in the US. Meanwhile, missions to Southeast Asia by Air Reserve Forces transports are being curtailed. (See "Bulletin Board," page 70.)

Lockheed's experimental XH-51A compound helicopter has topped its own unofficial world speed record for rotorcraft, reaching 302.6 miles per hour off the Southern California coast near Oxnard during tests sponsored by the Army Aviation Materiel Laboratories of Ft. Eustis, Va. The previous unofficial mark of 272 miles per hour was set in May 1965 by the same aircraft. The XH-51A is equipped with stubby wings and a Pratt & Whitney J60-2 jet engine to augment the forward thrust of its rigid rotor blades, driven by a United Aircraft of Canada PT6B-9 gas turbine. It was piloted on the record run by Lockheed test pilot Ray Goudey.

The Defense Department has canceled the US Strike Command's Exercise Kitty Hawk, which was to have involved more than 70,000 personnel of all services in North Carolina in August. DoD said the exercise was called off to reduce defense expenditures. It had been budgeted for more than \$20 million.

Lt. Gen. John W. O'Neill has formally assumed command of AFSC's new Space and Missile Organization (SAMSO) with headquarters at Los Angeles AF Station, El Segundo, Calif. SAMSO was created July 1 with the realignment and consolidation of the Space Systems Division at Los Angeles AFS and the Ballistic Systems Division at Norton AFB, Calif. Maj. Gen. Paul T. Cooper, former SSD Commander, serves as Deputy Commander for Space at SAMSO. Maj. Gen. John L. McCoy, who formerly led BSD, is now Deputy Commander for Missiles, remaining at Norton AFB. General O'Neill's previous assignment was as commander of AFSC's Electronic Systems Division, L. G. Hanscom Field, Mass.—END



Experimental Lockheed XH-51A compound helicopter bettered its own unofficial world speed record for rotorcraft, clocking at 302 miles per hour.

HARD WAY CHARLIE



HYDRO-AIRE

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Even in grammar school he was always the kid who responded to the tough challenge. Really tough. Like making a large balloon with bubble gum while doing a head stand (no hands). Or giving a guy a hot foot while the teacher's in the room. Stuff like that.

We've often wondered what happened to Hard Way Charlie. We thought maybe he became an astronaut or a frogman or secretary general at the U.N.

But last week we found his emotional twin. He's the guy in charge of "make-or-buy" decisions at Hydro-Aire.

His job is to spot the most complex components that require closest tolerances, the most sophisticated manufacturing techniques, the most advanced equipment and skills—and keep them in-house.

Literally, that is the policy. Because these same components must be controlled in manufacture to assure reliability and delivery. Because Hydro-Aire is fundamentally a group of problem solvers—in engineering as well as manufacturing. And because the perfectionist problem solver not only designs and develops the solution—he also follows through to make sure it works.

Random example:

A vital component in our Hytrol anti-skid aircraft braking systems is a slide and sleeve assembly of rather exacting dimensions: I.D.'s and O.D.'s within 10 millionths of an inch, roundnesses within 5 millionths and concentricities within 10 millionths.

"We were told," explains Hard Way Charlie's double, "that this kind of precision grinding could be done only by master craftsmen whose 'feel' somehow judges the result. Instead we pioneered in advanced air gaging and electronic gaging to really measure these tolerances."

As a result, Hydro-Aire now has a Refined Grinding Department with custom built equipment that turns out one thousand of these gizmos each month.

But that was yesterday's challenge. Today, Hard Way Charlie's double is concerned with ultra-sonic cleaning; new advanced Clean Room facilities; chemical milling; magnaforming; laser machining; instant wave soldering of circuit boards. Things like that.

What about the easy stuff? Nuts. Bolts. Washers. Standard housings. He suddenly looks a little sleepy.

"We buy 'em. From very good vendors. Gee, I wonder what those fellows do for a real challenge?"

Maybe they try for a bubble gum balloon while doing a head stand?

With lightning-fast jet fighters as their terrible swift sword, the Israelis convinced the world in early June that they intend to defend their right to exist and their right to peaceful borders against unfriendly Arab neighbors. The six-day Middle East war was a classical example of effective application of simple but well-planned air-strike tactics to set the stage for subsequent ground victory . . .

The Air War in the Middle East

By J. E. Dawson



The death of Egypt's air force is symbolized in this reconnaissance photo of three Russian-built MIG-21s. On June 5, Israel's strike force included twenty Vautours, seventy-two Mirage IIICJs, eighteen Super Mystères, forty Mystère IVs, forty Ouragans, and sixty Magister aircraft.

AND it came to pass in A.D. 1967 that the armies of Israel went forth through the wilderness to meet their enemies, not mounted on steed or camel, but in Vautours, Magisters, Mirage IIIs, and Super Mystères.

History will not deny the part that airpower played in the modern-day holy war, which began June 5 and whose outcome was virtually decided in the first twenty-four hours. Israel's success on the ground in the five days that followed was an inevitable follow-on to her quick and complete mastery of the skies. Outnumbered three to one by a combined Arab force, Israel fought a daring and beautifully managed air battle which served to prove once again that airpower, used effectively in an unrestricted environment, is the key to victory.

Three elements characterized the Israeli air offen-



Veiled in dust, an Israeli helicopter evacuates wounded soldiers from the Sinai peninsula. Throughout the six-day blitz, the Israeli Air Force also employed two squadrons of Noratlas and Strato cruiser transports and two helicopter squadrons with S-55s, S-58s, and a few Super Frelons.



—Wide World Photos

At left is Russian-made MIG-21 with Israeli Air Force markings. The plane, flown to Israel by a defecting Iraqi pilot last year, was exhibited for the first time during an Israeli Air Show, July 6.

Watching the Air Show at an undisclosed location in southern Israel, the nation's military hierarchy were shown air demonstrations and feats which a month before had set the course of the war. Israel Defense Forces' Chief of Staff Itzhak Rabin is at left, Defense Minister Moshe Dayan, center, and Air Force commander Mordecai Hod, right.



—Wide World Photos

sive: surprise, speed, and technical expertise, blended in an offensive which in one day destroyed 410 Arab planes and knocked out twenty-five airfields. A fourth key element deserves mention. Israeli pilots were not hamstrung in carrying out their missions. They flew their sorties with no strings attached, free to achieve their goal as best they saw fit. And the goal was to immobilize Arab airpower, paving the way for quick victory on the desert floor.

Those watching the concurrent battle, the war of words being televised from the United Nations front, were ill-prepared for such a fast military victory. In the diplomatic battle one stalemate followed after another. Meanwhile Israeli Defense Minister Moshe Dayan was battling the war to a successful conclusion with minimum loss of lives and maximum destruction to enemy aircraft, tanks, and supplies. In fact, Israel not only changed the map of the Middle East in six days, but smashed the greater part of a decade's worth of military aid supplied to the Arab world by Russia.

Reports vary as to just how the Israeli's caught the Egyptians off guard. Some say that early on June 5, Air Force Chief of Staff Mordecai Hod sent his pilots west, high over the Mediterranean, from which they looked south and east, hitting Egyptian bases from the blind side, catching pilots and personnel unaware, and destroying the parked aircraft on the ground. They reportedly flew their twin-engine Vautour light bombers at optimum single-engine altitude (around 25,000 feet) both going and returning, coming in low on both engines for the strike. Distant bomber bases at Luxor and Ras Banas could have been crippled this way. Others hold that to escape Arab radar detectors, Israeli aircraft flew as low as 100 feet directly south, attacking Egypt's bases quickly and silent. At any rate sixteen Egyptian airfields were hit in the first

(Continued on page 29)



Israeli photos recorded the havoc wreaked on Egypt's Soviet-made air force. Tupolev-16 bombers were hit before they could get into the air. A TU-16 is shown in its protective revetment at Cairo West military airport. Though not in flames, the bomber's tail surfaces are severely damaged.



A dramatic example of Israeli airpower is the spattered and pocked superstructure of the USS LIBERTY, technical research ship cruising in the Mediterranean when mistaken for an Egyptian ship by Israeli aircraft and torpedo boats.



Evacuation of US dependents from Wheelus Air Base, Libya, was begun soon after the crisis erupted. Fitted with seat belts, the first of more than 6,000 evacuees prepare for their flight to Europe aboard a USAF C-130 transport.



—Wide World Photos

Despite the immobilization of a great part of Egypt's air force, this photo shows, according to Israel, Egyptian MIG fighters making a final attack on Israeli forces in the Sinai peninsula before the latter reached the Suez Canal. Israeli troops take cover as planes swoop in for attack. Egypt's depleted air force was no match for the determined, well-trained Israelis.

two waves of Israeli attacks, bomber bases first, then the fighter bases. The Israeli aircraft could carry only minimal weapon loads and maximum fuel to make the distance.

The secret of their success, according to Robert R. Rodwell in *Flight International*, was a new type of bomb, weighing little more than 500 pounds. Rodwell describes the ingenious weapon as about eight feet long and one foot in diameter, with retrorockets to kill the forward speed on release and an accelerating tail rocket which ignites when the vertical position is reached to drive the bomb point blank into the target.

"Secret weapon" or no, 451 Arab aircraft were destroyed in the first sixty hours, and twenty-five airfields cratered into uselessness. To ensure that the fields would remain out of action, delayed-action bombs were dropped in follow-up missions.

Although Israeli combat strength was fewer than 300 aircraft, up to 3,000 sorties were reported during the first twenty-four hours of the war. Some IAF pilots may have flown eight to ten sorties a day.

With Egyptian airfields knocked out of the war, Israel turned its attention to Jordan and Syria later on June 5. Rodwell reports that after Jordan's Amman Airport was attacked by two waves of eight Mystères, there were not 200 continuous yards of undamaged concrete. The brief Middle East conflict of 1967 surely will go down as a classic exercise.—END



Three smoking Russian MI-6 helicopters, helpless on an Egyptian airfield, illustrate the pinpoint accuracy of the Israelis. Israeli pilots wasted little ammunition, for little damage was found adjacent to the destroyed aircraft.

An unidentified soldier inspects the spoils of war as he bends over the remains of a Soviet-built MIG-19 on an airfield at Djebel Lebny in Israeli-occupied Sinai. The Egyptian jet fighter was destroyed on the ground by teams of Israeli pilots who caught the Egyptians unaware.



—Wide World Photos



This is a launching site for a Russian-made surface-to-air missile, captured intact by Israeli troops in their drive through Egypt's Sinai desert at Mitla Pass. A decade of Russian military aid to the Arabs was erased by Israeli air and ground forces during the brief but effective battle.

—Wide World Photos

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What methods the US will employ in coming years to deter nuclear war depends upon today's military force structure, which includes weapons such as bayonets, helicopters, antiguerrilla specialists, and World War II and Korean-type forces. While the Soviet Union and even Communist China have been building up their strategic and military technological strength, the US has diverted its brains, material, money, and men into the Vietnam jungles to guarantee the right of a people, patently unable to agree among themselves, to agree upon their political future. But in tomorrow's world, technological defeat could be fatal and the US must work fast to unleash its vibrant technology and concentrate on . . .

Tomorrow's Strategy— Out of the Jungles and Into the Lab

By Col. Stephen J. Saltzman, USAF (Ret.)

THE BASIS of US strategy can be stated simply. It rests on the notion that we can deter nuclear war and at the same time avoid an arms race by building a missile force only large enough and secure enough—and clever enough—to withstand any level of attack and still strike back to inflict unacceptable damage on the attacker. This notion is labeled “assured destruction.”

It is becoming clear that our strategy of assured destruction has had an effect on the Soviets exactly opposite to the effect it was hoped to have. Instead of encouraging them to be content with some relatively low level of nuclear forces, a kind of nuclear stalemate, it has encouraged them to go for superiority by increasing their supply of high-payload missiles, by designing orbital weapons, and now by deploying antiballistic missile systems.¹ Some students of these matters are concerned at signs that we will continue to try to make our strategy work; that we will patch and mend, cut and try. These students are concerned that each new fix and each new rationale will mire us deeper in a bog whose quicksands are no longer as easily identified as they once were.

Tomorrow's strategy will have to be designed around the military forces that are being laid down today; the prospect of shaping tomorrow's strategy around today's forces offers a famine of alternatives for some future President. Tomorrow is almost on us. And today's military force structure is a costly matrix which hardheaded realists will want to amortize slowly, which its designers will not abandon easily, and which new strategists will not be able to change swiftly, hampered as much by the very long time it

takes to design and build new weapons as by resistance from those who will insist on getting the most mileage from the existing investment in military hardware.

The Bases of Our Strategy

When you begin to address this problem, you look naturally for its source. You look for the fulcrum from which today's strategy gets its purchase, the keystone that locks together strategy's arch. Two of these we can identify rather positively. There may be others; these two suffice to illuminate the area.

The first of these we may call The Parity Concept, a concept that built upon the thesis that nuclear war is not an alternative available to rational governments but tempered that thesis with a fine regard for pragmatism—such a war *could* occur; you'd best face that fact and be prepared to cope with it. This concept held that no progress could be made toward peace unless the military environment could first be stabilized.

With the invention of nuclear weapons and high-speed delivery systems, the offense had outstripped the defense, a highly unstable situation. One way to correct this imbalance is through arms control. But the proponents of parity held that another and perhaps more practical way is to bring your nuclear weapons and their delivery systems into balance with the enemy's. In this way you reduce his fears, prove your good faith, and remove the pressure to engage in a spiraling arms race. These theorists argued that the national self-interest is best served by this course of action. All that remains is to convince the Soviet that his self-interest is also best served thereby. Until you

¹All notes may be found at end of article.



The last decade has seen a step-up in missile and anti-missile development, each new refinement answering the enemy's latest feat. Here an ICBM Minuteman is tested.

can convince him, however, you maintain some edge of superiority but show good faith by a cautious and visible phasing down to parity.

Mr. Paul Nitze, until recently Secretary of the Navy and who on June 30 replaced Cyrus Vance as Deputy Secretary of Defense, enunciated this idea publicly in 1960. In a paper, he wrote of a Class A and a Class B nuclear capability.² He said that a Class B capability—one in which you deter an enemy by having enough secure nuclear strength to retaliate powerfully but not enough to destroy him—was far preferable *if* the enemy could be convinced that it was also in his best interest to maintain this kind of force. Failing to convince him, however, Mr. Nitze said that the only rational strategy was to develop and maintain a Class A capability in which you have clear-cut superiority.

It was this kind of thinking that led Secretary of Defense McNamara to remark shortly after he took office that he would breathe easier if the Soviets would develop second-generation intercontinental ballistic missiles to replace their exposed early models. The early models sat on top of the ground and would probably be destroyed if we should attack first. Secure in deep silos against attack, however, second-generation missiles would not have to be used at the slightest provocation, and you would thus reduce the likelihood of their use at all. The parity concept only makes sense when both your nuclear force and your enemy's can survive an attack. Exposed, "soft" bombers and missiles didn't meet this requirement. Soft missiles were quickly done away with, and the bombers are following.

To convince those who felt that the Soviets could not be trusted to cooperate in such a heady gamble, along came the categorical statement that an all-missile posture is safe, that the thirty minutes' flight time and half-mile accuracy of ICBMs is going to look good for any reasonable future planning period. Since, therefore, there are no strategic military jobs that cannot be done by improved ICBMs dug more deeply into the ground or carried by submarines at sea, and kept modernized by improvements, it became possible to eliminate any serious thought or work toward developing follow-on strategic systems, including military space systems.

Mr. John Rubel, Deputy Assistant Secretary of Defense at the time, was able to say these things in 1961.³ He was able to repeat them with new emphasis in a 1962 speech that was heralded as a major policy statement.⁴

Dovetailing with The Parity Concept, a second idea exerted a tremendous influence on New Frontier strategic views. This was the idea that internal and external pressures on the Soviet government would have a moderating influence on its long-range goals, and quickly.

Walt W. Rostow, who is now a Special Assistant to the President, was the idea's principal architect and untiring salesman. He reasoned that such pressures had always turned militant states into conservative ones. But he felt that no states had ever suffered the order of "corrosive dynamics" now affecting the Soviets—massive agricultural deficiencies, a public clamoring for long-promised but long-delayed improved living standards, the growth of pressure groups within Russia, the demands of the satellite states, the burgeoning economies of Europe and Japan, the abrupt halt of The Great Leap Forward in Red China, and the Russian-Chinese schism. So Rostow hypothesized that at some point in time, perhaps as early as 1971, the danger of war with the Soviets would recede. With war fear no longer a factor, the struggle against communism would then take social, psychological, technological, political, and economic forms, and we should be devoting much of our energies and resources to preparing ourselves for conflict in those areas.⁵

If you were persuaded by this line of reasoning, it became relatively simply to accept the follow-on
(Continued on following page)

thought that there was really no requirement for strategic military forces beyond those then in production or improvements of the same. Coupled with the parity idea and its technical support, lingering doubts about Rostow's point tended to disappear. Either idea standing alone posed high risk. Together, they seemed to cancel out the risk or at least to make the risk acceptable.

Current Strategic Problems

In the years since the new strategy took shape, difficult problems have confronted the United States, some of which defy solution. A big problem, and close at hand, is obviously Vietnam and the very large war we are waging there to guarantee the right of a people, patently unable to agree among themselves, to agree upon their political future. Stated that way—and how else can you state it?—it is a Wonderland nightmare. Even more nightmarish is the image of our nation moving more and more of its major pieces into the protection of a pawn it has probably advanced too far.

Another problem is related to the first. The development of The Great Society is stalled, or at least impeded, by the diversion of a treasury of brains and material and money and men. What value is there in holding the Soviets at bay with a cost-cutting policy of assured destruction instead of a more expensive policy of superiority, thus generating funds and energies and manpower to develop The Great Society so we can engage the Communists nonmilitarily at the point when war danger recedes—when we are detoured from our nonmilitary goals through a military quagmire that drains our strengths and prevents us from attaining one of the major goals our strategy was designed to attain? Thirty to forty billion dollars a year would build a lot of Great Society.

There are larger problems, although their lack of immediacy tends to cloak them from view. Perhaps the most distressing of these is that while we face west to Vietnam, the greatest of our post-World War II alliances appears to be crumbling at our backs. NATO, created and built on the foundation of US nuclear superiority, has had its military base all but wiped away, and its political base was never very strong. The process of disintegration began with the Berlin Crisis in 1961. After Berlin there was no longer any reason for Europeans to be confident that the United States would back them up with nuclear defenses. To the contrary, our frantic efforts to rush nonnuclear reinforcements to Europe made it obvious that we probably wouldn't. Berlin pulled the plug and confidence ran out fast. And our recent decision to pull back 35,000 troops gave the *coup de grâce* to any notion of a nonnuclear defense.

The fact is that de Gaulle is correct: Traditional concepts of mutual defense alliances are invalid in the face of nuclear weapons. Atomic warfare is simply too dangerous for a nation to engage in it willingly for the benefit of an ally. It has become axiomatic that nuclear defenses will be used only when national inter-

ests are *identical*, not when they are merely *mutual*. Identity of national interests implies political union, a vision that has vaporized in the heat of de Gaulle's drive for a renaissance of Gallic greatness. Our own ineptitude also contributed to the demise of that goal which many Americans desired so greatly.

Another and major source of concern is that belief in a US-USSR détente is causing us to be indecisive about the technological war. US military technology long ago reached a state of advanced tumescence and in large part has had to lie moist and quivering, waiting to be taken. The Soviet Union, on the other hand, unaffected either by the war in Vietnam or by any deep belief in a peaceful future, is using today's hiatus to move rapidly ahead in space and unquestionably in other military technology fields that could give them strategic dominance in the 1970s. Those who face the fact that we have contained the Soviets primarily through a dwindling strategic dominance suffer from the niggling gut feeling that there are some things we ought to be doing in research and development that we aren't doing.

And then there's the Red Chinese bomb, an unhappy reminder of the existence of another militant giant's growing military power. It is symptomatic of the fact that the world, no matter how fervently we would wish it, simply won't stand still.

There are more problems. And the list, unmercifully, grows. But these serve as illustrations.

First Things First

A fighter off his balance cannot begin to make his strength and skill felt until he regains his footing. This seems to be the case with the United States today. There are some immediate problems that must be solved even as we begin to shape a new strategy.

Again, the most obvious is Vietnam. How to conclude a war we never wanted and in which we seem unable either to prevail or disengage? The variety of options has long since dissolved. Ho Chi Minh has no wish to negotiate. That seems to leave us with the choice of winning or getting out.

Has anyone taken a dispassionate look at withdrawal? Just what would such a move cost us?

In terms of lost territory, it might cost little. The Chinese have been fighting the Vietnamese for a thousand years and have never managed to conquer them. If we accompanied our withdrawal with certain well-advertised assurances to more stable governments in the area, such as Thailand, and with expanded military assistance commitments there and naval commitments in South China waters, there is good reason to believe that our withdrawal from Vietnam would not initiate a series of falling Southeast Asian dominoes.

In terms of reduced credibility in US guarantees, it is at least moot that withdrawal would affect either the US image abroad or our treaty arrangements. If we rationalized our disengagement by citing the inability of the South Vietnamese to form a stable government, the Western world might applaud our move. Indeed, a global opinion survey might well show that most



The guerrilla tactics adopted by the armed forces for the Vietnam War will doubtlessly influence the training of all future recruits. The most dramatic and prophetic changes are not in the troop formations, however, but in the evolving emphasis on chemical and psychological methods of warfare.

governments and most people regard our continued actions in Vietnam as ill-advised if not plain stupid. And you feel certain that historical hindsight will write the Vietnamese War as a major and perhaps crippling mistake, depending, of course, on whose historians are around to write that history.

It is in terms of lost face and national pride that the cost of withdrawal could be high. But the cost of saving the national face in Vietnam comes high. Perhaps too high. Only time will tell how high.

If you are unwilling to look dispassionately at withdrawal from Vietnam, then it seems you must be willing to face up to a dispassionate look at the risks involved in concluding that war as quickly as possible and at the least cost. In an either-or situation, how can you deny the logic of such a proposal? Can you describe a viable third alternative?

It must be clear by now that incremental increases in US strength fighting under the same ground rules and with the same restrictions won't do the job. Given the French-, British-, and now American-proved axiom that it takes approximately fifteen formal troops to cope with one guerrilla and given the fact that a horde stands behind the Viet Cong, how can you argue with Senator Fulbright's warning that Vietnam is "an open-ended war"?

If we are to conclude the Vietnam War as quickly as possible and at the least cost, then it is obvious that we must isolate the Viet Cong from outside support so we can finish him off inside South Vietnam, so that we can put an end to the "open-end" feature of this war. This means, for example, attacking targets we haven't been allowed to attack. It means closing the port at Haiphong by mines, by blockade, or by bombs. It means considering extreme steps, such as clearing an easily defended border around South Vietnam's jungles cheaply and quickly with small

tactical nuclear weapons, as Gen. Frederic Smith suggested in a 1960 article⁶, instead of trying to do it at exorbitant cost and slowly with bulldozers and Marines as we recently tried on a twelve-mile section of border.

In a word, it means upping the ante. In a word, it means risk. If we are unwilling to fight with the means at our disposal instead of pussyfooting around in dread of esoteric notions like escalation and at a cost in flesh and material resources that is fast becoming unbearable, then it is time for us to use the words that have ended all wars since time began: "Let's get the hell out of here."

The Red Chinese problem must be faced, perhaps less pantingly than Vietnam but certainly with more alacrity than is implied in the official line that, although Red China has the bomb, it will be a long time before Red China develops modern delivery systems—another myth that isn't holding up too well.⁷ Aside from the fact that major cost reductions for rocket vehicles have put a delivery capability within reach of the poverty-stricken Red Chinese, is it mandatory that a nuclear weapon be delivered by "a modern delivery system"? Or in thirty minutes? Might not a suitcase, or a lot of suitcases over a long period of time, do the job just as effectively? An Oriental might just be thinking along those lines. He usually does think along the lines of the simplest solution. And that fact inevitably comes to us as a surprise.

So, it is time to begin—in Sun Tzu's phrase—to "shape" the Red Chinese instead of being shaped by them. The obvious *cheng* of Vietnam is shaping us and softening us for some less obvious *ch'i*. Sun Tzu's dicta on war have been basic to Chinese strategy since 500 years before Christ and have been unaffected by such latter-day strategists as von Clausewitz. It is reasonable

(Continued on following page)

to assume that that old man is beaming approvingly at the modern practitioners of his art. On the other side of that coin, you wonder at the suitability of our tongue-in-cheek aspirations to head off the Red Chinese via US-USSR cooperation against a common threat.

Beyond question, one of our most desperate problems is at home. The Vietnam syndrome—Save the World—has created the Vietnam backfire—Hands Off the World. Our strategy to contain communism by guaranteeing freedom of choice for anyone requesting assistance has swung a large segment of our public opinion to a viewpoint you can only describe as isolationist. Complicating the problem further, this new state of the public mind is most prevalent among the very persons who will have to support a new strategy, the mass of today's youngsters who will be tomorrow's voters and taxpayers. Perhaps it is symptomatic of age (in states as well as in individuals) and of the kind of creative decline that marks a society's apogee that we turn, in our less-confident years, to worship power as the only true guarantor of our security, and perhaps the young persons who oppose today's policies will, with age, take what we may euphemistically call more moderate views. But for those who must plan tomorrow's strategy, this problem of the public mind is a frustrating but necessary factor to consider. What assumption would you make regarding tomorrow's public mind? Since your strategy would largely stand or fall on the accuracy of that assumption, it assumes major importance.

Can you imagine a US President today who would have the political courage to intervene massively in some new crisis far from home? Can you imagine the United States in another war of attrition where we wear the enemy down or he wears us down? Yet that sort of intervention, that sort of war, is basic to the military force structure (bayonets and helicopters and antiguerrilla specialists and World War II-Korean-type forces) we have built and are building in expanding numbers to support our strategy. Can there be any doubt that our strategy is faulty or has in fact been breached? Where are we planning to use these forces after Vietnam? Another Cuba or another crisis that directly affects our national interests would bring instant public-supported reaction. But another Vietnam? An African crisis? In point of fact, we might find it difficult to arrange for intervention.

The Organization of American States has consistently rejected the US-sponsored proposal for an Inter-American Peace Force (which would be, as these things are, largely US) because such a force would "violate the principles of national sovereignty." What part of that OAS decision is a reaction to daily impressions of the loss of national initiative to a crusading military-assistance force? So the new strategist must add to his burdens the problem of a strong international reaction against intervention. If the cure appears to be worse than the disease, maybe these nations we are preparing to save won't want to be saved. Maybe they'll prefer to fumble through on their own. And how does that affect United States security and the new strategy?

Toward a New Strategy

Where to begin in the formation of a new strategy? Certainly you would want to save as much of the old as remains useful. All of it hasn't been overtaken by events. All of it hasn't been proved faulty.

You would want, for instance, to preserve much of Rostow's thinking. Certainly tomorrow's Soviet Chairman is going to be much more troubled than today's Chairman by internal and external stresses, and certainly this is going to soften Soviet militancy. Besides, this idea appeals. It is the kind of positive idea that solidifies national opinion. It appeals alike to fact-facing realist and to idealistic intellectual. No one wants war. Not even our fiercest hawks want war. No one wants to make the future mark time while we solve more imminent problems first. Everyone wants to get on with the future, confident in his own security and well-being and in even more utopian conditions for his descendants. So you would want to save much of Rostow's thesis and get on with The Great Society. You might, in time, even hope to apply the same concepts, cautiously, to the Red Chinese.

You would continue foreign aid on an increasingly selective basis and continue the present trend toward *quid pro quo*, positing continued aid on continued good performance, a policy that recognizes that you will be disliked whether you assist or not, that a desire to be liked isn't any kind of a basis for foreign policy anyway, and that world opinion is a will-o'-the-wisp.

You would want to preserve a capability to react swiftly—instantly!—and nonnuclearly to international crises where our assistance was requested or where our interests were threatened. This capability should be large enough to handle several simultaneous crises, but it would probably be wise to plan only on strengths sufficiently large to confront an aggressor with the fact of US presence, a *fait accompli* he would have to circumvent if he desired to continue with his aggression.

But this crisis-handling force would only have meaning if it were backed up by strategic military strength that the Russian and the Chinese would respect and that other aggressors—Communist-exploited or no—would have to consider before continuing the aggression in the face of US presence. Here, it seems, is where present strategy stumbles hardest, and it is here that the new strategy must concentrate.

What direction should you take in the development of new strategic strengths? Obviously you don't throw away what you have. And obviously you try to fix what you have so that it can do the job better. But there are other things you can do.

If you base your thinking on the assumption that the nuclear weapon is the last weapon man will invent, then you proceed quite naturally to the conclusion that a Maginot Line of survivable and deliverable weapons is the be-all and end-all of strategic weaponry and that all you must do is to embellish and amplify and protect and sophisticate the one you've already got. You proceed to this conclusion even in the full knowledge that a static defense has always been flanked by a determined aggressor, as ours is being

flanked today. And anyone would concede that in terms of explosive power the nuclear weapon is quite ultimate. What value explosive power of an order of magnitude two or even twenty times today's, excepting for specialized applications such as space-detonating missile defense systems?

But the new strategic thinker must ask himself where, in the doctrine of war, is there a rule that a weapon must explode, or make a noise, or raise a lot of rubble? And then he must test his thinking against this question. A weapon of the future could, in fact, affect only the climate. Or communications systems. Or the mind. Or the nervous system. Or the reproductive process. What then of your expensive, foolproof, static nuclear defense systems?

So, in your new strategy, you would want to unfetter our vibrant technology to regain and then to maintain worldwide military technological superiority.⁸ The result of that unleashing would not only support the new strategy; it would become a weapon in itself. It would become a weapon whose effects could be used psychologically or politically, as well as militarily. Technological victory, in your hands, could give you the means to control aggression. In your hands, it could end wars and the threat of wars. In a dangerous world, technological defeat could be fatal.

Like the tone of Rostow's thinking, technological warfare also has its appeal. It stimulates the imagination. It is dynamic. It is a policy that can rally allies around new strengths. It is a policy that says we are tired of being pushed around and of having our security threatened and our well-being disturbed. And it is a policy that gives you the highest return in security for the dollar invested. It also gives you a high payoff feedback into the civilian economy.

The old strategy has built rigidity into the end of the war spectrum that can kill us—the strategic end. It has given us essentially a pure missile posture, with its one-option “go-no-go” characteristic, an all-nuclear strategic posture in a world that shrinks in horror from nuclear explosives, a posture whose only useful effect is to threaten and whose threatening ability is becoming less and less credible. There aren't many men who could bring themselves to use such a capability, even in retaliation. And their numbers will shrink.

There are many who will say that a policy of technological warfare is destabilizing and warlike. They will say that it will set off another arms race. To them you must say that it takes two to tango. You must say that the Soviet is already running as hard as he can; the only reason we don't see the specter of an arms race today is that there is only one contestant. Besides, like the Soviet, we aren't going to display our plans on a sandwich board. There are things you can do that will provoke the Soviet and there are things that are not visible and will not provoke him. There are things going on in his laboratories and in his space experiments that we would probably find quite provoking if we knew of them.

The decision to initiate the Manhattan Project (and similar decisions to initiate similar projects in

other countries) opened a Pandora's box. We opened the box and we have pestilences abroad. Rational men know we must live with those pestilences. Refusal to think about the unthinkable won't make the unthinkable go away. They exist. It would be unimaginable folly to turn our backs on them or to make our strategic plans as if they didn't exist, or as if today's bubbling technological cauldron won't produce new pestilences to threaten our existence.

The original Pandora's box contained, among all the plagues, Hope, which remains as man's sole comfort in misfortune. You hope for a better future. You hope our leaders will have the vision and wisdom and statesmanship to move our society to greater heights and that these new peaceful responses will guarantee our safety and well-being. You are dismayed, shamed, by your own careful conclusions that say: Rely on power until peace is assured.

But you remember, from *Ecclesiastes*, the verse:

“If the serpent bite before it be charmed,

Then is there no advantage in the charmer.”—END

FOOTNOTES

¹The problems inherent in maintaining a strategy of assured destruction and a suggested new strategy were dealt with in detail in “Nuclear Strategy and the Arms Race,” by Col. Richard C. Bowman, USAF, *AIR FORCE/SPACE DIGEST*, April 1967.

²“Strategy in the Nuclear Age,” by Paul H. Nitze, Foreign Research Center, Johns Hopkins University, 1960.

³“The Military Impact of Astronautics,” by John H. Rubel, *Missiles & Rockets*, October 1961.

⁴Speech to Aero Club of Washington, D.C., by John H. Rubel, November 1962.

⁵“West Awaits New Red Strategy,” by W. W. Rostow, *Washington Post*, December 30, 1962.

⁶For a detailed exposition of how nuclear weapons might be employed in a tactical war situation such as Vietnam, the only authoritative article on this subject available in the public domain, see “Nuclear Weapons in Limited War,” by Gen. Frederic H. Smith, Jr., USAF, *Air University Quarterly Review*, Maxwell AFB, Ala., Spring 1960.

⁷“The Myth of Technological Stalemate,” by J. S. Butz, Jr., *AIR FORCE/SPACE DIGEST*, March 1967.

⁸Brig. Gen. Robert C. Richardson, III, USAF, addressed the problem of military technological superiority in his article “Defense on the Technological Front” in *AIR FORCE/SPACE DIGEST*, June 1966.

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Paris Air Show

Bigger than ever before, the 1967 Paris Air Show reflected the steadily growing importance and size of the world aerospace industry. Although nothing radically new or surprising was shown, the Air Show remains the best opportunity available to see, all in one place, aircraft from all over the world on the ground and in the air . . .

Showcase for World Aerospace

By Stefan Geisenheyner

EDITOR FOR EUROPE

Photographs by Guy R. Dyke

WITH the steadily growing importance and size of the world's aviation markets and the proportionally increased number of aviation suppliers, large or small, it becomes almost impossible to give comprehensive coverage to such a major aviation event as the Paris Air Show 1967. More than 500 exhibitors showed their wares and vied for the attention of the viewer and the prospective customer. This report, therefore, highlights only the most exciting and important new developments shown in Paris.

During this year's show, nothing radically new could be seen, either in the form of flying hardware that has not been demonstrated elsewhere before or which has not been discussed extensively in the trade press at an earlier date.

Commercial Aircraft

As in 1965, the commercial aircraft display was dominated by the Russian exhibition which again featured the giant AN-22, the world's largest transport; the IL-62 long-range airliner; and the medium- to short-range TU-134, the AN-24, as well as a newcomer, the YAK-40.

The AN-22 shown this year (it has received the NATO code name "Cock" in the meantime) is obviously a different machine from the one demonstrated during the '65 show. No Russian comment could be obtained as to whether this is still a prototype model or an aircraft of the production series. But it appeared that the makeshift and haphazardly placed equipment of the '65 AN-22 version must have been the forerunner for instruments and internal layout in the '67 version, which obviously came off a production line.

The '67 aircraft was used extensively by the Russians to transport their display material to Paris by flying on a shuttle basis between Russia and France. In the past two years the development of a passenger version of this aircraft has been discontinued, and it will instead be used mainly for transporting outsized loads.

The IL-62, the Soviet's bid for a share in the long-haul passenger transport market, made an excellent impression. The flight demonstrations showed that the

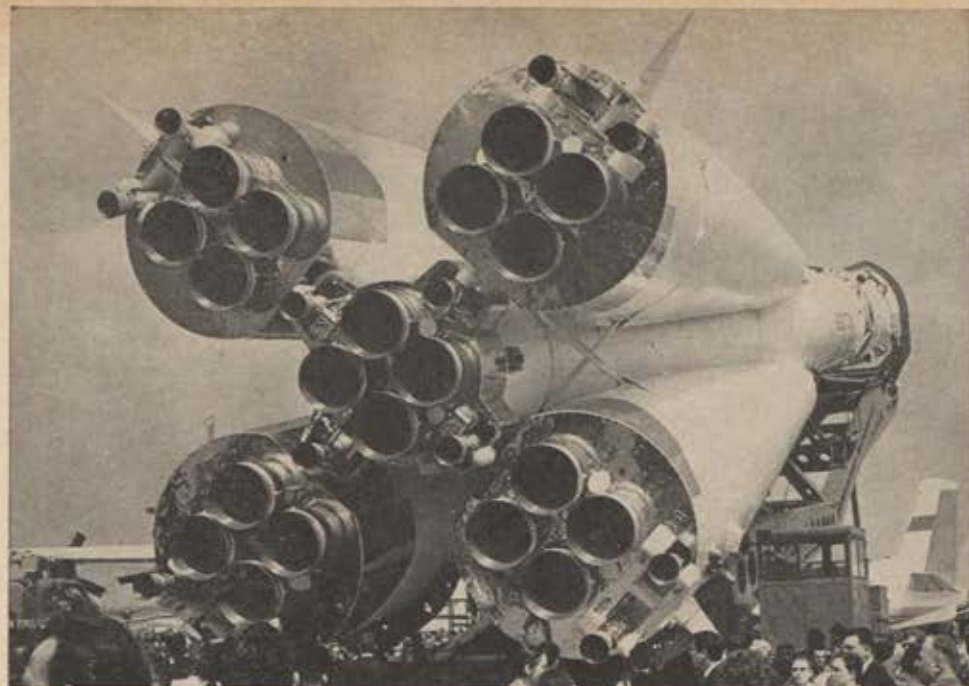
air-inlet problems appear to have been solved, and it was claimed that Aeroflot, the Soviet state airline, will begin to use the aircraft in regular service this month. The designers claim that the IL-62 can fly the Moscow-New York route nonstop at Mach 0.89 and that this will be demonstrated soon.

The Western world has been discussing for a long time the necessity for a small feeder liner of a size resembling that of the still widely used DC-3. Several programs for such a liner are under way today, and it is interesting to note that the Soviets came first in producing such an aircraft in the form of the YAK-40. This twenty-four-seat aircraft is powered by three 3,500-pound-thrust turbofans mounted in the tail of the aircraft. Due to the general design layout, obviously tailored to meet stiff Russian takeoff and landing requirements while operating off grass airfields, the aircraft will not be economical to operate under Western conditions, since, with three engines, it is grossly overpowered. It certainly, however, will see large-scale production in the USSR as it is meant to replace the many hundreds of IL-14 and IL-12 piston-engine aircraft used by Aeroflot.

The TU-134 was seen during the previous Paris Show as a development model. Reportedly, it has gone into production since then and is used on several of Aeroflot's routes. Despite the interest shown in the TU-134 by several Asian and African airlines, no sale outside the Russian sphere of influence has been concluded during the past two years.

An unexpected and gratifying success was achieved for the US by the appearance of the Douglas DC-8-61 commercial airliner in the colors of Eastern Air Lines, which made its debut as the only US passenger transport in Paris. The interest of the public, the press, and the various technicians from East and West was quite obvious, as demonstrated by a queue of hundreds waiting in the rain to see the aircraft from the inside.

Two other US entries in the civilian large transport department were a Lockheed C-141 StarLifter and a C-130 Hercules, both in civilian garb. These two aircraft, developed to meet military requirements, are admirably suited for the heavy transport role over long



The Soviet Vostok booster lifts off by means of twenty fixed engines at the rear and twelve smaller vectoring control rockets. The strap-on pods are dropped after about sixty seconds and the central cluster of four engines, totaling about 250,000 pounds of thrust, burn more than three minutes longer. The rocket and spacecraft are 124 feet long, the core being 92 feet and the pods 62.4 feet.

to medium distances and are sure to find more customers during the coming years.

A real newcomer to the Air Show, as well as to most technicians and press people there, was the Dutch Fokker F-28 Fellowship, which performed during the last two days of the show. The aircraft is designed as a follow-on to the very successful F-27, of which more than 450 have been sold all over the world. Four nations—the Netherlands, Germany, Britain, and the US—are participating in the construction of this new fifty- to sixty-seater. As with the F-27, Fairchild Hiller will build the aircraft under license in the US under the designation F-228, specifically designed for America's regional airlines. It will be a somewhat smaller version of the European F-28. In flight, the aircraft made a very favorable impression in the high- and low-speed regime, and it can be expected that the F-28 will enjoy a similar sales success as its F-27 predecessor, since a definite need for such a liner exists everywhere.

In the light aircraft field, three interesting aircraft with an excellent sales potential were entered by Britain, Germany, and Canada. Surprisingly, the aircraft nobody had given a really good chance of survival, not to mention success—the Short Skyvan light transport—suddenly seems to be a smashing sales triumph. Fifty of these two-engine aircraft, to be used either to carry palletized freight or as a fifteen-seat transport, were ordered by the US distributor, Remmert-Werner. The French turboprop engines it presently uses will be replaced by the Garrett TPE331 for the American market. These planes are destined to be used as feeder liners for the freight version of the Douglas DC-9, since the Skyvan uses the same size pallet as the larger aircraft.

The second prospering aircraft in the light transportation field is the de Havilland Canada Twin Otter. This very popular twin-turboprop STOL aircraft has been an outstanding sales success during the past year, and at the time of this writing sales of more than 100 aircraft have been concluded.

An impressive STOL performance in the air was given by the light twin-engine Dornier Sky servant. For the sake of simplicity and maintainability, this aircraft is equipped with piston engines since the designer believes that for the next ten years adequate turbine servicing will not be available in those areas for which the Sky servant is destined; namely, the remote parts of Africa, Indonesia, South America, and the outlying Pacific regions. During the show, two aircraft were sold, four options were taken, and an unnamed government is negotiating for the acquisition of a fleet of twenty-five.

Whereas during the 1965 Paris Show, civil aircraft projects were mentioned in profusion, this time only two projects were seriously discussed: the Anglo-French-German A-300 "Eurobus," as the much-debated airbus is called today, and its competitor, the Lockheed CL-1011. The A-300 finally seems to be taking shape and is supposed to go into airline service by 1972. The three governments finally agreed that the aircraft should have about 290 seats and a range of up to 1,700 nautical miles and be powered by two engines.

The project, however, has not left the study stage yet because the three prospective builders cannot agree on the type of engine to be used. Germany and Britain favor the Rolls-Royce RB.207, whereas France is opting for the Pratt & Whitney JT9D. Under the present political climate in Europe, it is surely strange for France to prefer a US engine. However, France's major engine producer, SNECMA, has a very close financial and engineering tie with Pratt & Whitney which practically forbids a collaboration with Rolls-Royce. The planners have hoped that by late July a definite choice will be made so that the project definition phase of the program can lead to a final go-ahead next spring.

While comprehensive information could be gathered about the A-300, little could be garnered about its competitor, the Lockheed CL-1011. It can be assumed, (Continued on following page)



Just as Charles A. Lindbergh did in 1927, stunt-pilot Frank Tallman lands the exact replica of the Spirit of St. Louis, which he built at Le Bourget airport during the 1967 Paris Air Show. The New York-to-Paris flight commemorated the fortieth anniversary of Lindbergh's history-making flight.

however, that the company is very active in this field.

Two light aircraft with a good sales potential have recently reached the construction stage but were not exhibited. They are British Handley Page Jetstream executive aircraft and the feeder liner VFW-614. The latter is Germany's first larger jet aircraft construction since the war that is reasonably certain to go ahead in spite of all the financial difficulties presently experienced. In the latest configuration, this two-engine jetliner will have forty-four seats and a maximum range in excess of 1,000 miles. If the governmental money allocations come in on time, it is hoped that the first flight can take place in 1969. The airframe is to be constructed in close cooperation with Fokker, and the engines are to be a civilian development of the Bristol Siddeley-SNECMA M45 turbofan.

The light twin-turboprop executive Handley Page Jetstream is fast becoming a major success for the British aviation industry. The company was able to amass 165 orders even before the aircraft's first flight.

One of the major attractions of the static display was the full-size mockup of the Anglo-French Concorde supersonic airliner. It was announced by Sud Aviation that the first flight of the prototype Concorde is slated for February 28 of next year. The company mentioned, however, the possibility of a slippage of this scheduled date because there are some delays in the delivery of ancillary equipment. The target date for the reception of the airworthiness certificate for the first production Concorde is set for May 31, 1971.

The USSR's aviation export agency, Aviaexport, was unwilling to comment on the progress of the Russian rival to the SST and the Concorde—the TU-144. It was implied, nonetheless, that the aircraft would fly this year. A model of the aircraft, closely resembling the Concorde in nearly every respect, was shown in the Russian pavilion. The characteristics of the TU-144 as stated by the Soviets are: payload—twelve tons; 120 passengers; cruising speed—Mach 2.25; range—6,500 kilometers; takeoff distance—1,900 meters; and landing distance—1,500 meters.

Military Aircraft

In the military category, nine important new developments were on view in Paris for the first time. Two US aircraft, the General Dynamics F-111 and the Ling-

Temco-Vought A-7A, which both crossed the Atlantic unrefueled from the US directly to Le Bourget, proved to be the star performers of the US exhibit and were brilliantly and most impressively demonstrated in the air. The A-7 fighter-bomber nicely fills a considerable number of requirements of several Central European air forces and may become one of the outstanding export aircraft of US industry if all the cards are played right with proper timing.

The Ling-Temco-Vought XC-142A from the US and the Dornier Do-31 from Germany were the two heavyweights in the VTOL transport field. Both aircraft offer approximately the same payload capability but show a considerably different design philosophy. The XC-142A features a four-engine, tiltwing, turboprop design, whereas the Do-31 in the demonstrated configuration has two Bristol Siddeley thrust-vector Pegasus engines to which at some later date two wingtip pods containing four lift-jet engines each will be added. The Do-31 flew from Munich to Paris nonstop over a distance of 447 miles at an average speed of 450 mph, a speed-distance record for VTOL aircraft.

Shown for the first time publicly was the military version of the Hawker Siddeley P.1127, now named Harrier. The combat payload of this aircraft is presently about 5,000 pounds and the ferry range with under-wing tanks is given as 2,000 nautical miles. This indicates a range of about 500 to 600 nautical miles at altitude with full combat load.

An outsider in the military field was the North American OV-10A. This aircraft, to be used in the forward-air-controller role and as light attack and transport aircraft in limited wars, had a hard time competing with the larger and noisier military jet aircraft. Neither its high- nor its slow-speed capabilities nor short-takeoff performance seemed to be extraordinarily good, but it should not be forgotten that the aircraft was built mainly for easy maintainability, high payload, and survivability under fire, and not for exceptional performance.

Two new French fighter-bomber aircraft, both from GAM Dassault, were also shown publicly for the first time. The Mirage F-2, a low-level, high-speed, fighter-bomber, features—for the first time in the Mirage series—instead of a delta-wing configuration, a conventional swept wing and tail section, giving it better stability in low-level flight. The second Dassault air-

craft, named Mirage 5, is another fighter-bomber development of the Mirage III interceptor, which was demonstrated with all wing pylon positions filled. During a landing on the last day of the show it lost its landing gear and went up in flames. The pilot was rescued, fortunately.

The last newcomer in the military field at Paris was the light, two-engine Swedish SAAB 105 trainer fighter-bomber. It is being mass-produced for the Swedish Air Force under the designation SK60 and is offered on the military export market. Presently the aircraft is powered by two Turbomeca Aubisque turbofan engines, which will be replaced in future aircraft versions by two General Electric engines delivering more power and thereby providing better takeoff performance and payload capability. The range of the aircraft will be reduced substantially, however, since the new engines are not as economical in fuel consumption at cruise speeds.

A center of attraction was the full-size mockup of the Anglo-French fighter-bomber and trainer Jaguar, which is being built as a joint venture by the British Aircraft Corp. and Breguet of France. The first official data were released during the show. With a maximum takeoff weight of 28,000 pounds, this two-engine jet will have a combat radius on a low-level mission of about 350 nautical miles and more than 650 nautical miles on a mixed high- and low-level attack sortie. These figures are based on internally carried fuel. With wing pylon tanks, the ferry range of this supersonic aircraft is supposedly better than that of the Phantom. At altitude, the Jaguar will reach a speed of about Mach 1.7; at low level it can still fly at supersonic speeds. Its sole internally carried armament will consist of two 30-mm cannon, supplemented by the usual variety of outboard stores ranging from bombs to air-to-ground and air-to-air missiles. The maximum weapons load on the wing pylons will be about 10,000 pounds. As a tactical fighter-bomber, the Jaguar can operate off grass fields with a takeoff run of less than 3,500 feet. Germany is very interested in this almost exclusively European development, and elements of the Luftwaffe as well as in the government would like Germany to join the development and construction effort. The first deliveries to the French Air Force are slated for the early '70s. It is expected that the RAF and the French AF and Navy will ultimately need about 300 Jaguars. Some sources believe that up to 600 aircraft will eventually be built for these two air forces.

An aircraft now unlikely to reach the hardware stage, the AFVG (Anglo-French Variable-Geometry) aircraft, was widely discussed during the Show. The French decision to pull out of the project was not announced until after the Show ended. Although financial problems were given as the reason for its demise, it was also difficult to meet the combined specifications of the RAF, the French AF, and the French Navy, which are hard to bring under one hat. The models which were shown on the stands of BAC and Dassault depicted a tandem two-seater with two engines placed side by side in the rear fuselage. The

weight of the projected aircraft had reportedly gone up to 42,000 pounds, making it doubtful that the French Navy could have flown such a heavy aircraft from its carriers. As with the Jaguar, the German government and military have shown interest in the AFVG development, and when the French pulled out the British invited the Luftwaffe to join in the venture.

Due to the very insecure future of the AFVG programs, the French government decided to fund its own variable-geometry development. The result, the Mirage G, was shown to the press at the test center of Melun-Villaroche, where it was to make its first flight at the end of July. The Mirage G closely resembles the Mirage F-2. In fact, the aircraft seems to be the same if one disregards the wing-sweep mechanism. The sweep range appears to lie between fifteen and seventy degrees, about the same as that of the F-111. According to statements made to the press, the Mirage G was designed in four months and built in twenty-one months, relying extensively on already existing aircraft parts. This French development seems to indicate that the French government had long ago lost interest in the AFVG project and instead decided to go its own way in the variable-geometry field.

For the first time, facts about the German-American advanced vertical strike (AVS) aircraft became available during the show. The aircraft, under study by Fairchild Hiller and Entwicklungsring Süd, will have variable-geometry wings combined with jet lift, making this Europe's most ambitious military project. Two vectored-thrust engines equipped with swingdown nozzles are mounted in the rear fuselage, providing the primary propulsion. In front of the wing roots, mounted in two pairs, are four lift engines which swing out from their retracted position in the fuselage for takeoff operations. These engines can also be swiveled into a horizontal position so as to provide forward thrust in the takeoff phase. If the aircraft actually materializes, and there seems to be a good chance that it will, the AVS can be called one of the mightiest fighting machines ever devised. A contract for twelve development aircraft is hoped to be signed next February if the program goes ahead. The first aircraft could fly in 1972 to 1973.

Helicopters

In the military helicopter field, a host of interesting designs could be seen almost daily in the air. Unquestionably, Bell's AH-1G HueyCobra was the sleekest and most unusual helicopter. It will be used by the US Army as an attack helicopter until Lockheed's AH-56 Cheyenne attack helicopter is ready for combat. About 500 HueyCobras will be produced. Lockheed's AH-56 will have a rigid rotor constructed after the same principle as their XH-51 research prototype, which showed its astounding maneuverability almost daily. Loops or slow rolls are no difficulty for this helicopter, if it can get up enough airspeed. Another rigid-rotor aircraft is the German Bölkow BO-105, which was presented to the press for the first time earlier this year.

(Continued on following page)

Of the joint Anglo-French helicopter program, two aircraft types, the Sud Aviation SA-330 and the SA-340, were viewed in the air and on static display. The third aircraft covered by the Anglo-French program, the Westland WG-13 medium helicopter, has not yet taken final shape. In fact, the whole project is surrounded by a tight shroud of security measures.

Midway through the show, two Sikorsky HH-3E helicopters arrived after a thirty-one-hour crossing of the Atlantic from New York to Le Bourget, nonstop, with nine air-refueling rendezvous off Labrador, Greenland, Iceland, and Scotland. The refueling of the helicopters by a Lockheed C-130 was demonstrated over the airfield.

Another Sikorsky helicopter shown was the CH-53A, a major contender for the eagerly awaited helicopter decision of the German armed forces. Its competitor, Boeing Vertol's CH-47B, was not present but the older and by now combat-proved CH-47A was demonstrated regularly. The Sikorsky as well as the Vertol design impressed by their maneuverability and lift capability, and it is easy to understand why Germany has not come to a decision yet as to which of the two helicopters, being so much alike in performance and reliability, should be bought.

Hughes Tool demonstrated its OH-6A light observation helicopter, of which full-scale production is well under way. Though the OH-6A is primarily intended for military work, it can be used just as well in the civilian utility field. Here it is competing with Bell's Jet Ranger, an attractive light helicopter development aimed at the private-owner market.

The Soviets brought two of their eighty-seater MIL MI-6 helicopters and the MI-10K crane to the Show. In addition, they demonstrated the twin-engine Kamov KA-25 and the KA-26 for the first time in the West. The KA-25 features a coaxial rotor design; the gross weight lies around 12,000 pounds, and the aircraft is equipped for crane operations with a rearward-looking second control position under the nose. The KA-26 is a light twin designed as an agricultural aircraft.

Engines

Large crowds were drawn to the full-scale mockup of the General Electric GE4 turbojet engine with afterburner, destined to power the American SST. The engine is twenty-five feet long, measures six feet in diameter, and will weigh about 11,000 pounds. A thrust of more than 60,000 pounds with afterburner is expected. The presently running test engines have produced 40,000 pounds dry and 52,600 pounds with afterburner. Also on display was the GE-1/10 engine, which is a contender for the main propulsion unit of the German-American AVS project. This engine, of which few details were available, is a turbofan with afterburner and tilting exhaust nozzle delivering about 8,000 to 9,000 pounds thrust dry.

The competing engine for the AVS project was shown by Pratt & Whitney. Their JTF16 is based on the TF30 turbofan and will deliver about 9,000 pounds thrust dry. There are some differences in size and ex-

ternal configuration between the P&W and the GE designs, showing clearly that the AVS design has not been frozen yet. Both companies have development contracts to build a demonstrator engine. On display also was the P&W TF30-P1 turbofan, the prototype engine for the General Dynamics F-111. Several variants of this engine are under construction.

Since the merger of Bristol Siddeley and Rolls-Royce, the two companies can jointly offer engines over the whole spectrum of thrust levels in use today. Out of the multitude of jet engines available, four are especially noteworthy. The Olympus 593, the powerplant of the Concorde, was seen in mockup form. It has been flown regularly on a Vulcan testbed. It is on schedule, and delivers 32,500 pounds of thrust.

Seen on the Rolls-Royce stand was the mockup of the TF41-A-1, which is under development with Allison for the LTV A-7D fighter-bomber to be used by the USAF. The engine is based on the Rolls-Royce Spey and reportedly will give the aircraft a better range and takeoff performance than the engine used today in the A-7A. The TF41 is scheduled to run toward the end of this year and will deliver a thrust of 14,250 pounds.

In a cooperative venture, Rolls-Royce is working with Turbomeca of France on the development of the RB.172-T260 Adour powerplant destined for the Jaguar. The mockup shown did not unveil too much of the internal layout, but it could be gathered from representatives on hand that the Adour is a two-shaft turbofan engine with annular combustion chamber delivering about 5,000 pounds of thrust dry and up to 7,000 pounds of thrust with afterburner.

Another novel engine on display was the RB.162-81, a lift jet for which no specifications were given, including the aircraft in which it could be used. One could assume that it may be employed for thrust augmentation on heavy transports. The M45 jet engine series which were started some years ago by Bristol Siddeley and SNECMA of France have been given a lot of publicity, but no particulars about the engine as such have been disclosed, since it is, with one exception, a secret military program. The German feeder liner design, VFW 614, will use the M45H, but due to the prolonged deliberation of the German government—which is sponsoring both the airplane and the engine—over the funding, actual construction has not yet been started. The M45G was destined to be used on the AFVG.

Very few details, and those only after extensive questioning, could be extracted from the Russians about their engines. In fact, Western handbooks on jet engines give more information on Soviet engines than the Russians were willing to give during the Show. Questions about Russia's SST engines were met with silence or "incomprehension." Obviously, in Russian eyes all Western engine builders must be very strange fellows to show, for instance, a cutaway model of the GE4, thus giving away all its precious secrets. But just such experiences demonstrate how valuable the Paris Air Show is to the way of life of the Western world.—END

Industry, with government encouragement, is once more looking for ways to harness atomic power for aircraft propulsion. Current studies center on large, subsonic aircraft in the one-million-pound gross weight class which could serve as missile launchers, flying command posts, patrol/reconnaissance, and long-distance cargo aircraft. While the technological challenge of the atomic plane exceeds that of nuclear-powered rockets and surface vessels, initial findings from current studies indicate that nuclear-powered aircraft are feasible because of unlimited endurance and revolutionary capabilities that are also cost/effective . . .

Rebirth of Aviation's Top Challenge: The Nuclear-Powered Airplane

By Edgar E. Ulsamer

ASSOCIATE EDITOR, AIR FORCE/SPACE DIGEST

THE theory of nuclear propulsion for military aircraft is experiencing a renaissance, giving rise to the heady prospect of airborne missile launchers, command posts, and large logistics aircraft of almost unlimited endurance and revolutionary capabilities. Present efforts differ substantially in approach and objectives from those of the previous nuclear bomber program (ANP), which rode high in the 1950s and was terminated toward the end of the decade.

While the initial effort was characterized by high-flying exuberance, the present program, involving a number of aerospace companies and government agencies, is devoid of pyrotechnics and marked by, as one executive put it, "a cautious low-key approach." Equally dissimilar is the application: For the moment, all study efforts are confined to massive subsonic aircraft at least as large as the C-5A. This is so for technical as well as economic reasons. C. L. "Kelly" Johnson, Lockheed's Vice President for Advanced Development Projects, recently described the history and prospects of nuclear propulsion in these words: "We tried very hard in the 1950s to make a nuclear-powered bomber, but we got terribly mixed up in asking nuclear power to do something that it did not want to do. [But] with the changes that we have had in the last ten years in metals and in our knowledge of nuclear problems, slowly but surely, the first application will come in large cargo aircraft." (See also page 65, AIR FORCE/SPACE DIGEST, February 1967.)

A government scientist states the case for the nu-

clear plane in this fashion: "ANP had two strikes against it when the mission parameters were set. Holding the weight to 500,000 pounds was one principal mistake and requiring the plane to fly supersonically was another. Nuclear propulsion doesn't seem to become practical in aircraft much below 1,000,000 pounds gross takeoff weight, and really comes into its own at about 1,200,000 pounds. Also, we are now convinced that only subsonic capabilities are in the cards for the atomic plane."

He added that recent recognition of these two facts "will probably go down in history as the two main breakthroughs in the exploration of nuclear power for aviation."

Air Force Interest Increasing

"Recent developments in nuclear reactors and shielding," according to Lockheed's Chairman of the Board, Daniel J. Haughton, have made nuclear power a "distinct possibility" for large subsonic aircraft. T. R. May, President of Lockheed-Georgia Co., which spearheads current industry efforts in the nuclear-propulsion field, says that Air Force interest in an "orderly and realistic study program of nuclear propulsion is increasing discernibly."

Other Lockheed officials directly involved in the current effort point at a principal caveat: "We need to do more work focused on the system effectiveness

(Continued on following page)

and the performance capabilities of a nuclear-powered aircraft system. We have a comprehensive in-house study under way and similar evaluations are in progress elsewhere. When these have been completed, a decision can be made on whether a nuclear-powered airplane program should proceed. We don't as yet recommend any actual construction program of a nuclear airplane."

Dr. H. S. Sweet, a senior scientist who helps direct the study program, explains Lockheed's "in-house effort is part of our long-range, post-C-5A systems planning, which includes a number of large aircraft configurations employing conventional as well as nuclear propulsion." Findings from this company-funded work are being made available freely to the Air Force, NASA, and AEC. Other aerospace companies involved in this and related studies include Westinghouse, General Electric, Aerojet-General, and the Allison Division of General Motors.

In spite of the determination to hold fast on a cautious course, Lockheed finds much to justify optimism in regard to nuclear propulsion for aircraft of the C-5A type or larger and at a price that may well be attractive in the light of the intrinsically unique mission capabilities.

Since the demise of the original ANP scheme, some progress in such areas as shielding, reactor efficiency, reduced reactor size, and increased safety has been made. But Lockheed's planners say that the most important advance is the recognition "of what nuclear propulsion can do and cannot do in aeronautics," coupled with the emergence of large aircraft concepts in military and commercial aviation typified by the C-5A and the Boeing 747.

The Nuclear Power Rationale

The impetus for nuclear-propulsion R&D in aircraft, according to Lockheed, is based on the following rationale and technological developments.

- The advent of massive aircraft of the C-5A type can make the heavy and costly installation of a nuclear propulsion system for cruising worthwhile.
- The availability of ultrahigh-powered, advanced-technology engines, such as the TF39 (which, of course, is coming into being because of the increased propulsion requirements of the C-5A), which feature a thrust-to-weight ratio sufficiently high to carry the additional weight of a nuclear-propulsion unit. (Lockheed's planning is based on using engines much like

Lockheed planners envision operating a TF39 engine in either conventional mode or in tandem with nuclear reactor and heat-exchanger system in case of atomic-power adaption of C-5A. Size of engine becomes evident in photograph, which shows B-52 using three pairs of standard engines and one pair replaced by single C-5A engine.

the standard four engines of the C-5A operated with conventional fuel during takeoff and landing. The aircraft would be driven by the reactor's nuclear energy, in the form of heat, during cruise only. The dual-purpose engines would include a heat exchanger located forward of the combustion chambers to permit operation in either mode.)

Liquid Metals or Helium?

Lockheed's Deputy C-5A Program Director, F. A. Cleveland, stresses that a major challenge and promise lies in reactor and heat-transfer-loop technology, especially the use of liquid metals such as potassium, lithium, and sodium and the related pump efficiency in order to permit more direct and more efficient conversion of the reactor's heat generation into useful propulsive thrust. Inert gases such as helium are also being considered for the heat exchanger. Government officials also prefer to continue the examination of the liquid-metal and inert-gas approaches.

- Comparable progress in shielding techniques combined with the fact that reactors have grown smaller.

- Government scientists stress that areas of equal importance are reactor efficiency and fuel-element burn-up rate as they affect time between overhaul (TBO). NASA calculations indicate that a TBO ranging between 1,000 and 10,000 hours could represent a viable compromise between what the state of the art makes possible and what is desirable. Oxidation is seen as the principal foe of reactor and heat exchange longevity. While use of such heat-resisting metal as molybdenum and columbium enables the designers of nuclear-propulsion systems in space applications to achieve satisfactory longevity, these metals can't be used in the atmosphere without special and difficult coating techniques. It is feasible to surround the system with an inert gas except at the radiator in the engine, where the heat energy has to be transferred to the airflow.

Reactor overhaul and refueling will be difficult and expensive. The simplest approach is to remove the shielded reactor from the airplane and take it to a refueling facility. Meanwhile, a spare refueled reactor can be put in the airplane to reduce airplane down time. Reactor overhaul and refueling will be accomplished by specially trained operators manipulating so-called "slaves" (remote control devices that function and look like human hands) in a shielded building.

Nuclear contamination, which in the initial ANP





The only existing nuclear-propulsion hardware for aerospace application is for nuclear rockets. Shown here is experimental AEC-NASA test-cell installation of NERVA project, which is slated to produce about 250,000 pounds of thrust. Aerojet-General Corp. and Westinghouse Electric Co. are principal contractors.

program posed severe problems, appears to be less severe in heavier aircraft which can "afford" better shielding. Lockheed scientists hypothesize that encapsulating the reactor in a rupture-safe shield, known as the unit shielding technique, is now feasible. The ANP approach had to compromise because of the then-existing state of the art and weight limitations, and settled for a divided shielding technique. This placed part of the shielding around the reactor and some more around the crew. The result was that the entire aircraft except the crew compartment was contaminated, that maintenance was next to impossible since even after shutdown the radiation levels at such points as the engines were far above the industrial dose rates considered safe by the AEC, and that the aircraft would have represented an intolerable safety hazard.

Crash Survivability

By contrast, the Lockheed Co. predicts that unit shielding will be able to survive a controlled crash and even a midair collision when linked to special energy absorption techniques which are of a classified nature. Consideration is being given to "self-welding" valves linking the reactor shielding with the heat exchangers. This self-welding technique would be automatically activated.

Unit shielding confines contamination to the reactor area, while the rest of the airplane remains "clean," thereby permitting normal maintenance. This presupposes that a leak-proof design is possible.

Mr. May, predicting that state-of-the-art advances last year and current progress will result in eventual go-ahead on a full-scale nuclear-propulsion hardware program, envisions "an orderly development program built around the C-5A."

The hardware progression Lockheed will propose, he says, starts with static ground testing of the propulsion unit and the heat-exchange-loop system. Areas that require further study and innovation include the reactor fuel elements, the heat-exchange system, and pumps.

The next step after static tests would be flight testing of a system aboard the C-5A. Following the satisfactory completion of such a development phase, the actual modification of a number of C-5A aircraft to

employ nuclear power for cruise flight could begin.

Mr. May feels that the number of conversions of C-5As to nuclear propulsion would depend on the mission requirements. Complete "nuclearization" of the C-5A fleet, he thinks, would be neither necessary nor practical.

The Optimized Nuclear Plane

If the nuclear segment of the C-5A fleet performs as expected, the final phase in the development and deployment of nuclear-powered aircraft could set in, according to the Lockheed executive.

This would be the design and manufacture of special, massive aircraft "optimized from the very outset for the employment of nuclear propulsion."

"There can't be any question about the fact that eventually we will have to build aircraft designed specifically and solely for the unique characteristics of nuclear propulsion. Adapting already existing airplanes to accommodate a reactor and related systems will be adequate in the early state of the developmental program but is not going to furnish the full efficiency that nuclear power is capable of," Mr. May suggests.

Such optimization would affect engine locations, which should be as close as possible to the reactor, as well as the latter's quick "removability" to facilitate overhaul and refueling.

Eventually, far down the road, there may be even a requirement for nuclear-powered commercial cargo carriers to operate over distances exceeding the range limitations of conventional aircraft.

On a speculative long-range basis, both the air pollution caused by conventional organic fuels and the possible depletion of the world's natural fuel supplies might catalyze the eventual change-over to nuclear power of conventional aviation.

Two Power Sources Considered

What will be the basic features, in terms of performance and operational capabilities, of the nuclear C-5A?

Lockheed has studied extensively a design in which only one set of engines relies on two energy sources: conventional jet fuel for takeoff and landing and nuclear power for cruise. This approach has certain advantages. While nuclear reactors sufficiently powerful to furnish the maximum thrust needed for takeoff can be built, considerable weight can be saved if the reactor is required to furnish only the lower thrust needed for cruise. Safety and radiation considerations are improved if the reactor is not operational during takeoffs and landings. However, Lockheed recognizes that additional study may show that the use of two reactors and nuclear power during takeoff may give the best performance, considering that no chemical fuel would have to be carried and the engine would be simpler.

Government evaluations of nuclear propulsion in-
(Continued on following page)

clude considerations of nuclear power for all modes of flight, without auxiliary conventional power, as well as nuclear-powered takeoffs and climb-outs augmented by conventional power. Government scientists say little is gained in terms of safety by not having the reactor "on the line" at takeoff, because if it has been operational at all, it represents a potential contamination hazard under any circumstances.

Installation of a nuclear propulsion system (reactor shielding and primary and secondary heat-exchange loops) capable of furnishing cruise power for the C-5A is calculated to weigh in at between 200,000 and 300,000 pounds. This equals roughly the weight of the fuel needed to operate the C-5A with the standard design payload of 220,000 pounds over a distance of about 3,000 nautical miles.

With maximum fuel—318,000 pounds or 49,000 gallons—the conventional C-5A can transport a payload of about 80,000 pounds over a distance of more than 6,000 nautical miles.

A nuclear-powered C-5A, by contrast, will have a payload between 75,000 and 100,000 pounds and no range limitations attributable to fuel.

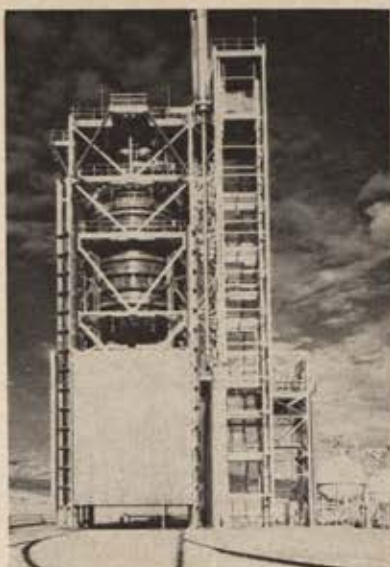
Conventional fuel needed for takeoff and climb-out as well as descent and landing will amount to about 70,000 pounds, according to the Lockheed study. If the weight of the nuclear propulsion unit can be reduced from the presently envisioned values, the weight of the maximum payload could increase by a corresponding amount. In terms of interior space the reactor installation is expected to require a 35-foot-long section in the center of the aircraft, or roughly a volume reduction of twenty-five percent from the normal configuration.

At this time nobody wants to venture a specific guess as to how much it would cost to develop and build a nuclear-powered C-5A. At the same time nobody questions that the price will be "very high."

Nuclear Power Considered Cost/Effective

Will a nuclear-powered aircraft be cost/effective? Yes, say Lockheed planners, because it can perform missions that can't be flown any other way. In case of mission radius requirements (without refueling) of 3,000 miles the nuclear plane is advantageous; for greater radius missions, it is a necessity. As for the payload/range equation that aviation has lived by ever since its inception—it just doesn't exist as far as the nuclear-powered aircraft is concerned.

This almost unlimited endurance is enhanced further by the fact that the nuclear aircraft has no speed limitations beyond those imposed by the aerodynamics of the airframe. It can "loiter" just as long at 470 knots as at 130 knots. Its advantages parallel those of the nuclear submarine or surface ship over conventionally powered craft and to an extent, those of the nuclear rocket. The latter, of course, has "range limitations" because in order to create thrust in the vacuum of space it must expel a mass, such as hydrogen, whose on-board supply it eventually dissipates. But the need for technological sophistication of the nuclear power



Considerably further along than the development of nuclear propulsion for aircraft, the atomic-powered rocket engine shown here at Jackass Flats, Nev., will have twice the performance (specific impulse) of the best chemical rocket engine.

unit design is less pronounced in naval or space vehicles than in aircraft.

The nuclear airplane, be that a modified C-5A or a completely optimized design, appears to be ideally suited for patrol, reconnaissance, airborne alert, search, and long-distance cargo missions. As an airborne missile launcher employing SRAM, Poseidon, or other missiles, it could perform a mission similar to that of the Polaris submarines but with far greater mobility and flexibility. Missile-launch systems under consideration for the nuclear C-5A include vertical fuselage tubes of the Polaris type, downward ejection from the aircraft through launch bays, and launch through the aerial-delivery openings.

The apparent delay in, or even demise of, the Fast Deployment Logistics (FDL) ships project which was to complement the C-5A's logistics mission is likely to hasten and underscore the requirement for a nuclear cargo plane. Assuming no prepositioned fuel supplies or aerial refueling, the standard C-5A cannot exceed a mission radius of more than 3,000 miles and, with a full payload, needs additional fuel for the return flight over any radius above 1,500 miles. On missions involving likely trouble spots in the world the C-5A takes out more in fuel weight than it brings in in payload. While access to some fuel sources, or a chance for aerial refueling, will exist in the majority of all possible conflict sites, this won't be true for all of them.

Any change in the world picture in the next ten years—the minimum time span needed according to Lockheed to convert the C-5A to nuclear propulsion—which would cut back the number of US bases and restrict the prepositioning of supplies, would seem, then, to justify consideration of a new ANP undertaking. Perhaps, in that light, the roughly \$1 billion invested in the original ANP during the late 1940s and the 1950s will yet pay dividends. In that sense, of course, any future ANP will also benefit from the lessons learned in nuclear propulsion for naval vessels and such projects as the NASA/AEC Kiwi and Nerva space rockets.—END

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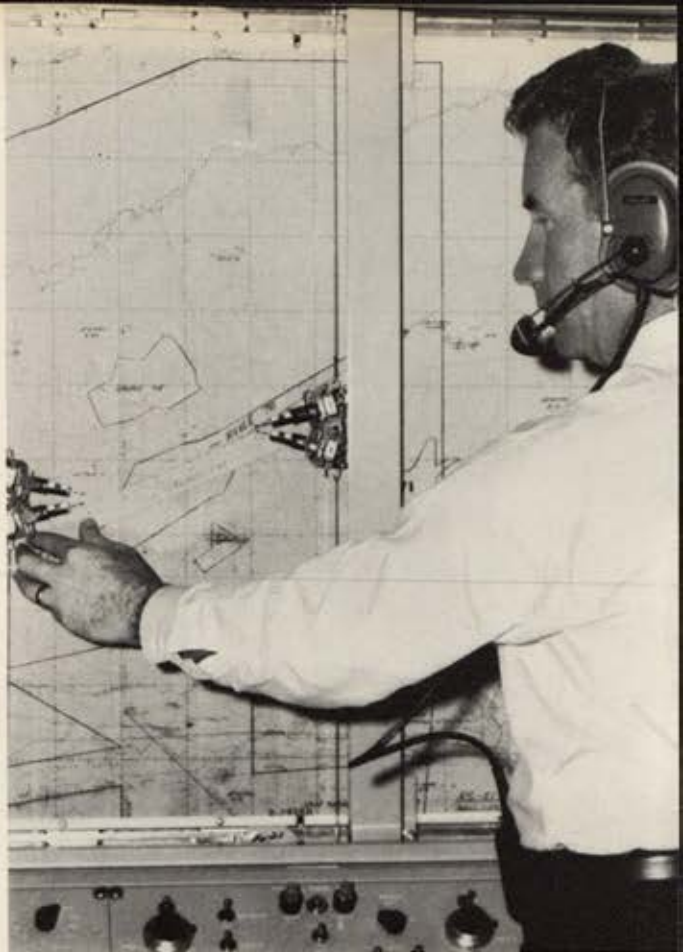
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ANSER—USAF's "Short-Order" Think Tank

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"Tradeoffs" . . . "Cost/Effectiveness" . . . "Concept Formulations" . . .
These are today's Pentagon currencies. Helping the Air Force deal in them on a quick-response basis is the job of ANSER, the smallest and least known of USAF's not-for-profit advisory firms.

Needed—One and Only One—National
Manned Orbital Laboratory Program

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In the face of financial pressures occasioned by war overseas and improvement programs at home, and in recognition of the priority of defense requirements, shouldn't there be *one* manned orbital laboratory program, managed by the Defense Department, with NASA cooperation, instead of the NASA and DoD efforts on the drawing board?



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ANSER: USAF's "Short-Order" Think Tank

BY WILLIAM LEAVITT

Senior Editor/Science and Education

The not-for-profit defense advisory firms which have been a striking feature of the post-WW II nuclear/space age have been the subject of increasing public interest and even congressional scrutiny. The following article on Analytic Services Inc. (ANSER) is the third in a series in AIR FORCE/SPACE DIGEST on the Air Force-associated "think tanks."—THE EDITORS

Photos by Edward Webster, ANSER

THE smallest and least-known not-for-profit advisory firm in the US Air Force's collection of "think tanks" is Analytic Services Inc. (ANSER), of Falls Church, Va. ANSER is but minutes by car from the Pentagon and leads a quiet but influential corporate life as consultant to the Air Staff's Directorate of Operational Requirements and Development Plans (AFRDQ). AFRDQ is the focus of the Air Staff's advocacy of new Air Force weapon systems in the councils of the Defense Department.

In contrast to RAND, Aerospace, and MITRE Corporations, with their staffs numbering in the hundreds and their sizable facilities, ANSER lives so modestly in its leased two-story brick headquarters—somewhat

reminiscent of a suburban dry-cleaning plant—that very few people outside the specialized defense-advisory community have ever heard of it. ANSER makes no headlines, has no publicity man, and since its establishment in 1958 has done its work with such a near-passion for anonymity that it was only a couple of years ago that the corporation and its staff of fifty-three analysts began to get "by-lines" on the studies they produced.

ANSER has no laboratories. Nor does it do very much long-range policy research in the style of RAND. Neither does it do the kind of systems engineering or technical direction of projects that is the business of MITRE and Aerospace. Its basic mission, by its own description, is to provide "objective and timely analysis

Located in a modest two-story brick building in Falls Church, Va., a few minutes by car from the Pentagon, ANSER is on day-to-day call for analytical studies and consultations to aid the Air Staff in its development of "Concept Formulation Packages" for proposed Air Force weapon systems. The emphasis at ANSER is on responsiveness to Air Force needs, and to serve that requirement its product has changed and its focus has been narrowed in recent years.





ANSER President since the not-for-profit corporation's founding has been Dr. Stanley J. Lawwill, a mathematician with some two decades of experience in weapons evaluation and operations analysis for the Air Force. ANSER style has to a great degree been shaped by Dr. Lawwill, working closely with Air Staff.

support to the United States Air Force through the Director of Operational Requirements and Development Plans (AFRDQ), Deputy Chief of Staff, Research and Development."

In today's Defense Department environment of "cost/effectiveness," "program packages," "concept formulations," and the like, this may be translated to mean that ANSER's principal job is to assist the Air Staff in systems-analysis and cost-effectiveness studies of proposed Air Force weapon systems, working in the language of "tradeoffs" and "quantification" that is spoken these days at the Pentagon. ANSER's people, who come mostly from the engineering, mathematical and physical sciences, aid in documenting the Air Force's advocacy of proposed weapon systems in the service's dealings with decision-makers at Defense Department level. The importance of this mission has led to the establishment of three basic criteria for assignment of problems to ANSER. They must be "time critical." They must have a major potential dollar impact on the military budget. And there must be some prospect of influencing the final decision.

Cost/effectiveness is the name of the game in today's Pentagon, and ANSER's job is to help the Air Force play the game. The point is not made frivolously. In the present Pentagon environment, sharp questions are asked about proposed weapon systems, and research-and-development planners are expected to come up with well-documented answers.

Or as Maj. Gen. Glenn A. Kent, who wears two hats as Deputy Chief of Staff for Development Plans at Air Force Systems Command and Assistant to the Deputy Chief of Staff, Research and Development, for Concept Formulation, and who is one of the Air Force's main links with ANSER, put it in a recent *Air University Review* article:

"... You should be able to reproduce, when called upon, any number in the study in a reasonable time without too much fumbling. You only really understand something after you have made the calculations your-

self. If the study is so complex that you feel you simply can't master the calculations, then one of two things (or both) is wrong: either the study is too complex or you are a poor analyst, and should take up another pursuit.

"A rule of thumb regarding simplicity," the general added irreverently, "is that 'even generals must understand it.' Many of the top people in the Defense Department make it a point to understand important analyses in considerable detail. Rather awkward situations are created when the analyst and intervening echelons do not do likewise in detail."

ANSER has a small staff of professionals, ranging in background from aeronautical engineers who cut their occupational teeth in the airframe industry to retired military officers. The average age is thirty-seven, a bit younger than the mean at RAND. But there is no typical ANSERite except for the fact that ANSER people seem to have in common an interest in analyzing problems and generally prefer the relative quiet of their environment to the hustle of industry. Their mien is informal, and they work in rather uncluttered offices, often lunching at their desks, a practice perhaps resulting from ANSER's location next to an unappetizing doughnut shop and across the road from an equally unappetizing hamburger palace.

And although ANSER staffers go about their business with evident seriousness, patches of humor are visible on the premises. For example, on one office wall is a huge picture of the late comic genius, W. C. Fields, flanked by an "in" joke motto of the analysts' world: "The systems analyst must do enough cross-checking to convince himself that, in all probability, he has the correct facts, and then he takes his chances."

ANSER is tightly funded by today's standards, some \$1.3 million under the current year's contract. ANSER's work, increasingly in the tactical area of late, has been narrowed down in the past couple of years to six major study areas: the specialized close-air-support aircraft (A-X); the advanced ICBM; the assault transport (VLT); future strategic aircraft analyses; the advanced tactical fighter (F-X); and the US-West German V/STOL fighter. ANSER people, working with pencil, paper, and digital computer when required, concentrate on these study areas, although they are available



ANSER and Air Staff review projects. Left to right, Col. J. O. Frankosky of AFRDQ; Bernard S. Gershan, ANSER Research and Technology Branch Chief; Dr. Lawwill; Brig. Gen. L. L. Wilson, Deputy Director of AFRDQ; Lt. Col. A. E. Wilson, ANSER Project Officer at one of ANSER-USAF conferences.

on a day-to-day consultation basis for "quick-fix" problems Air Staff people bring in.

ANSER has a nearly symbiotic relationship with the Air Staff AFRDQ shop, which is headed by Maj. Gen. Kenneth C. Dempster. And the emphasis is on quick response to Air Staff needs. ANSER's President, Dr. Stanley J. Lawwill, a mathematician with some two decades of experience in Air Force weapon evaluation and operations research, consults frequently with General Dempster and his staff, and regularly attends AFRDQ staff meetings. ANSER's workload is determined by consultations between AFRDQ and ANSER. ANSER studies usually run a couple of months, and unless there is a required recycling of the study to explore matters in greater depth (a recent example has been ANSER's study of the Advanced Manned Strategic Aircraft (AMSA) question which evolved from fairly crude beginnings to much more detailed analyses of various force-structure mixes changing over a period of years) ANSER goes on to other things.

ANSER President Lawwill, a soft-spoken man who to a great degree has set the self-effacing style of the firm, offers an interesting insight into ANSER's mission by way of contrasting ANSER with RAND. RAND, he notes, studies what RAND thinks the Air Force needs to have looked at, while ANSER studies what the Air Force wants studied. This is not to say that ANSER always says yes to Air Force views. Rather, ANSER analyzes the questions at hand, comes up with its report on the technical and cost-effectiveness parameters of proposed systems, and relays those views to the Air Staff. What the Air Staff does with the ANSER

product is the Air Staff's business. ANSER advances no Pentagon advocacies of its own.

ANSER's corporate history goes back to 1958 when it was established, with management and funding help from RAND, as a California-chartered, not-for-profit company. But the idea of quick-response service from outside civilian groups antedated ANSER's formal establishment. Between 1950 and 1957, the Air Staff contracted out a good deal of such work to as many as twenty different not-for-profit groups. This scattering proved unsatisfactory, and it was decided to try to focus the effort in a single group. The first approach tried was setting up within Melpar, Inc., a special outfit called the Scientific Analysis Office. Headed by Dr. Lawwill, this SAO was, except for administrative purposes, divorced from the profit-making parent Melpar firm. One of the reasons Melpar took on the assignment was that it had recently acquired Corvey Engineering, a company that had done technical editing for the Air Staff. The Melpar arrangement soon ran afoul of the same kinds of problems that had earlier plagued Douglas Aircraft when RAND had been housed under its administrative roof: Potential conflict of interest, and industry's reluctance to disclose proprietary information.

Consequently, the Air Staff decided to take the not-for-profit approach. RAND was approached to see if it would take on quick-response jobs and perhaps create a new division for the task, but the California-based corporation suggested that it might instead help create a new and separate not-for-profit firm. And thus ANSER was born, with a working-capital loan and with initial management assistance from RAND,

DISTRIBUTION OF PROFESSIONAL PERSONNEL AT ANSER

BY DEGREE HELD

Ph.Ds—18.9% (10 employees)

Masters—32.0% (17 employees)

Bachelors—47.2% (25 employees)

No degree—1.9% (1 employee)

BY DISCIPLINE

Engineering Sciences:
(Aeronautical, Civil, Cost, Electronics,
Industrial, Mechanical, Nuclear)—47.2% (25 employees)

Mathematical Sciences:
(Theoretical and Applied Math, Statistics)—18.9% (10 employees)

Physical Sciences:
(Chemistry, Physics, Aerodynamics)—22.6% (12 employees)

Social Sciences:
(Economics, Political Science, Other)—11.3% (6 employees)

Engineering, mathematics, and the physical sciences dominate the academic backgrounds of ANSER's professional staff, as the above chart shows. More than half of the staff members hold degrees beyond the Bachelor's. Because of the small size of the staff, there is, as one political scientist who works at ANSER puts it, a good chance for staff members to get "plugged in" on several projects.



Cost-effectiveness studies are a major task at ANSER and form part of the input into Concept Formulation Packages that go to DoD. Above, M. Edward Goretzky, Economic Analysis Branch Chief, left, works with staffers James E. Pelletieri, and Edmund M. Phelan to line up data that will be fed into a cost study.

both long since repaid and phased out. Some thirty professionals, led by Dr. Lawwill, came over to ANSER from the Melpar Scientific Analysis Office, which eventually went out of existence. ANSER, RAND's foster child, found leased quarters in Virginia, and under Dr. Lawwill embarked on its career as quick-response consultant to the Air Staff.

In keeping with its style and mission of responsiveness to Air Force needs, ANSER's role has changed markedly through the years. In the earlier days, ANSER spent much of its time and energy preparing long-range research-and-development documents for the Air Staff, in which the state of the technological art was projected, and in which Air Force needs by way of future weapon systems were explored. These documents went out to the Air Force and to appropriate industry under the Air Staff label. They represented a species of "ghost-writing" in the days before the great changes in the Pentagon and the ingathering of decisional authority by the Defense Department. In those days, ANSER's analytical emphasis was much more on the conceptual and far-out side of system development. As an example, in 1959 much of the Air Force's first major document on military space was written at ANSER. That kind of operation occurred in the more free-wheeling pre-McNamara days when there was not only more money available, relatively speaking, for research and development, but also more decisional authority focused in the individual military services.

As the Pentagon evolved, so did the Air Staff and with it ANSER. By 1965, ANSER's role had changed to a primary emphasis on systems-analysis and cost-effectiveness studies for the Air Staff. The Air Staff decided that ANSER's energies should be focused on a few specific critical areas, such as those current major tasks listed earlier. There were practical reasons for that move from the Air Staff's point of view. For one thing, ANSER was getting spread too thin. Too many Air Force officers were coming into ANSER's small shop and asking for studies. And, even more importantly, the Air Staff, responding to the demand for cost-effectiveness documentation from the Defense Depart-



Air Staff officer, Lt. Col. R. L. Salisbury, standing, is one of many "blue-suiters" who "come to live" at ANSER and work side by side with staffers on studies. With Colonel Salisbury at the computer console are ANSER staffers Joseph E. Himes, a physicist, and Mrs. Nancy Westerman, a mathematician.

ment, resolved to use ANSER's talents in that specialty to the full.

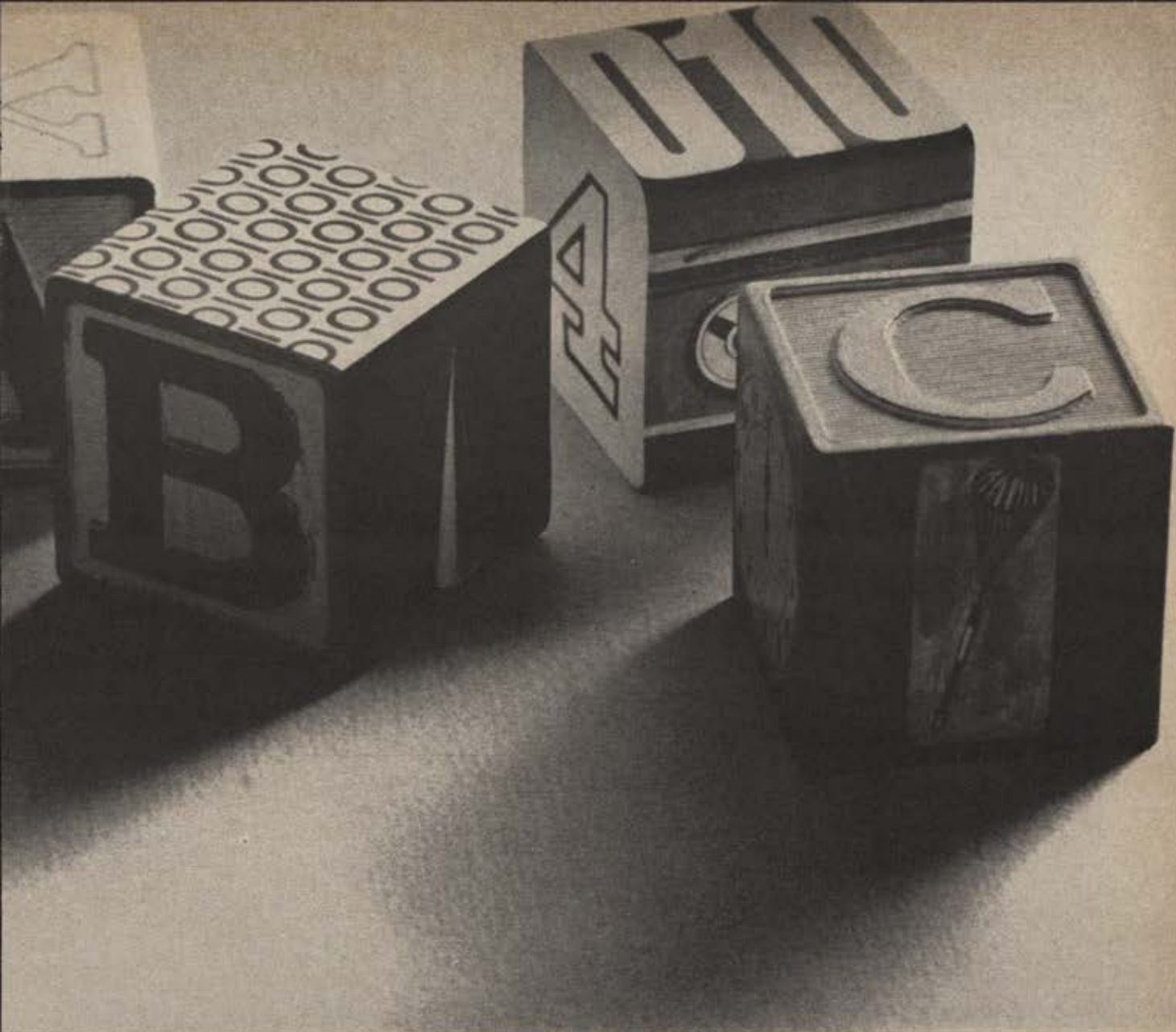
Today, in the words of one general officer who is closely familiar with ANSER's operations, "Air Force control of the ANSER product is much tighter." He describes ANSER's contribution as probably "the best bargain the taxpayers are getting today" in terms of the firm's dedication to the Air Force and the low cost of its operation.

How does ANSER go about its job of helping the Air Staff? Other Air Force officers conversant with the ANSER operation offer some insights. One describes the ANSER role this way: "The Air Force can find its own problems. These days, we don't need research and development projections and analyses. Where we do need help is in finding proper solutions to problems. For example, the Air Force knows it needs a new fighter. But there are such questions as: What type should it be and what should be its specific characteristics?"

"We need someone to look at the various possibilities objectively. That is where ANSER can help. But ANSER can't do the job alone. It has to be a cooperative analysis."

The same officer points out that the Air Staff is by no means devoid of in-house analytical capability. There are trained "blue-suit" analysts working for the Air Staff. There is a sizable corps of civil-service analysts supporting the Air Staff. And, for the nuts-and-bolts data and expertise, there are the technical people at the System Command's field facilities, such as the Aeronautical Systems Division at Wright-Patterson AFB, Ohio. But "outside" assistance from ANSER adds to the total weight of analysis that can be brought to bear on problems.

The case of the F-X advanced fighter is a good example. AFRDQ and ANSER can concentrate on the knotty problems that aren't amenable to study in the field. Meanwhile, the field facilities, and industry, which can speak frankly to ANSER since ANSER has no commercial ax to grind, can provide the "bulk" data on performance of proposed systems. Then ANSER,



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we don't kid around.
We grew up with them.**

Since 1956 we've been involved with many reentry test programs. From their beginnings all the way through to a new concept of high performance Recovery Vehicles.

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These and other test programs have helped the Air Force Ballistic

Systems Division produce increasingly effective weapons. And provide knowledge essential to their continuing programs for Force Modernization.

These test programs have given us something, too—which, as equal opportunity employers, we'll gladly share with qualified engineers and scientists. A proven ability to design and develop test vehicles. And to manage test programs on time. Within budget.

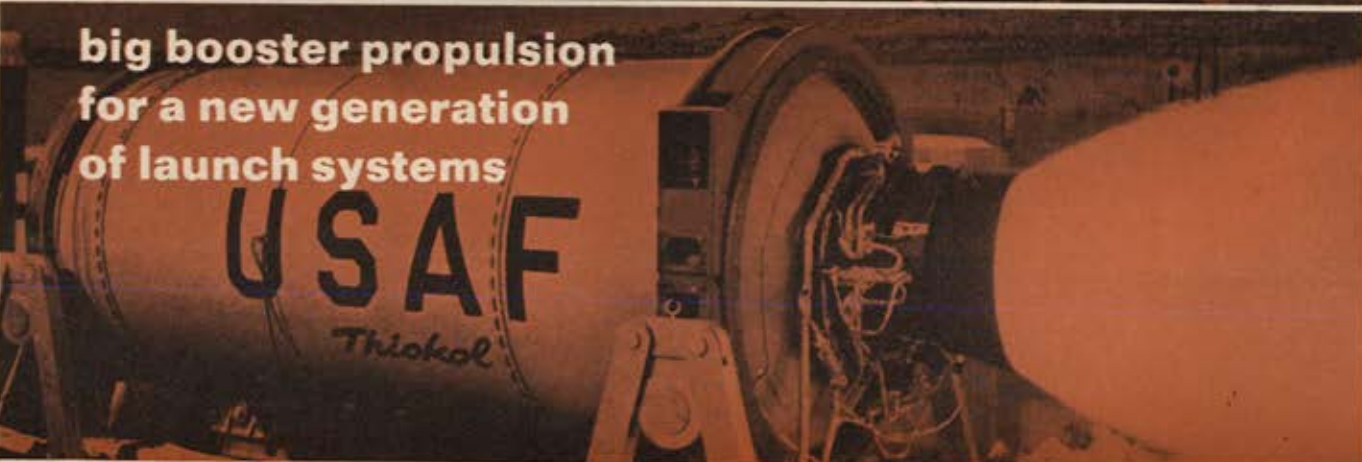
AVCO MISSILE SYSTEMS DIVISION,
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**The aerospace people
who have more reentry
systems experience than
anyone else.**



**Through
advanced technology
at Thiokol**



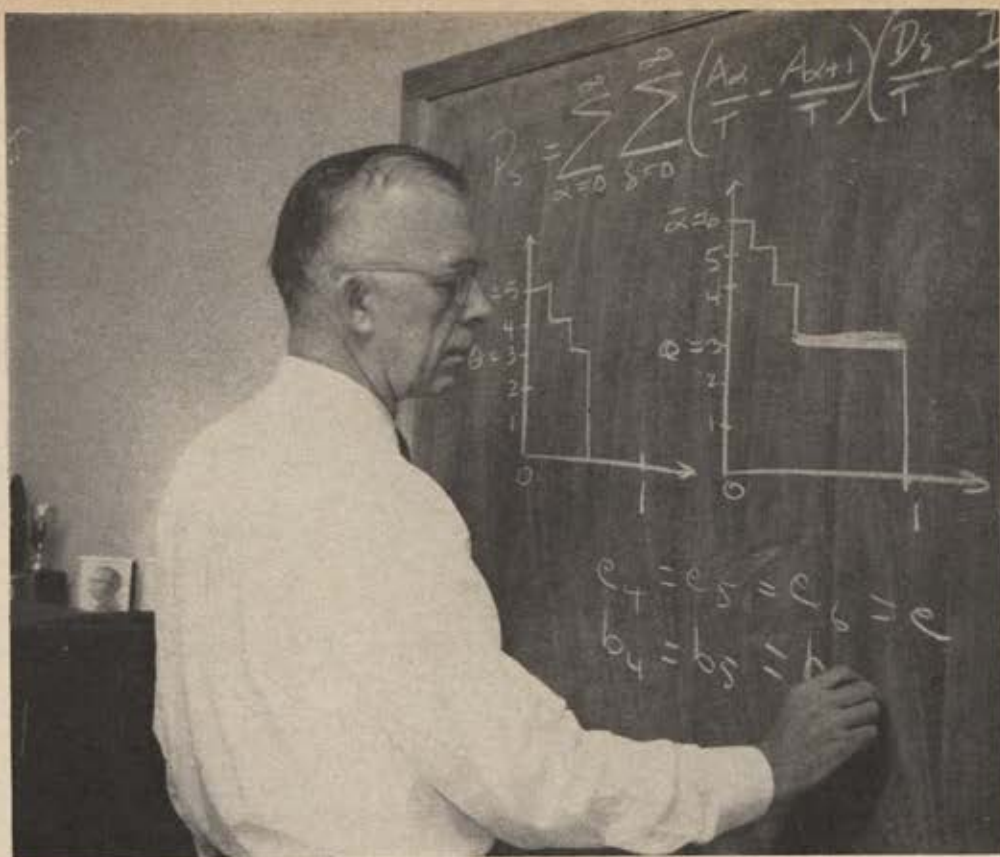
**big booster propulsion
for a new generation
of launch systems**

Big booster technology had its beginning and initial success with development and completion of the Minuteman I first stage. At Thiokol, this concept is being moved ahead steadily and applied toward larger and equally effective motors. As prime movers or strap-ons, big solid motors provide instant, total readiness for the present generation of payloads. Thiokol is building today, the technology required for the propulsion needs of tomorrow.



Thiokol CHEMICAL CORPORATION
Bristol, Pennsylvania

Beginning a new generation of progress in rocketry



An ANSER staff member since the company's establishment is John D. Matheson, a mathematician and retired US Army Corps of Engineers officer. A member of the ANSER Strategic Branch, Mr. Matheson has recently been working on a simplified mathematically-based method for determining preferred strategies which has attracted considerable interest in the strategic-analysis community. It cuts down on traditionally required examination of huge matrices of possible strategic choices.

working as consultant to AFRDQ, can help prepare the Air Staff case for proposed systems—in the required cost-effectiveness language of the day—for presentation to the Defense Department. By the time a specific system is ready for presentation, it has evolved into a Concept Formulation Package. That is the current stock in trade of General Dempster's AFRDQ shop in the Air Staff. And into such packages are fed the Air Staff's own expertise, data from the field and industry, ANSER's evaluations and tradeoff analyses, and any other appropriate information. After that, it's up to the Defense Department's decision-makers, who sometimes order the whole matter restudied.

To meet its array of analytical challenges, ANSER is organized into five functional branches: Strategic, Tactical, Research and Technology, Economic Analysis, and Defense. Analytical assignments from the Air Staff are generally parceled out to the cognizant branches, but very often the branches will borrow staffers from other branches to make up a team. And Air Force officers from the Air Staff quite often "come to live" at ANSER for a couple of months to work alongside ANSER staffers on the studies. One branch, Economic Analysis, is slightly different from the others in that it is essentially a support group, providing cost-analysis expertise to other branches on call.

An idea of the kind of work done at ANSER is suggested by some efforts under way in the Research and Technology branch. There, staff people are looking simultaneously at specific systems for intratheater transport and making cost-effectiveness studies of specific hardware in the light of Vietnam experience and with the benefit of data provided by industry. They are also examining approaches to precise navigation, examining current and proposed systems, with a view

to matching the technological potential to the kinds of airplanes and missions the Air Force may expect in the coming decade. And, in the relatively far-out areas, they are examining the increasingly important air-to-air missile problem in terms of warhead weight, targeting problems, and kinds of defenses that may be developed by potential enemies.

How are the problems attacked? For one thing, it is important to point out that ANSER people work, as one staffer describes it, on the "gross-macro-level." That is an engineer's way of saying that ANSER's analytical studies are fairly "big-picture." Various systems are generally compared in terms of their cost/effectiveness and in terms of how they fit into over-all Defense Department programs. ANSER does not get down to nuts and bolts, unless nuts and bolts are crucial to the analysis. Rather, ANSER's job is to create relatively "crude" mathematical models of the utility of proposed systems in order to present alternatives to decision-makers.

As General Kent pointed out in his *Air University Review* article cited earlier, "The prime purpose of an analysis [is to provide] illumination on the utility of a particular weapon system or piece of equipment. This illumination provides the basis for the Air Force proposing (or not proposing) that the system should be developed and procured; that is, its utility is such that the Department of Defense should (or should not) spend money and resources to buy it."

ANSER, which has evolved from earlier, more scattered evaluative and R&D projection-writing roles to its present more tightly focused operation, is in some ways closer to the Air Force than any of the other not-for-profits. Its leadership is in virtually daily contact with the Air Staff through General Dempster and

his AFRDQ people. Ninety-five percent of its funding is from the Air Staff and virtually all of its work is for the Air Staff. From the Air Force's point of view, this is an excellent arrangement. And in most ways, ANSER seems quite pleased with the arrangement, too.

But corporations and the people who work for them do have lives of their own, and it would be Polyannish not to report that even at ANSER, small as it is, there is discernible ferment over the future of the company and interest in the idea of some diversification of effort and clients.

Although ANSER has plenty to do as it is, there are those who argue that the rather constant level of Air Force funding presents significant staff-attrition problems in an era of rising costs. They believe also that the provision of a slightly more varied intellectual menu for ANSER staffers would help to attract and hold new talent. And although new people do come on, it is a recognized fact that in such a small organization, promotion possibilities are limited. This problem has partially been alleviated in the past by the fact of ANSER serving as a kind of launch pad for people to move on to important posts with other organizations.

At the same time, advocates of diversification do strongly emphasize the requirement for ANSER's prime loyalty to its basic sponsor, the Air Staff. Diversification is a tricky question. The Air Force generally opposes the idea on the grounds that devotion to the main client tends to be watered down. Yet, from the financial point of view, the Air Force is itself in a bind vis-à-vis its not-for-profit adjunct firms, as a result of the over-all ceiling on not-for-profit funding that has been imposed by Congress. The ceiling total can be divided up any way the Air Force wants to divide it, but that process can become a matter of robbing Peter to pay Paul.

ANSER people acknowledge that the Air Force views the money problem with greater understanding than in the past. There is at least some hope, in ANSER's case, of funding relief simply to absorb cost-of-living increases and maintain staff strength. And there are some thoughts of an enlargement of the scope of ANSER's work within the Air Force, a step which, if it were taken, could bring some financial relief, too.

As to diversification of clients, the Air Force has approved a small measure of outside work. ANSER recently completed a study, funded by the Arms Control and Disarmament Agency, of obstacles to technological innovation. That was an outgrowth of an earlier study, approved by the Air Force, of the application of aerospace industry skills to nonaerospace public problems, which was done for a presidential commission exploring the economic effects of arms control and disarmament. Also, under an ANSER "self-sponsored" research program, funded out of its 3.8 percent management fee charged to the Air Force, ANSER is studying the potential impact of the coming supercargo aircraft on the selection of manufacturing sites by American industry.

By comparison with the diversification of effort and clients that has taken place at RAND, which works not only for the Air Force but for the Defense Department, the Atomic Energy Commission, the National Aeronautics and Space Administration, and several



Trained as a nuclear chemist but interested in socio-political-economic impact of technology, ANSER staff member Ron Black has worked on studies of transferability of aerospace skills to nonaerospace problems, and bars to technological innovation.

other Federal agencies, ANSER's excursions have been minute—but the idea is there.

In any case, ANSER's conservative management philosophy, its tradition of primary allegiance to the Air Force, and its basic financial dependence on the Air Force, combine to preclude brochuremanship or hustling for outside business. Whatever diversification and growth that may occur will be the product of careful agreement between the Air Staff client, ANSER President Lawwill, and the ANSER board of trustees.

In some ways, ANSER is one of a kind. As suggested earlier, it has nearly a symbiotic relationship with the Air Staff's AFRDQ shop. Within that relationship, it operates as friend, adviser, and when necessary, as one Air Force officer puts it, as "crutch."

Which brings up the question: Why ANSER? There are, as noted, trained analysts in uniform. There is a civil-service analysis cadre in the Air Force, and, of course, there is what one RAND staffer has called "the corps de ballet" of analysts and quantifiers within the Defense Department structure over the services. The justification for ANSER is much the same as for the other Air Force not-for-profits. ANSER is able to operate beyond the rigidities of the civil-service system and beyond the parochialism of military people who—no matter how broad-gauged they may be—are still often stuck with "party lines." It may be noted, too, that parochialism is not unique to the uniformed military. The Defense Secretariat is by no means devoid of "party lines" of its own.

This does not mean that ANSER has all the answers. As one ANSER branch chief points out: "The brains are never all on one side of the table." To do its job for the Air Force, ANSER needs not only the Air Force's best inputs but also the cooperation of industry and, on occasion, the cooperation of the other military services. Somehow, through the common language of "methodology," the exchange takes place. And out of the dialogue and the calculations come the briefs for presentation in the court of last resort, the Department of Defense.—END

There are current plans for two manned orbiting laboratories, NASA's Apollo Applications Orbital Workshop and USAF's MOL. In the face of financial pressures occasioned by war overseas and improvement programs at home—and in recognition of the priority of defense requirements—should there not be one program operated by the Defense Department with full cooperation by the civilian space agency?

Needed—One and Only One— National Manned Orbital Laboratory Program

BY COL. RICHARD C. HENRY, USAF

FOR THE past decade, the major thrust of US space activity has been the exploration of near space, with manned and unmanned spacecraft orbiting the earth at altitudes ranging up to 1,000 miles. The environment has been mapped, systems have been tested, techniques have been demonstrated, and the technology for deeper explorations has been developed, leading, of course, to the ultimate objective of the manned lunar landing. At the same time, unmanned probes of lunar and interplanetary space have already been made.

The immediate rewards of the recent explorations in earth-orbital space are already clear. Now that the basic exploration and demonstration phase in earth-orbital space is nearing its conclusion, more and more hitherto earthbound disciplines and technologies are defining the usage of space to support their undertakings.

But what about space for defensive military purposes?

Although a treaty on the peaceful uses of outer space has been signed, the investigation of the use of space for defense continues. This is important, for space has already been used by the Defense Department for a variety of purposes such as communications, navigation, and weather forecasting. The Space Treaty, it should be understood, is designed to prevent territorial claims on celestial bodies and to bar the deployment of offensive weapons of mass destruction in space.

Space systems designed to support defense activities on the earth are not precluded.

Since shortly after World War II, we have been engaged in a battle of technological supremacy with the Soviet Union. The advent of space technology was an important milestone in that battle. Since Sputnik was launched, military planners have been looking at the potential of space for defense. While to date no significant offensive or defensive role has been acknowledged and defense uses have been limited to areas such as those already described, most military planners have felt intuitively that there will inevitably be a military utilization of space that will be crucial to the nation's defense—*simply due to the line-of-sight access that space provides to the earth's total surface.*

Evolution of Our Deterrent Strategy

If we examine the major events of the past twenty years in perspective, we can perceive the evolution of the deterrent strategy of the United States and the counterstrategy of the Soviet Union, and, in turn, the impact of space technology on these strategies. The Soviet Union chose to compete with the US in technology and sought to engage us in a frenetic series of reactions. In each case, Russia took the initiative and we reacted. And Soviet secrecy forced us to plan our military force structure on the basis of apparent Soviet capabilities rather than intentions, which in turn, ac-

centuated our reaction. This technological battle has served to accelerate the economic growth of the United States rather than weaken it, and if the Soviets had hoped to force us to squander our resources, their intent has apparently been frustrated.

A quotation concerning attrition by the French Marshal DeSaxe, written in 1745, well describes the pattern of Soviet activities during the past twenty years:

"I am not in favor of battle, and I am convinced that a competent general can make war for a lifetime without being forced to fight a battle. There should be frequent local engagements to wear down the enemy little by little. This is the most effective method of bringing the enemy to his knees and furthering our cause. I do not intend to imply that one should not attack the enemy if an opportunity of crushing him presents itself, but I do say that it is possible to make war without incurring the risk which a battle presents. If he can do this, a general has reached the acme of perfection and competence."

This quotation could, in light of the cold-war history, have been written in Moscow in 1946. This remarkable correlation between events and the strategy defined by this quotation suggests that the Soviet Union embarked on a war of attrition against the United States on two fronts. The first front has been characterized by local crises such as those in Greece, Berlin, Korea, and Vietnam. The second front has been and is the broader battle for technological supremacy. It has been characterized by such Soviet technical achievements as the ballistic missile, nuclear and thermonuclear weaponry, and the Soviet space program. In most instances, the Soviets have been capable of achieving technological surprise. In some cases, the surprise was one of timing. For example, the first Soviet atomic weapon detonation was earlier than expected. In other cases, the surprise was complete and genuine.

The ballistic missile and the Sputnik are examples in this latter category. In each of these cases, the United States has reacted by marshaling its resources for a counteraction.

Fortunately, the resources have been available and there has been enough time to react. The ballistic missile program of the late 1950s is an example of a crash program triggered in response to Soviet accomplishments in this method of weapon delivery. The military threat was very real.

With regard to space technology, the military threat was not apparent, and the national reaction was the passage of the Space Act of 1958; the creation of the National Aeronautics and Space Administration;



Colonel Henry, a recent graduate of the National War College and a veteran of several important military research and development projects as well as service with the National Aeronautics and Space Administration, recently was assigned as Assistant Deputy Commander for Operations, 479th Tactical Fighter Wing, George AFB, Calif. The above article is adapted from a research paper written while Colonel Henry was a student at the National War College. The opinions and conclusions expressed are those of Colonel Henry and do not represent necessarily the views of either the National War College or any other governmental agency.

the initiation of the Mercury, Gemini, and Apollo manned spaceflight programs and a host of unmanned satellite programs; and finally, but most importantly, the enunciation of a basic policy that US exploration of space would be for peaceful purposes. This was a rather massive program of reaction. NASA currently employs some 35,000 people, has activated seven new major facilities, has constructed a total of \$2.2 billion worth of government facilities, has an annual budget of about \$5 billion, and draws on the efforts of some 170,000 people in the aerospace industry. The Department of Defense effort in space technology has been at a level of about \$1.5 billion a year in a broad-based technology program geared to the "building blocks" for an undefined future when a military mission can be more precisely defined.

Maneuvers of the Duelist

General André Beaufre, of the French Army, in his book *Introduction to Strategy*, described deterrent strategy as a series of moves and countermoves by the major participants in an arms race. From this he evolved a matrix equating the various actions to the classic maneuvers of the duelists. This Gallic approach to recent history might be just one author's view of history, but there is one strand of continuity that tends to emphasize the seriousness of technological supremacy. With each major technological advancement by the Soviet Union, the time available for US reaction has become shorter. The United States initially lagged in ballistic missile development, and the threat was serious. Can the United States afford to lag again similarly in a future major military technological breakthrough?

The United States decided after the Korean War that it would preserve military operational forces in being. This concept has been extended to technology in a limited sense through the establishment of major research and development activities in each of the services and at the Department of Defense.

This force in being is achieved in space technology by the investigation of the use of space for defense. We can illustrate this idea by assessing its applicability to General Beaufre's strategy matrix, which appears on the accompanying page.

This matrix illustrates the role of military space technology throughout the deterrent strategy spectrum. Although some have suggested that a "technological plateau" has been reached and that no breakthroughs which might alter the balance of power are on the horizon, this argument flies in the face of scientific advances. It is vitally important that the United States ensure that it is not caught on the plateau when its adversary has surged ahead.

The pace of technology continues to quicken, and the United States has no choice but to expend resources to build a posture in space which will preclude technological surprise and permit rapid reaction to a threat. This posture should include certain basic elements.

The Department of Defense, as an operating agency, must be proficient in manned spaceflight operations. Such proficiency includes a reservoir of qualified people who can be marshaled for a crisis. DoD must also

A MATRIX FOR DETERRENT STRATEGY

ACTION, IN THE MANNER OF THE CODE DUELLO	DEFINITION	EXAMPLES	INVESTIGATE THE USE OF SPACE FOR DEFENSE
Attack	Achieve some technical breakthrough which outdates the enemy defense system.	US, followed by Soviet thermonuclear weapons. Ballistic missile.	Yes. Provides a search for technological breakthrough.
Surprise	Achieve some technical breakthrough far greater than anticipated.	Soviet rockets, atomic and thermonuclear weapons, Sputnik.	Yes. Provides, through exploratory development, protection from surprise.
Feint	Lead the enemy on in the technological race in a direction different from the course one is actually following.	Soviet bombers in 1966 (?). Soviet lunar-landing program (?).	Yes. Provides, through improved military knowledge, protection against reacting to a feint.
Deceive	Lead the enemy to believe that one has made some breakthrough or conceal some technical advance actually made.	Vostok (?). ABM program (?).	Yes. Military knowledge and proficiency in space operations protect against Soviet deception in space.
Thrust	Outstrip the enemy in some field in which he is making a major effort.	Increase in the speed and ceiling of US aircraft in 1955. Manned spaceflight program.	Yes. Provides the technological and experience base for potential future thrust.
Wear Down	Force the enemy into vast expenditure, greater than one's own, in an important field in the arms race.	The whole technological race.	Yes. Improved knowledge and experience protect against unnecessary attrition due to Soviet surprise, deception, or feint.
Follow-up	Exploit some technical advance to gain a limited political advantage.	Soviet protection of Cuba, Sputnik.	Yes. Possibility exists. Protects against Soviet action.
Parry	Reestablish the effectiveness of some defensive system by readjustment or technical achievement.	DEW Line. Atomic submarines and Polaris. Reinforcement of shield forces.	Yes. May provide the technology necessary for a significant enhancement of an existing defensive system.
Riposte	Trump some technical advance by the enemy by a similar advance which outdates his.	Gemini program.	Possible. If the effort is timely, it will reflect the initiative. If the effort is not timely, then it may be called upon to trump a Soviet technical advance.
Break-off	Arms agreement or political withdrawal to avoid a showdown.	Soviet withdrawal from Cuba, 1962. US emphasis on space for peace.	Possibly. Program cancellation would be a break-off.
On Guard	To be ahead of the enemy.	The technological and intelligence race. Forces in being.	Yes. Provides, through its technical and operational personnel, launch, tracking, and recovery facilities and basic hardware, a force in being for use on a minimum-reaction time basis.
Disengage	Achieve a breakthrough which forces the enemy to change his posture.	Tactical atomic weapons.	Yes. Offers the possibility to achieve a breakthrough in, for example, ballistic missile defense.
Threat	A measure which could lead to the start of escalation.	Tactical atomic weapons. Survival tactics.	No. The nature of US research activities does not constitute a military threat.

have technical-support facilities of the sort that cannot be built overnight. Still another requirement is continuing exploratory development necessary to ensure that the technology in its military version is available. The total of these elements constitute forces in being, a basic part of the deterrent strategy. Just as a B-52 wing or an airborne division is a force in being, a continuing military exploratory space research program, encompassing both manned and unmanned spaceflight, is a force in being. The one is for the present; the other is for the future. While we cannot gain the future unless we successfully pass through the present, the future can be lost by our actions in the present.

The Space Laboratory

The space laboratory is unique among space missions in one respect. It is an operational facility in space, its lifetime in orbit limited only by man's ingenuity in providing resupply and reliable long-duration operating equipment. It can perform a wide variety of functions, ranging from astronomy to self-contained on-board experiments to observations of natural and man-made features on the earth.

This flexibility accrues both from the operational and flexible nature of the space laboratory and the characteristics of operating in the orbital environment with long-duration, repetitive, and regular overflights and stable operation. The space laboratory is crucial to the investigation of space for defense. Similarly, the laboratory is crucial to the exploitation of space for the advancement of technology in general and the support of various activities on earth.

Advanced technological defense experiments can be conducted, taking advantage of the vacuum of space, the overview of the earth that space provides, and the absence of gravity. Similarly, astronomical observations and studies can be conducted without the impediments of the atmosphere. Finally, the economic resources of earth can be surveyed, using the large overview and the direct line-of-sight access that space provides.

The deployment of a space laboratory is very expensive, as confirmed by the large costs associated with current and past space projects. Hence, we should examine the question of the utility of a space laboratory versus alternative methods for acquiring the identical data.

If we consider that a space laboratory in a polar orbit will provide orbital overflight of the entire earth's surface once each day, we can conceive of the tremendous amount of data about the earth that can be accumulated in the course of a single year. Using this feature, the laboratory can, in addition to conducting the defense experiments and in addition to conducting the purely scientific studies and experiments, embark on an earth-resources survey that would serve a wide variety of technical professions and a wide variety of customers. We can envision an International Data Bank containing data on oceanography, climatology, geology, cartography, hydrology, meteorology, and natural resources, *all furnished and updated routinely by a space laboratory*. NASA is currently preparing a series of atlases of Gemini and Mercury photographs of the earth for general usage. This is but a tentative first step.

The potential to human welfare that can be derived from such a data bank would seem to be limited only by man's imagination and ingenuity. Yet, this is only a by-product of the laboratory, which is deployed for defense and scientific investigations.

The additional costs would be nominal when compared to the cost of collecting such information by aerial or on-site surveys. Most important, the repetitive nature of the space laboratory's overflights makes the updating of the data a routine matter.

Management of World Resources

Perhaps most important is the contribution that the space laboratory provides toward management on a global basis of the world's resources. The population explosion is widening the gap between the needs of the population and the resources available. To manage the world's resources, it is necessary to establish a base line of data on the resources available and the potential for gaining more resources. The laboratory can provide such an inventory of resources, crop lands, and fishing areas, and it can keep the inventory up to date.

Soil information, draining patterns, and topographic data should be of immense value to an underdeveloped country as it attempts to plot its future and improve its resource potential. Even the geologist, seeking mineral and fuel deposits, would use the data to plan mining and drilling activities.

Thus, the totality of the data about the earth that can be gained from a space laboratory staggers the imagination. Should the United States choose to make this information available to the United Nations, it could make a tremendous contribution to the various world organizations and help to bring about a cohesiveness of the individual members perhaps never before achieved. The barriers of geography would be broken. It is conceivable that the availability of resources could be doubled or even quadrupled, using space-gathered data.

Obviously the space laboratory is the logical next step for manned spaceflight in earth-orbital space. Besides being an important vehicle for defense research in space, it can support purely scientific research and, in addition, almost as a by-product, provide for the accumulation of earth resource data that would be of immense benefit to mankind. The multifaceted application of the laboratory to the political and military strategies of the nation raises a question as to whether the laboratory currently enjoys sufficient national emphasis vis-à-vis the exploration of the moon and the planets.

The Course Ahead

The previous comments have been related primarily to the need for earth-orbital space programs in defense research and the potential exploitations of space technology using the space laboratory. The laboratory becomes the focus of activity in earth-orbital space for it supports at the same time defense experiments, scientific experiments, and data collection. Yet there is, in this tenth year of the space age, no integrated national orbiting laboratory program—in the manner of

the lunar-landing enterprise—with defined objectives. Both NASA and the Department of Defense have initiated laboratory programs, each involving massive expenditures.

The characteristics of the two programs, the Air Force's Manned Orbiting Laboratory program and NASA's Apollo Applications Orbital Workshop program, are different, yet each is oriented to a thirty-day mission in space. The basic flight hardware is different; different launch vehicles are used; different launch sites are used; as well as different tracking stations, communications stations, control centers, and crew-recovery vehicles. Yet each program is oriented to the same basic mission duration—albeit with different specific mission or task objectives.

Are two programs necessary? If not, what program should the nation pursue? These questions arise at this time because both laboratory programs are in their infancy, thereby providing the opportunity for certain basic policy decisions.

The nature of the policy decisions are suggested by such questions as:

- Is the Department of Defense space laboratory a necessary project—now that the Treaty on the Peaceful Uses of Outer Space has been signed by the US and the USSR? The answer to this question must be an emphatic yes, for this program provides the technological and operational forces in being that are a key element in the deterrent strategy. These forces in being in turn provide the capacity to react technologically and operationally to a threat in or from space, should one develop. To fail to establish such forces could result in a serious gap in the total defense posture.

- A definition of these forces in being is in order: Launch facilities, control centers, tracking stations, communications systems, and recovery facilities are a part of the forces in being. The trained people who man these facilities are an equally important part of the forces in being. Experience and proficiency in training and flight operations, as well as the development, test, and procurement of hardware, provide a posture of capacity to react. The creation of these forces in being involves a lead time measurable in years.

- It is difficult to define the net worth of experience and proficiency; but it is not difficult to define the net losses that accrue from ill-conceived and misguided programs that result from inexperience and a lack of expertise.

Why Not One Integrated Project?

Finally, as long as there is a battle of military technology, the United States cannot afford not to invest in the insurance that the continuous probing of the state of the art in space technology provides.

The response to the question concerning the DoD space laboratory (MOL) leads to the next question: Why is it necessary that two government agencies embark on separate projects when one integrated project could serve the interests and requirements of not only both agencies but all parties, private and public? Can the cleavage between the military and the nonmilitary be so complete that this must be so?

The answer to this question is obviously *no* because history is packed with examples of military-civilian

cooperative efforts. What has happened is that the policy of having *two* space laboratory programs is the result of the separation between military and nonmilitary space—a policy which, it is now suggested, has become obsolete in the face of present realities.

There are military and nonmilitary customers for the weather satellites, communications satellites, and navigation satellites. In like manner, there are military and nonmilitary customers for the research accomplished in a space laboratory. Hasn't the exploration of earth orbital space matured to the point where the separation between military and nonmilitary programs becomes artificial in many instances? DoD is a customer for communications facilities orbited by the Communications Satellite Corporation (COMSAT) and, in a similar manner, is a customer for the weather data generated by meteorological satellites orbited by NASA and the Environmental Science Services Administration (ESSA).

Some might argue that, in a similar vein, the space laboratory should be a civil program with the DoD as a main customer. This is, however, counter to the forces-in-being aspect of deterrent strategy. Any major development embracing the military applications of space technology is most likely to embrace manned spaceflight or knowledge accruing from manned spaceflight research and experimentation. It is in manned spaceflight operations and research where the DoD level of proficiency, experience, and capacity to react is the lowest.

The shift from nonmilitary to military leadership in earth-orbital manned spaceflight research would be consistent with our deterrent strategy and would not be inconsistent with our political posture, provided that there is sufficient integration of military and nonmilitary activities. The conduct of military space research is not inimical to United States interest, nor does it pose a threat to another nation. It is not the fielding of a weapon system, although it does provide a capacity to field a weapon system, reflecting a capability rather than an intention.

The decision to have one space laboratory program, and only one program, would allow a concentration of resources toward the technical and planning solutions that are required. Planning is required because an effective laboratory should be in a polar orbit, providing complete overflight of the United States. Heretofore, US manned spaceflights have been limited to overflight of only the southernmost portion of the nation; hence, the need for additional facilities, planning, and integration.

The competition for public resources is keen, as the nation seeks to wage a war on poverty at home, support a policy of leadership abroad, and move ahead in space, all concurrently. My purpose has been to suggest how, in a small way, certain resource demands can be alleviated, while preserving and building a capability that is needed in an age that requires strong US deterrent power.

The opportunity for decision is at hand. Space technology can be exploited as an instrument of national power through a national integration of objectives. Concentration of effort would surely produce a better return to the national welfare.—END





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In the eyes of AF/SD's European Editor, the US decision to withdraw four Air Force fighter squadrons and two Army brigades from Europe is already having an adverse effect on our political and economic, as well as military, relationships . . .

AIR FORCE

AUGUST, 1967

Europe Reacts to US Troop Cuts

By Stefan Geisenheyner

EDITOR FOR EUROPE

WIESBADEN, GERMANY
THE announcement by the US Department of Defense late in April that beginning early next year a reduction of US armed forces strength in Germany will take place sounds like one more reprise of Rudyard Kipling's poem "Tommy":

Then it's Tommy this, an' Tommy that,
an' Tommy, 'ow's your soul?
But it's "Thin red line of 'eroes,"
When the drums begin to roll.

Once more the "thin red line" is expected to hold and defend regardless of how badly it may be equipped or how unfavorably located geographically.

Eventually, 25,000 US Army men, 10,000 American airmen, and four fighter-bomber squadrons—equipped with F-4s and constituting almost half of USAFE's tactical nuclear strike force—will return to the US. At the same time, Britain will reduce its Army of the Rhine by 6,000 men. The already thin red line of Europe's defenses will be thinned out to such an extent that the general military situation in case of a crisis will be profoundly different from the past. This is clearly understood by the European governments, who are now beginning to change radically their political attitudes, toward the East as well as the West, as a direct result of the withdrawals.

Changing NATO Strategy

That such a political change has become mandatory is shown by a short analysis of NATO strategy. Over the past several years, NATO forces have been trained and equipped for so-called "Forward Defense coupled with Graduated Nuclear Deterrence." This implies that in case of aggression the battles would be carried to enemy territory through a series of powerful offensive thrusts. No use of nuclear weapons is envisioned unless the enemy should use them first. Then, if needed, nuclear strikes would be flown at a gradually increasing intensity until either the enemy refrained from using atomic devices himself or, as *ultima ratio*, SAC operated against the enemy's heartland.

USAFE, as well as elements of the Luftwaffe and the RAF, is trained and equipped to support forward defense operations with conventional weapons, with the threat of nuclear strikes available at any time. It is highly unlikely that nuclear missions would have to be flown at all, but the capability to fly them is invaluable as a deterrent and has surely helped to protect Western Europe in past crises.

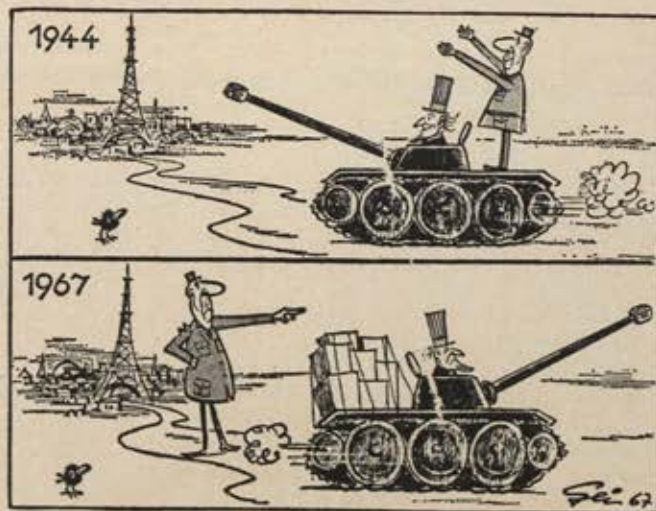
After the reduction in strength has taken place, NATO's

conventional forces in Central Europe will be weakened to a considerable degree. Most serious, however, is the withdrawal of the nuclear strike force represented by USAFE's fighter-bomber squadrons. NATO's basic strategy suddenly becomes invalid. NATO's military mission will, therefore, have to change, and, in fact, important changes were made early in May.

With the reduction of US and British troop strength and expected further withdrawals in the future, Germany's armed forces, as well as those of their neighboring allies—Belgium and the Netherlands—will be too weak to even attempt a forward defense strategy. Moreover, without adequate tactical nuclear support capability, such a strategy becomes meaningless. Thus the total collapse of NATO's current strategic posture, which had been shaken by France's partial withdrawal, is heralded.

The new course of action, tentatively decided upon during the last meeting of the NATO Council, takes the following direction: In case of war, the German armed forces are to fight a conventional delaying action on West German territory, supported by the remaining allied troops, in order to retain and protect enough bases on which a nuclear strike force and airlifted troops from the US can be landed. Then a forward defense strategy can again be attempted.

Such a tortuous solution presents the military planner



Times Change

with a well-nigh insoluble problem. In their present form, the German armed forces are not properly equipped for their holding mission, being far too strong in their offensive elements. They will have to radically adjust their equipment and organization for the new static defensive mission.

But the most serious implication is the psychological impact this changing military philosophy will have on the German soldier. The incentive of keeping the actual fighting away from the homeland and to carry it to the territory of the aggressor has disappeared. It is a safe assumption, furthermore, that the present strength of Germany's army will be reduced. The government is financially incapable of expanding it so as to be able to pursue a forward defense by itself, and it would seem pointless to maintain the army at present strength since it can't be strong enough to defend Germany beyond its borders.

Since this article was written, West German Chancellor Kurt Georg Kiesinger has announced a "thorough reappraisal" of his government's defense policy. A West German troop reduction of some 60,000 men is in the offing, plus cutbacks and stretchouts of ongoing armament programs. It was also reported from informed sources that German military planning would relinquish offensive capabilities and restrict West German armed forces to a purely defensive role.—THE EDITORS

Any responsible statesman will, under such circumstances, resort to political actions aimed at appeasing the potential enemy or might even, in fact, agree to an ultimatum if that means saving the nation from annihilation. Thus, the immediate German political reaction is to seek new alliances, a road which points alarmingly toward a further divorce from present US policy and substituting a close cooperation with France, especially as far as relations with the USSR, NATO, and the US are concerned.

Germany's likely direction at present seems to be to follow in the wake of France, coming to a commercial and perhaps a military understanding with Russia, and sacrificing all the—until now—proclaimed goals of reunification with the German People's Democratic Republic in the East.

US Airlift Is Promised

It can be assumed that these possible political developments were foreseen by the US State Department and the Pentagon when the decision to reduce the troop strength was made early this year. To offset the psychological and military impact, an immediate airlift of troops from the US in case of need is promised and will be practiced during maneuvers once a year. At the same time, a tactical nuclear strike force will be put at the disposal of NATO for the duration of such exercises.

Much has been written about military airlifts in case of an emergency. An airlift to Europe is governed by its own laws, and this reporter stated in the December 1963 issue of AF/SD the European point of view, which is still valid today. To summarize:

- An immediate airlift in case of a sudden emergency in Europe is impossible because the necessary logistic preparation makes execution of the troop movement in less than fourteen days seem unrealistic.

- On the other hand, such preparations cannot be kept secret, especially in view of the USSR's excellent intelligence net and the ever-growing capabilities of reconnaissance satellites. Any such preparatory move for an airlift could be interpreted by the USSR as an aggressive act,

to be reacted to immediately and violently if a time of crisis prevails. A long-distance airlift, therefore, could be a liability instead of an asset.

- Even if the weather over the airfields in Germany were excellent, which it is not much of the year, a massive landing operation after the outbreak of a conflict would be impossible because the fields—the very first targets of the aggressor—would have ceased to exist.

A new and valid question can be added: Would France allow the overflight of its territory by an airlift armada during an impending conflict?

If France would not permit overflights, then the airlift would have to be staged through Britain, to continue from there overseas to southern Germany. This flight, passing through the narrow German, Dutch, and Belgian airspace available, would be like moving down a 700-mile-long shooting gallery if the US depots and airfields in southern Germany were to be used. For the military planner, this represents a tactically insoluble combat situation.

The End of an Era

In any event, with or without airlift, the beginning of the withdrawal of US troops from Germany heralds the end of an era. Since the end of World War II the US soldier in Europe has kept the balance of power between
(Continued on page 69)



"Nothing scares me more than the thought of the US defending West Berlin's freedom."

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East and West on the continent. He was the stabilizing agent, allowing Europe to emerge from the devastation of World War II and to become prosperous again. He was the major factor that allowed US industry to regain a firm foothold in Europe, thus creating an important market for the US economy. Europe without US assistance would long ago have become a Communist-ruled conglomeration of Soviet satellites of Russia, with its financial, military, political, and industrial potential harnessed to the goals of world communism. A unified Europe in close cooperation with Russia would represent the strongest power on earth. Especially here it should be pointed out again that it was, and is, the presence of the US military in Europe which has prevented this merger.

In view of this line of thinking, the reduction in troop strength represents a high-risk kind of policy, since an asset—highly beneficial to the US as a whole—is undermined to achieve some questionable short-range goals.

After the troops depart—and nobody here believes that by 1970 many more than 100,000 men will be stationed in Europe—a radical economic and military change of policy is likely. This continent will look more and more

toward the East for its own well being and, most important, find new markets for its consumer goods. Militarily, the Eastern neighbor is too strong and too influential to negate or discount.

How Europeans Took the News

On this side of the Atlantic, the average European man in the street took the news of the troop reductions in stride. A few newspapers ran editorials on it, but the news item as such did not make too big a splash on the front pages. Comments in Britain were favorable. The expected easing of tension in Europe was welcomed, and since that nation had also decided to reduce its troop strength in Central Europe, there was no cause in Britain to deplore the action. France's reaction was—as could be expected—a gleeful "we told you so" aimed at Germany. And in Germany itself, surprisingly few voices were heard deploring the reduction. Understandably enough, the German government underplayed in its statements the importance of the withdrawals, and the general public has not fully understood the implications since the impact of the blow has not yet arrived. In editorials it was mentioned that once the troop reductions have been made, dealings with the East will become easier and more important, that the German army might reduce its strength, too, thus freeing funds to build more hospitals and highways.

It is quite often heard that Germany does not want its freedom defended by the US, because the East and West German situation has a fatal similarity to the one in Vietnam. Some Germans believe that, with the Americans out of Europe, the possibility of a war here is substantially reduced.

The thin red line of defense for US interests in Europe has thus been broken down by the politicians. In case of crisis, it will be the thankless task of the soldier to remedy the mistakes of the policy-maker, and assuredly the price tag for mending the lines of defense will be considerably higher than the accumulated dollar losses incurred by stationing troops in Germany over the years. Furthermore, the question of whether or not at some future time the Europeans will ever want their ally—in their eyes now unreliable—to take a hand in their affairs again remains wide open.—END

US AIR FORCE
WIEN: TANZMUSIK
VIETNAM: NAPALMBOMBEN

A flyer distributed in Vienna during a US Air Force Bandconcert. (VIENNA: DANCE MUSIC, VIETNAM: NAPALM.)



THE BULLETIN BOARD

News and Comment about Air Force People...

By Jackson V. Rambeau

AFA DIRECTOR OF
MILITARY RELATIONS

Knocking Out the Props

WASHINGTON, D. C., JULY 7

Air Reserve Forces transport missions to Southeast Asia are being drastically reduced. The reason for the order, USAF officials explained, is that airlift requirements in the latter part of June had decreased to the point where there weren't enough loads for Military Airlift Command to fulfill its contracts with commercial air carriers.

Air Reserve Forces will continue to fly training missions to SEA and elsewhere, but until airlift requirements expand appreciably they won't be called on for extra missions funded by MAC. Coincidentally, the curtailment was ordered on the day a C-124 crew from Jackson, Miss., departed on the Air Guard's 1,000th mission to SEA since the Reserve Forces began flying there in December 1965.

The Defense Department has directed that SEA airlift be handled in the following priority: (1) By MAC organic aircraft; (2) By carriers under MAC contract; (3) By Air Reserve Forces transports. Within these guidelines, Reserve Forces C-124 units may be called on to carry outsize cargo which cannot be accommodated aboard commercial carriers.

Gen. Howell M. Estes, MAC Commander, told Congress recently that commercial airlift is "probably cheaper" than propeller-driven aircraft of the Air Reserve Forces. He pointed out that C-97s and C-121s "are not really configured to the present-day cargo utilization, the palletization system that we employ, whereas the DC-7s and other similar types of propeller-driven aircraft we get from the commercials are. Thus, I believe, in adding up all of the factors of maintenance, support, pay of personnel, etc., it is probably more expensive to operate these units than to buy commercial."

General Estes' figures are likely to come under close review, for if they are correct they could undercut con-

gressional support for retaining Air Reserve Forces transport units. General Estes has said he's anxious to begin converting C-97 and C-121 units to his Associate Group plan, in which Reserve Forces crews would augment MAC personnel in operating and maintaining C-141 and C-5A transports from MAC bases.

Congress will undoubtedly explore several other aspects of the Reserve Forces airlift structure before it agrees to any reductions. First, will airlift requirements for SEA continue to decline or is this only a temporary condition? Second, is USAF prepared to handle other contingencies with its existing airlift? Third, what about Tactical Air Command's airlift requirements? And, fourth, in light of current pilot shortages, is it wise to disband qualified aircrews by eliminating these units?

None But the Best

Effective almost immediately, there'll be no more second- or third-class citizens in the US Air Force. In a move designed to increase the prestige of junior airmen, the Pentagon was expected to announce in August a change in grade designations of airmen in grades E-2 to E-4. E-1 remains Airman Basic; E-2 becomes Airman; E-3, Airman First Class; and the title of Sergeant is reintroduced for E-4. Titles in grades E-5 through E-9 are unchanged. As an added prestige fillip, the new buck sergeants are included in the noncommissioned-officers family.

Medical Council Actions

A program of federal scholarships for medical students, which "would help to alleviate the problems of medical officer retention, and might prove the means of eliminating the doctors' draft," was formally endorsed by AFA's Medical Advisory Council, meeting in Washington in June.

The Council recommended enactment of H. R. 9738, a bill introduced by Rep. Charles E. Bennett (D.-Fla.), which calls for a scholarship of \$8,000 per year per student, carrying with it an obligation for an equal number of years of military service after graduation. Discussing the bill with the Council, John D. Tyson, legislative assistant to Mr. Bennett, explained that its objective is to attract 1,500 students per year. The bill is favored by the American Medical Association as a means to eliminate the need for a doctors' draft, but prospects for passage are uncertain because of its estimated \$50 million cost per year.

In other measures to improve retention of doctors in the services, the Council recommended "continuation pay," or a reenlistment bonus, for doctors who agree to remain after their obligated period of service, and additional pay for "highly skilled professional officers," those who have been Board-certified in medical specialties, to bring their earnings more in line with those of civilian specialists of comparable standing.



Maj. Gen. E. B. (Ben) LeBailly was awarded Distinguished Service Medal by Air Force Secretary Harold Brown for duty as USAF Director of Information, from January 1964 to June 1967. Gen. J. P. McConnell joined in presentation.



Eckert

Bolte

Callahan

LaMarre

Lightfoot

Smith

Wyatt

The Council reaffirmed support for legislation to exempt medical officers from the Officer Grade Limitation Act (OGLA), which would help to equalize promotion opportunities for medical officers in all services. At present, the Council was told, the Navy is five years ahead of the Air Force and three years ahead of the Army. The bill (H. R. 10242), introduced by Representative Bennett, has been endorsed by DoD and prospects for enactment are good.

It also commended DoD for setting up a special study group, under Army Col. Vernon McKenzie, to develop effective plans to achieve sharply increased levels of medical officer retention.

AFA President Bob Smart has reappointed all members of the 1966 Council to serve another term, to assure continuity in AFA's campaign to improve medical officer retention. Members, shown below, include Drs. Maurice I. Marks, El Paso, Tex., Chairman; Neil E. Crow, Ft. Smith, Ark.; Charles A. DeLaney, Costa Mesa, Calif.; Curtis D. Roberts, Brandon, Miss.; Albert H. Schwichtenberg, Albuquerque, N. M.; David Waxman, Kansas City, Mo.; and Barnett Zumoff, Brooklyn, N. Y.; Adviser to the Council, not shown, is Congressman Durward G. Hall of Missouri, also an MD.

Retired Council Named

The Commissioner of Baseball, Lt. Gen. William D. Eckert, USAF (Ret.), has been reappointed Chairman of AFA's Retired Council for 1967 by President Bob Smart. Members of the Council are pictured above.

Also reappointed with General Eckert are Army Gen. Charles L. Bolté, Alexandria, Va.; Maj. Gen. Dan Callahan, Cape Canaveral, Fla.; Col. Ed Lightfoot, Washington, D. C.; and Capt. Frederic A. Wyatt, US Naval Reserve, North Hollywood, Calif. New members of the Council are Gen. Frederic H. Smith of Washington, D. C., former USAF Vice Chief of Staff, and Col. F. H. LaMarre, McLean, Va. All but Captain Wyatt are retired from military service.

An End, and a Beginning

The Defense Department has given USAF authority to come up with a new program for administering and training mobilization augmentees which promises to be an improvement over previous efforts to provide realistic and useful training for individual Reservists.

Acting on an Air Force analysis, Deputy Defense Secretary Paul Nitze has ordered elimination of the Air Force Reserve's Specialty Training Program by September 29.

In its place, he has authorized "the conversion of existing Air Force Reserve Program manpower spaces by Program Change Request action into Air Force Reserve units which will be included in total Air Force M-Day augmentation requirements."

The full implications of Mr. Nitze's directive are not clear at this writing, but we understand that one result may be to give each major command the authority and responsibility for setting up its own units to train and administer mobilization augmentees.

This "unitized" approach, patterned after a Navy program, extends the "gaining command" concept to individual mobilization augmentees as well as to organized units. Each command will be charged with determining—and justifying—its personnel augmentation requirements and conducting training to fit Reservists to the jobs they would hold on mobilization. The system not only simplifies personnel and fiscal administration by assigning Reservists to a unit close at hand under direct supervision of the gaining command, but should improve the individual Reservist's motivation and *esprit* by bringing him closer into the command family.

This resolution of a knotty problem is in accord with guidance of the Low Board, and we anticipate receptivity on the part of Reservists. It is a tribute to the sensitivity to, and understanding of, Reserve matters by Tom Morris, Assistant Secretary of Defense (Manpower).

PARTING SHOTS—Senate hearings on H. R. 2, the Reserve Bill of Rights, were to resume in mid-July. Indications were that all essential elements of the bill would remain intact, and that a Reserve reenlistment bonus would be added. No opposition was expected over the National Guard technician retirement section. Final passage isn't due before mid-August, which means effective date is likely to be January 1, 1968, at earliest.

At the suggestion of AFA President Bob Smart, Rep. Charles E. Bennett (D-Fla.) has introduced a bill increasing military per diem rates from present \$16 and \$30 to \$20 and \$35, comparable to a civilian per diem bill now under consideration. Per diem boost is undeniably justified for both civilians and military. But as we've noted before—interests of civilian personnel are well covered, but who looks after the blue suiters?

AFA has been invited to testify before a subcommittee on enlisted promotion policies headed by Rep. Alton Lennon (D-N.C.) of House Armed Services Committee on enlisted promotion policies. AFA Airmen Council, meeting

(Continued on following page)



Marks

Crow

DeLaney

Roberts

Schwichtenberg

Waxman

Zumoff

Lt. Gen. Robert A. Breitweiser, who succeeds the late Lt. Gen. Glen R. Birchard as Commander in Chief, Alaskan Command, has moved in past year from head of USAF Southern Command to Vice Commander, MAC, to Commandant, Air War College, to Alaska.



Dr. Anthony A. Thomas, head of Toxic Hazards Division at Aerospace Medical Research Labs, Wright-Patterson AFB, Ohio, has been awarded USAF Exceptional Civilian Service Medal for pioneer contributions in field of aerospace toxicology.

July 14, was to come up with recommendations. Representative Lennon noted that even before hearings began his subcommittee was producing results: DoD approved an increase of 11,966 "top six" spaces for USAF, making possible 21,467 extra promotions in FY '68. Meanwhile, USAF has organized a fifteen-man task force to look into all aspects of an airman statutory promotion system.

SENIOR STAFF CHANGES . . . M/G Joseph S. Bleymaier, Dep. Dir., MOL Program, OSAF, relieved from add'l duty as Dep. Cmdr., MOL, SSD, and assigned add'l duty as Dep. Cmdr., Space and Missile Systems Organization, for MOL, Los Angeles AFS, Calif. . . . B/G Albert J. Bowley, from Cmdr., 40th Air Div., SAC, Wurtsmith AFB, Mich., to Cmdr., 45th Air Div., SAC, Loring AFB, Me. . . . M/G William H. Brandon, from Cmdr., US Forces, Lajes AB, Azores, and Cmdr., 1605th AB Wg., MAC, to Cmdr., 21st AF, MAC, McGuire AFB, N. J., replacing M/G Donald W. Graham . . . M/G Robert A. Breitweiser, from Vice Cmdr., AU, Maxwell AFB, Ala., and Commandant, Air War College, promoted to L/G and assigned as Cmdr. in Chief, Alaskan Command, Elmendorf AFB, Alaska, replacing the late L/G Glen R. Birchard.

B/G George E. Brown, from Dir. of Accounting and Finance, Hq. USAF (AFAAC), to Auditor General, Office, AF Comptroller, Norton AFB, Calif., replacing M/G Don Coupland . . . M/G Paul T. Cooper, from Cmdr., SSD, to Dep. Cmdr. for Space, Hq. Space and Missile Systems Organization, AFSC, Los Angeles AFS, Calif. . . . M/G Don Coupland, from Auditor General to Ass't to Comptroller, Hq. USAF, with duty station Norton AFB, Calif. . . . B/G Roy C. Crompton, from Cmdr., 4th Strategic Aerospace Div., SAC, Grand Forks AFB, N. D., to Chief, Objective Plans and Programs Div., J-5, Joint Staff, JCS . . . B/G Arthur W. Cruikshank, Jr., from Dep. Cmdr. for

Minuteman, BSD, AFSC, Norton AFB, Calif., to Vice Cmdr., 22d AF, MAC, Travis AFB, Calif., replacing B/G Roy W. Nelson, Jr. . . . M/G Stanley J. Donovan, from Cmdr., 16th AF, USAF, Torrejon AB, Spain, to US Rep., Permanent Military Deputies Group, Central Treaty Organization, Ankara, Turkey, and nominated for promotion to L/G . . . B/G William D. Dunham, from DCS/Operations, 7th AF, PACAF, Saigon, Vietnam, to Vice Cmdr., 3d AF, USAF, South Ruislip, England . . . B/G Lee V. Gossick, from Cmdr., AEDC, AFSC, Arnold AFS, Tenn., to F-111 Systems Program Dir., ASD, AFSC, Wright-Patterson AFB, Ohio, replacing M/G John L. Zoeckler . . . M/G Donald W. Graham, from Cmdr., 21st AF, MAC, McGuire AFB, N. J., to Dir., Maintenance Engineering, Hq. AFLC, Wright-Patterson AFB, Ohio.

B/G John W. Harrell, Jr., from Cmdr., 39th Air Div., PACAF, Misawa AB, Japan, to Cmdr., 314th Air Div., Osan AB, Korea, replacing B/G Pinkham Smith . . . B/G Roger L. Hicks, Jr., from Cmdr., 42d Air Div., SAC, Blytheville AFB, Ark., to Cmdr., 4th Strategic Aerospace Div., SAC, Grand Forks, N. D., replacing B/G Roy C. Crompton. . . . B/G James E. Hill, from Cmdr., 3615th Pilot Training Wg., ATC, Craig AFB, Ala., to Cmdr., 40th Air Div., SAC, Wurtsmith AFB, Mich., replacing B/G Albert J. Bowley . . . Dr. Harry M. Hughes, from Chief, Data Processing Section, to Senior Scientist (Biometrics), Aerospace Medical Research Div., School of Aerospace Medicine, AFSC, Brooks AFB, Tex. . . . M/G David M. Jones, Cmdr., AFETR, AFSC, Patrick AFB, with add'l duty as Dep. DoD Mgr. for Manned Space Flight Support Operations, assigned further add'l duty as Vice Cmdr., National Range Div., AFSC . . . B/G Benjamin H. King, from Vice Cmdr., 4th AF, ADC, Hamilton AFB, Calif., to IG, Hq. ADC, Ent AFB, Colo. . . . Mr. John S. Leak, from Civil Aeronautics Board to Technical Advisor, Directorate of Aerospace Safety, Dep. IG for Inspection and Safety, Norton AFB, Calif. . . . B/G Gustav E. Lundquist, from Cmdr., Systems Engineering Group, with add'l duty as Dep. Cmdr., R&T Div., AFSC, Wright-Patterson AFB, Ohio, to Cmdr., Hq. AEDC, AFSC, Arnold AFS, Tenn., replacing B/G Lee V. Gossick.

B/G John L. Martin, Jr., Dir. of Special Projects, OSAF, with duty station El Segundo, Calif., relieved from add'l duty as Dep., Cmdr. for Satellite Programs, SSD, AFSC, and assigned add'l duty as Dep. Cmdr., Space and Missile Systems Organization, for Satellite Programs . . . Mr. Irving R. Mirman, from Ass't DCS/Science and Technology, to Ass't to Cmdr. for Special Projects, Hq. AFSC, Andrews AFB, Md. . . . B/G Roy W. Nelson, Jr., from Vice Cmdr., 22d AF, MAC, Travis AFB, Calif., to Special Ass't for Environmental Services, JCS . . . M/G Harry J. Sands, Jr., Cmdt., Air Command and Staff College, assigned add'l duty as Acting Vice Cmdr., Air University, Maxwell AFB, Ala., replacing L/G Robert A. Breitweiser . . . B/G Kenneth W. Schultz, from Dep. for Ballistic Missile Reentry Systems, BSD, AFSC, to Dep. for Minuteman, Space and Missile Systems Organization, AFSC, with duty station Norton AFB, Calif., replacing B/G Arthur W. Cruikshank, Jr.

B/G Dewitt R. Searles, from Cmdr., 81st Tactical Fighter Wg., USAF, Bentwaters RAF Station, England, to IG, Hq. TAC, Langley AFB, Va., replacing B/G Dewitt S. Spain . . . M/G George B. Simler, Dir. of Ops., Hq. USAF, assigned add'l duty as USAF Member and Steering and Coordinating Member, Permanent Joint Board on Defense, Canada-US . . . B/G Dewitt S. Spain, from IG, to DCS/Plans, Hq. TAC, Langley AFB, Va. . . . B/G Eugene L. Strickland, from Dir., Int'l Staff, Inter-American Defense Board, Washington, D. C., to Vice Cmdr., 4th AF, ADC, Hamilton AFB, Calif., replacing B/G Benjamin H. King . . . M/G Emmett M. Tally, Jr., from Ass't to Cmdr., AFLC, Wright-Patterson AFB, Ohio, to Cmdr., Defense Construction Supply Center (DSA), Columbus, Ohio . . . L/G Hewitt T. Wheless, Ass't Vice CS, USAF, assigned add'l duty as Senior Air Force Member, Military Staff Committee, United Nations, replacing L/G Thomas P. Gerrity . . . M/G John L. Zoeckler, from F-111 Systems Program Dir., ASD, AFSC, Wright-Patterson AFB, Ohio, to DCS/Systems, Hq. AFSC, Andrews AFB, Md.

PROMOTIONS: To Major General: Robert W. Paulson.

RETIREMENTS: M/G Charles H. Anderson, B/G William L. Hamrick, Gen. K. B. Hobson, M/G Lewis E. Lyle, B/G Stephen D. McElroy, M/G Romulus W. Puryear, L/G Herbert B. Thatcher, M/G Thomas B. Whitehouse.—END



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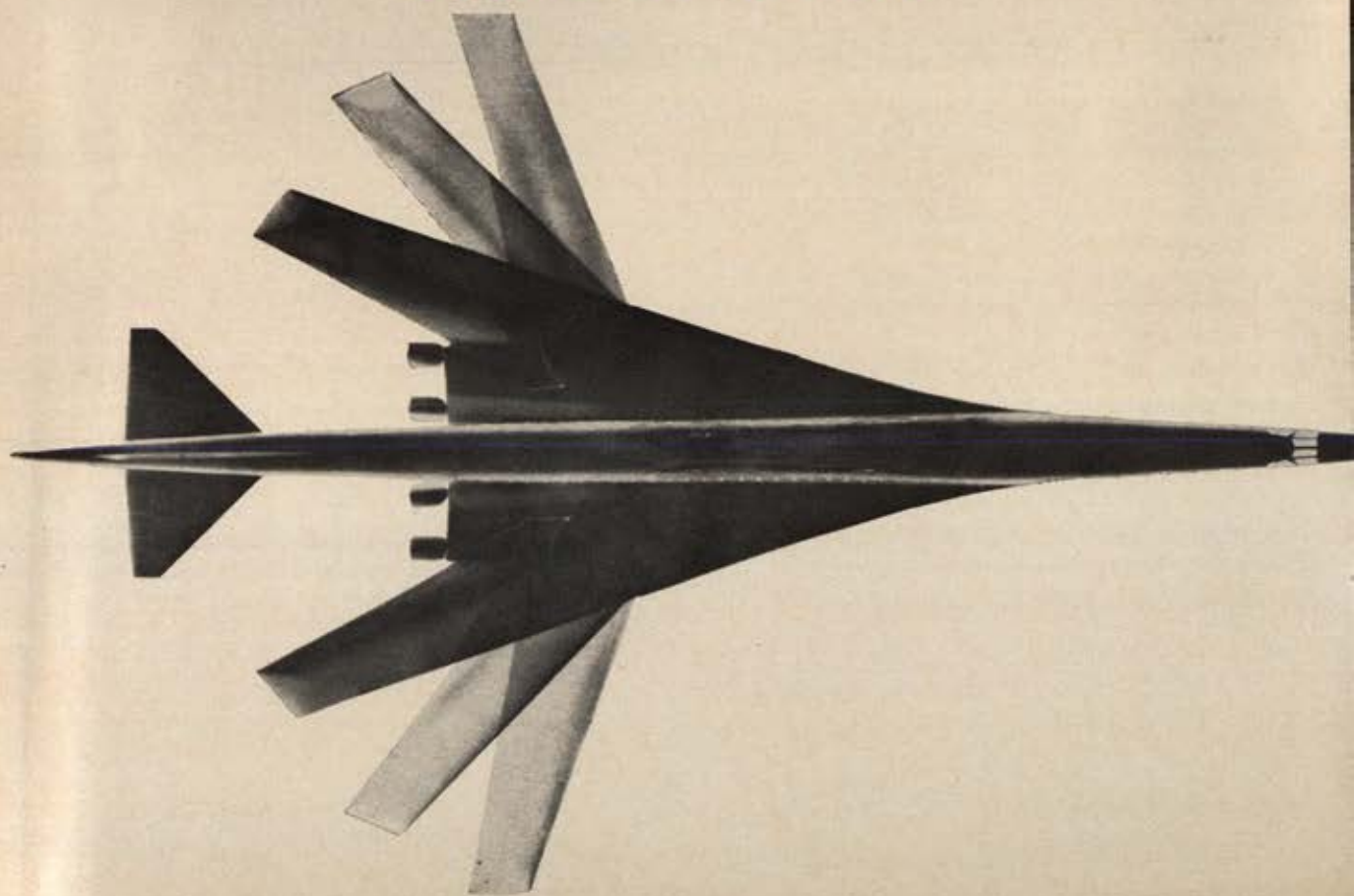
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CHAPTER OF THE MONTH

Ute, Utah, Chapter, cited for

consistent and extremely effective programming in support of the Air Force Association mission.

The second Annual Joint Meeting of AFA's Ute Chapter and the Utah Chapter of the Defense Supply Association was recently held at the Hill AFB Officers' Club.

This year, the format was enlarged to include not only a dinner meeting, but also an afternoon workshop entitled "Logistics 1970." The new format more effectively serves the individual missions of both Associations by contributing to a better understanding and support of DoD logistics policies and AFA objectives.

Some 100 military, industrial, and civic officials attended the workshop, which was moderated by AFA's Rocky Mountain Regional Vice President Nate Mazer.

Panelists included Walter R. Milken, Logistics Management Institute, Washington, D. C.; Col. Dana W. Stewart, chairman, AF Logistics '70s Study Group; Russel Johnson, McDonnell Douglas Corp., Long Beach, Calif.; Col. A. A. Riemondy, Materiel Management Director, Ogden AMA; James Murcklen, Sr., TRW Systems, Inc.; and Col. E. C. Howell, Chief of Transportation & Plans Div., US Army.

Also, Leo E. Berger, from the office

of Director of Command Control and Communications, Hq. USAF; Harold Gilreath, Lockheed-Georgia Co.; Harry Elkner, Defense Supply Agency; Milton Heineman, Boeing Co.; Lt. Col. Thomas Jewell, Military Airlift Command; John Garrett, Naval Academy Marine Engineering Laboratories; and Dr. Jim Peterson, RAND Corp.

Maj. Gen. Harry E. Goldsworthy, Director, Aeronautical Systems Division, AFSC, Wright-Patterson AFB, Ohio, was the guest speaker at the dinner, and Murray Moler, Associate Editor, *Ogden Standard-Examiner*, served as Master of Ceremonies.

Distinguished guests included Utah Governor Calvin L. Rampton; Brig. Gen. B. R. Daughtrey, Deputy Commander, OOAMA; Capt. A. J. Fisher, USN, Commander, Defense Depot, Ogden; Ogden Mayor Bart Wolthuis; AFA President Robert W. Smart; and Utah State AFA President David Whitesides.

The Ute Chapter and its President, Jack Price, are to be congratulated on a truly outstanding program. The consensus of those who attended was, "Let's have a two-day workshop next year!"

The Second Anglo-American Air Forces Friendship Ball, held at the Grosvenor House in London on May 6, was an outstanding success, as any of the more than 1,000 who attended would be delighted to confirm.

Timed to coincide with the twenty-second anniversary of V-E Day (May 8), the stated purpose of the Ball was to mark "the bond of friendship born in the stress of war and strengthened in the days of peace, between the United States Air Force and the Royal Air Force and celebrating V-E Day, a point in history toward which the co-operation of both Air Forces played such a vital part in the protection of world freedom—as they still do in the preservation of world peace."

The Friendship Ball was held under the patronage of Her Majesty Queen Elizabeth II and His Excellency, the American Ambassador to Great Britain, David Bruce. The event was organized and sponsored by the Royal Air Forces Association and the US Air Force Association's London Chapter,



During a recent visit to England to attend the London Chapter's Anglo-American Friendship Ball (see text) and the Royal Air Forces Association Annual Conference, AFA Organization Director Don Steele, right, presented to London Chapter Past President Ed Gray the AFA Unit Exceptional Service Plaque for the Best Single Program sponsored by an AFA unit during 1966. Looking on, from left, Maj. Gen. Clyde Box, Commander, Third AF, USAFE; and Mrs. Steele. During the presentations in General Box's office, AFA Medals of Merit were presented to Colonel Gray and Lt. Col. Carl Arnold, Director of Information, Third AF.

with the support of the respective Air Forces. All net proceeds were donated equally to the welfare funds of the sponsoring Associations.

Cochairmen of the Organizing Committee were Air Chief Commandant Dame Katherine Watson-Watt and Col. E. D. Gray, USAF (Ret.), immediate Past President of AFA's London Chapter and a Director of the Potter Instrument Co.

The Ball was produced by the staff of the Royal Air Forces Association under the leadership of G. R. Boak, General Secretary of RAFA, supported by an American group led by Lt. Col. C. G. Arnold, Director of Information, Third Air Force, USAFE, who conceived the original idea for the Ball.

Among the leaders of the US Air Force who attended were Gen. William S. Stone, Air Deputy to the Supreme Allied Commander, Europe; Lt. Gen. Theodore R. Milton, The Inspector General, USAF; Lt. Gen. John S. Hardy, Commander, Allied Air Force Southern Europe, SHAPE; and Maj. Gen. William D. Greenfield, DCS/Ops, Hq. ADC, Ent AFB, Colo.

AFA's staff was represented at the Friendship Ball by Don Steele, Organization Director, his wife, and W. G. Marley and R. A. Ewin of AIR FORCE/SPACE DIGEST's London office.

(Continued on following page)



A model of a Lockheed C-141 Star-Lifter attracts the attention of AFA officials at the Logistics '70 Workshop recently cosponsored by AFA's Ute Chapter and the Utah Chapter of the Defense Supply Association. Pictured are, front row from left, Utah State President David Whitesides, AFA National President Robert W. Smart, and Rocky Mountain Regional Vice President Nate Mazer; back row from left, Utah Vice President Nolan Manful, Colorado State Secretary Parks Deming, Ute Chapter President Jack Price.



Distinguished guests and participants in the California State AFA's recent Mid-Year Conference and Santa Monica Chapter's Eighth Annual Awards Banquet were, from left, Carl Eaker, Hughes Aircraft Co., and brother of General Eaker; Brig. Gen. Merian Cooper, USAF (Ret.); AFA National Director John Alison; AFA National President Robert W. Smart; and Lt. Gen. Ira Eaker, USAF (Ret.). President Smart spoke at the banquet and General Eaker addressed the guests who attended the Conference luncheon.

During the evening, a presentation was made by the RAFA to Colonel Arnold in appreciation of all his efforts in behalf of the Friendship Ball. Messages from both Queen Elizabeth and President Johnson were published in the official program.

After a program of entertainment featuring Joan Turner, popular British comedienne and songstress, and dancing to music provided by orchestras of the Central Band of the Royal Air Force and the Third US Air Force Band, and the Los Tropicanos Steel Band, the crowd reluctantly departed. In deference to the Royal Air Force's Golden Anniversary celebration, the Third Annual Anglo-American Friendship Ball will be postponed until 1969.

AFA's Santa Monica Chapter recently hosted the California State AFA Organization's Annual Mid-Year Conference held in conjunction with the Chapter's Eighth Annual Awards Banquet.

The Mid-Year Conference program consisted of an AFA Leaders' Workshop, a luncheon featuring Lt. Gen. Ira C. Eaker as the guest speaker, and a State Organization Executive Committee Meeting.

More than 200 attended the Awards Banquet at which the featured speaker was AFA President Robert W. Smart.

Among the award recipients were John and "Dolly" Foster, of the Orange County Chapter, and Martin Ostrow, AFA's Far West Regional Vice President.

Special guests included Santa Monica Mayor Herbert Spurgin; AFA National Directors John Alison, John Beringer, and Ronald McDonald; Brig. Gen. Merian C. Cooper, USAF (Ret.); Col. Mark C. Bane, Jr., Chief of Staff, Continental Air Command; Mrs. Mary

Wilson, widow of AFA's beloved Gill Robb Wilson; and Will Bergstrom, California State AFA President.

An extremely interesting and informative program on aerospace, as well as the aims and objectives of AFA, was presented to more than 200 registered delegates and guests at the annual convention of AFA's Texas State Organization which was held in Austin.

Air Force Command briefings were presented by the Air Training Command, Tactical Air Command, and Strategic Air Command. Amarillo Chapter Vice President Bob Izzard, program director of an Amarillo TV station, gave an excellent presentation on the background and conduct of the war in Vietnam. His presentation was illustrated with movie films taken during his recent tour of the fighting activity with the Air Force in Vietnam.

Robert Langford, Austin Chapter President and Chairman of the Convention, served as Toastmaster at the luncheon, and Lt. Gen. Fred M. Dean, Vice Commander in Chief of the US Strike Command, was the guest speaker. General Dean discussed the Air Force role in the Strike Command.

Gen. Raymond J. Reeves, Commander in Chief of the North American Air Defense Command, was the principal speaker at the Awards Banquet. General Reeves told the more than 200 delegates and guests of NORAD's role in defending North America, and elaborated at length on the value and necessity of the Air Force Association.

The Waco Chapter was named "Chapter of the Year," and the award was accepted by Chapter President Russell Brock. Ben M. Griffith, President of the San Antonio Chapter, was named "Texas AFA Man of the Year." These awards and other state awards



Key figures at the Texas State AFA Convention are, from left to right, Sam E. Keith, State President; Gen. Raymond J. Reeves, Commander, NORAD; Robert Langford, Austin Chapter President and convention host; and Earle North Parker, AFA National Director.



Ben M. Griffith, left, President of San Antonio's Alamo Chapter, was pleasantly surprised when State President Sam E. Keith presented him the "Man of the Year" award at the recent Texas State AFA Convention. For the first time, state officials decided to keep the Man of the Year and the Chapter of the Year awards a closely guarded secret, and apparently were successful.

were presented by State President Sam Keith; National Awards were presented by National Director Earle Parker.

Col. Vance Murphy, USAF (Ret.), Director of Aviation for the city of Austin, served as Toastmaster for the banquet and introduced the following newly elected State Officers: Sam Keith, President; John Allison, Vice President (North); Jack Morris, Vice President (South); Harlan Hodges, Vice President (West); Joe Draper, Secretary; and Robert Langford, Treasurer.

The Delegates voted to hold the State AFA's 1968 Convention in Del Rio. The State Organization's first attempt at a one-day convention was outstanding in every respect.

CROSS COUNTRY . . . AFA's San Francisco, Calif., Chapter and the Bay Area Chapter of the National Aeronautics Association sponsored an air salute of authentic antique Waco, Stearman, and Ryan aircraft, to Mrs. H. H. Arnold, widow of the late General "Hap" Arnold, on the occasion of her eightieth birthday.

Dates to remember: September 2, Louisiana State Convention, Biloxi, Miss. . . . October 6-8, New Jersey State Convention, Atlantic City, N. J. . . . October 7-8, Michigan State Convention, Detroit, Mich. . . . November 3-5, Idaho State Convention, Pocatello, Idaho . . . November 4, Massachusetts State Convention, Westover AFB, Mass.

—DON STEELE

This Is AFA

The Air Force Association is an independent, nonprofit airpower organization with no personal, political, or commercial axes to grind; established January 26, 1946; incorporated February 4, 1946.

Objectives

• The Association provides an organization through which free men may unite to fulfill the responsibilities imposed by the impact of aerospace technology on modern society; to support armed strength adequate to maintain the security and peace of the United States and the free world; to educate themselves and the public at large in the development of adequate aerospace power for the betterment of all mankind; and to help develop friendly relations among free nations, based on respect for the principles of freedom and equal rights to all mankind.

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Following each state contact's name and address are the names of the localities in which AFA Chapters are located. Information regarding these Chapters, or any phase of AFA's activities within the state, may be obtained from the state contact.

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This eliminates the penalty of lower coverage for the man on flying status whose death is caused by illness or ordinary accident.

The accidental death benefit was recently increased to \$12,500—a substantial increase in this benefit for every age.

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AFA Military Group Life Insurance carries no hazardous duty restriction—no waiting period for coverage of personnel assigned to a combat zone. This insurance plan was designed as a service to our members, and we believe we serve best by continuing to offer the broadest possible coverage consistent with safety for all policyholders.

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the low group rate after they leave the service, and until age 65—provided their coverage has been in effect for at least a twelve-month period prior to their date of separation.

Net cost of insurance has now been reduced by dividend payments for four consecutive years . . . in addition to major benefit increases made in the policy during the same period.

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All Air Force personnel on active duty, in the National Guard, and in the Ready Reserve are eligible to apply for AFA Military Group Life Insurance.

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CIVILIAN GROUP LIFE INSURANCE

This program offers AFA's nonmilitary members \$10,000 of needed insurance protection at the lowest cost we know of for any group term coverage which offers equal benefits:

Double Indemnity is a unique feature of this plan, covering almost all accidental deaths, including death caused by aviation accident unless the insured is acting as pilot or crew member of the aircraft at the time of accident.

Coverage may be continued at low group rates to age 65, when it may be converted to any permanent plan of insurance then being offered by the Underwriter, United of Omaha, regardless of the health of the insured person.

The plan also provides many other benefits including waiver of premium for disability, and a choice of convenient settlement options.

Any member of AFA, man or woman, who is not on active duty or in the National Guard or Ready Reserve, and who is between 20 and 60, is eligible to apply except for members who have left military service but still retain AFA Military Group Life Insurance. (Residents of Ohio, New Jersey, Texas, and Wisconsin are not eligible for this group coverage, but may apply for similar coverage at comparable rates.)

Four AFA Group Insurance Plans Help You Provide a Secure Future for Your Family!

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AFA *guaranteed* Flight Pay Protection is available to rated personnel on active duty. This insurance protects active-duty members on flying status against loss of their flight-pay income because of injury or illness. Protection is guaranteed even against preexisting illnesses after a policy has been in force for a period of twelve consecutive months.

Grounded policyholders receive monthly payments equal to eighty percent of their flight pay (tax free) for periods

up to two years if grounding is caused by aviation accident and for periods up to one year for grounding caused by illness. Because they are tax free, these payments are essentially the equivalent of full government flight pay, which is taxable income.

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8/67

Bob Stevens'

"There I was..."

Nothing much has changed in twenty-five years. We are little better than boors when we seek to confound with the facts those of our brethren who have already made up their minds . . .

Scene: A USAAF training base: 1942

AIR CORPS 567, MAKE A 360 OVER KELLY BEACON AND LOSE ONE MINUTE IN SPACING, GO AHEAD—



KELLY TOWER, THIS IS 567, FOR YOUR INFORMATION IT TAKES **TWO** MINUTES TO MAKE A 360!



ROGER 567, THEN MAKE A 180 AND **BACK IN!**



THANKS TO LT. COL. J.A. TALBOT
APO 96553, SAN FRANCISCO

Famous last words:

①

QUIT SWEATING THOSE *6! FUEL GAUGES!! WE'VE GOT A COUPLE HUNDRED WHEN THEY SHOW "EMPTY."



②



IDEA FROM—
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Bob Stevens

OUR NEW GAS TURBINES FOR GENERATOR SETS USE

40%
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Recuperated AiResearch gas turbines are now available for 30 KW and 60 KW generator sets. And they will soon be available for sizes up to 200 KW.

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AiResearch gas turbines for mobile communications and control power generation give you multi-fuel capability, 60% fewer spare parts, far less size and weight, up to 50% less maintenance, and six times the useful life of internal combustion engines. Get the full story from AiResearch Manufacturing Company, 402 S. 36th St., Phoenix, Arizona 85034.



AiResearch
Gas Turbines

Designers with a "make room for invention" philosophy laid the lines for the Phantom. Latest evidence of that foresight is the United States Air Force's new...

F-4E

Youngest Fighter In The Sky

With the first flight of the F-4E, dramatic advancements in engine, armament and fire-control technology have been added to the Phantom.

The F-4E has an internal General Electric multi-barrel rapid-fire cannon, adding an air-to-air and air-to-ground gun capability to the missile, bombing, and rocket capabilities of earlier Phantom models.

The USAF F-4E also introduces an advanced Westinghouse radar, slotted stabilators and other aerodynamic refinements.

Our development teams are continuing to improve the Phantom, keeping the best of what they have, adding the best of what is new, and continuing to demonstrate that mission flexibility is an inherent quality of the growth-oriented Phantom design.

Even as new versions of the Phantom fly, McDonnell Douglas "Anticipation Engineers" are designing advanced "X" fighters for the decades of the Seventies and Eighties. In these, as in the Phantom, structural commonality, multi-mission/multi-nation adaptability, and a "stay young" design will be fundamental characteristics.

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