

AIR FORCE

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

A B M

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LUNAR ORBITER. Designed and built by Boeing for NASA, Lunar Orbiter flew five spectacularly successful moon photo missions to scout landing sites for America's Apollo astronauts. Orbiter's record: Five flights. Five flawless performances.



TUCUMCARI, the U.S. Navy's first hydrofoil gunboat, was designed and built by Boeing. Water-jet propelled and incorporating an advanced foil system, it can "fly" at better than 40 knots and is highly maneuverable, even in heavy weather. In operation since fall, 1967, Tucumcari has "flown" the equivalent of San Francisco-Tokyo and return, and has achieved a near perfect score on schedule reliability.

SATURN 5. NASA's Apollo/Saturn 5 flights, including the recent Apollo 9 mission, start with the firing of the Boeing-built first-stage booster. Largest in the U.S., it produces 7.5 million pounds of thrust. Boeing is also integration and evaluation contractor, and performs systems engineering and launch support for NASA on the entire Saturn 5 system. Record to date: Four flights. Four successes.

MINUTEMAN III's first launch was a complete success. So was Minuteman II's. Minuteman I's was one of the most successful first flights in U.S. missile history. Successful Minuteman launches to date: More than 200. As weapon system integrator, Boeing assembles, tests, installs and delivers the complete missile system to the U.S. Air Force.

BOEING



The bird that Charlie hates



No wonder the enemy hates the Hercules. It just won't quit.

A major target of attack, this Vietnam workhorse — flown by the USAF's TAC — daily keeps setting new airlift records. Keeps delivering, despite the brutal beatings it takes from enemy fire. Or from jolting, rough-field landings. And from grinding hours of constant action.

To survive, it must endure

quick, steep descents and jarring impacts as it hits down on remote airstrips. It has to dodge its way into danger zones, unload up to 20-plus tons of arms, men and supplies, then turn around fast and scoot for home with a new load — hopefully over a flak-free route.

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needs in Southeast Asia. Day in, day out. Around the clock. Getting clobbered but keeping going.

Tight squeezes are routine for Hercules, however. One was even described as “unflyable” after gunfire shattered some control surfaces, ripped apart a wing, and set an engine afire. But the skilled TAC pilot was able to fly it for eight desperate minutes to reach base, and all



on board walked away from the landing.

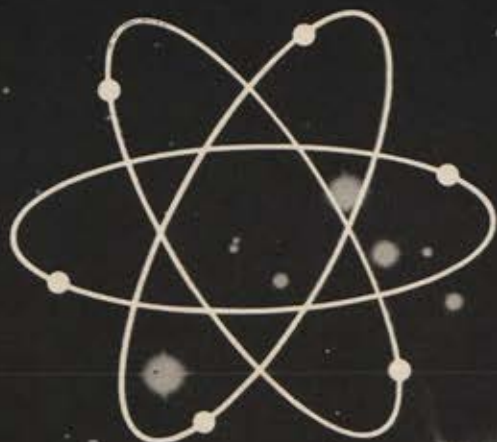
Most remarkable is the way this rugged plane surpasses the expected, so far as needing a rest is concerned. Flying the deadly areas and taking enemy punches all the while, it stays on line for amazing stretches of time.

In Vietnam, one typical Hercules flew more than 386 hours in 28 consecutive days without a single late takeoff!

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and SPACE DIGEST

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VOLUME 52, NUMBER 4

APRIL 1969

- The First Big Decision /** AN EDITORIAL BY JOHN F. LOOSBROCK 9
- Government-Wide Cohesive R&D Policies /** BY EDGAR E. ULSAMER 27
The new Secretary of Transportation, John A. Volpe, promises that DOT will stress mutual help in technological commonality in dealing with such other government agencies as DoD, USAF, and NASA.
- The Fight Over the ABM: Debate or Witch-Hunt? /** BY CLAUDE WITZE 34
The nation has not seen such an intense wave of emotionalism engulf any issue since the troubled era of the late Sen. Joseph McCarthy.
- First All-Purpose Plane Since the DC-3 /** BY EDGAR E. ULSAMER 39
A family of new superjets—the so-called trijets—is coming into being and promises to dominate the airlines in the 1970s.
- Pilot Training—Experience Is the Best Teacher** 42
BY TSgt. GERALD O'HARA, USAF
Seasoned combat veterans are passing along their knowledge and experience to youngsters in the Undergraduate Pilot Training program.

SPACE DIGEST

- Needed: A Beefed-Up Applications-Satellite Program** 49
BY WILLIAM LEAVITT
Even as the Apollo manned spaceflight program proceeded toward its climactic landing on the moon this summer, strong pressures were developing for a vigorous unmanned applications-satellite program.
- The Last Lonely Inch /** BY J. R. ALLIETTA 56
Ninety percent of the world's people conduct three-quarters of the world's business using the metric system. But the US continues to cling to an illogical and outmoded system of measurement.
- Mariner-6—On Course to Mars /** A SPACE DIGEST PHOTO FEATURE 59
While world interest focused on the complex manned Apollo-9 mission, a complex unmanned probe started on its way to Mars.
- Space Debris: Keeping Track of Space Junk /** BY HAROLD R. WILLIAMS 60
Since Sputnik, orbital space has become a junkyard for a sizable collection of man-made hardware. The litter presents some problems.
- Canada's Military Unification—A Progress Report** 72
BY AIR VICE MARSHAL ROBERT A. CAMERON, RCAF (RET.)
A veteran of and expert on Canadian military affairs describes the current state of the armed forces consolidation and contributes some pointed commentary on the progress of unification vis-à-vis the goals set forth by the original planners.
- Such a Nimble Giant /** BY EDGAR E. ULSAMER 79
Aviation writers on a recent press flight were impressed by the maneuverability and takeoff and landing capabilities of the mammoth C-5 Galaxy.
- National Salute to USAF /** BY DON STEELE 88
A special report on AFA's Iron Gate Chapter's sixth annual Banquet and Ball, saluting the Air Force Secretaries and Chiefs of Staff.

DEPARTMENTS

- Airmail 10 Letter from Europe 29
- Airpower in the News 14 Letter from Los Angeles 64
- Aerospace World 21 The Bulletin Board 81
- New Books in Brief 23 Senior Staff Changes 84
- Index to Advertisers 24 AFA News 85





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GOVERNMENT AND INDUSTRIAL DIVISION

The First Big Decision

By John F. Loosbrock

EDITOR, AIR FORCE/SPACE DIGEST

"In proportion as the structure of a government gives force to public opinion, it is essential that public opinion be enlightened."

—George Washington, in his Farewell Address to the nation on leaving the Presidency.

IN Washington's time public opinion was pretty much formed at the top by the intellectual, economic, and political leadership of the country and trickled down via the rudimentary means of communication available—newspapers, pamphlets, letters, and word of mouth. The population was thinly spread. The voting franchise was highly restricted by present standards. The literacy level was low.

The changes that have taken place since serve largely to point up what our first President said. The problem has been compounded and complicated, not solved in any sense. The expansion of the nation in area and in population, the complexity of the economy, the involvement of the United States in the affairs of other nations around the globe, and above all, the real-time reflexes of electronic journalism have not diminished the impact of public opinion on the decision-making process of government. They have only made more people privy to the debate that precedes the decision and, if anything, they have tended to make the public portion of the debate less responsible, in many ways, than ever before.

Even illiteracy no longer is a barrier to communications. Those who can neither read nor write can still see and hear. On succeeding days recently one could see—live and in color on the television screen—the splashdown of the Apollo capsule after ten days in orbit and the President of the United States announcing his resolution of the great ABM debate (see p. 34).

Surely President Nixon would agree wholeheartedly with the words of his distinguished predecessor. His decision on the ABM reflected the overriding necessity, in the highest office in the land, to filter out the noise, the static, the demagoguery from the public discussion. At this writing, the decision looks like an almost perfect compromise politically and a satisfactory resolution of the problem from both the military and the diplomatic points of view. The program is to be continued. But it is to be deployed to protect two wings of SAC's Minuteman missiles. And it is to be subject to continuous review in terms of changes in the threat, impact on arms-control talks, and improvements in technology.

Putting the Sentinel ABM system around large cities never made much sense to us. Psychologically, it only frightened the populations that were to be protected and, for a different reason, frightened those who were not to be so honored. The credibility of our second-strike force, as President Nixon pointed out, is the nub of the matter, and the survivability of the force is critical to its credibility.

Nor did the thesis that a defensive system could be considered provocative ever appeal much to us. Some years ago, we recall, some of the same people who have been criticizing Sentinel as provocative were urging the hardening of missile sites on the grounds that a vulnerable missile system was provocative because it was not survivable. You can't have it both ways.

The hard-core critics won't be appeased, of course. No decision short of scrapping Sentinel entirely would have satisfied them. They are people who simply believe there is no threat or, if there is one, that it can best be dealt with by palaver and concession. They wouldn't buy even a 100 percent perfect, foolproof system.

Nor will the all-out advocates of the offense as the only real defense be happy. But they should be mindful of the implications of the alternative to a reasonable offense-defense mix. Mr. McNamara agreed to a so-called "thin" ABM system only reluctantly and, in our judgment, invented the rationale that it was designed only to cope with the Red Chinese threat with the thought that this would seem so silly as to ensure eventual cancellation of the whole project. But, as the Soviet reaction to the "assured-destruction" policy clearly indicates, going whole hog for the offense only generates offensive activity on the part of the adversary. It is "assured destruction" that is truly provocative. It is not good strategy. It is not good morality.

Beyond the substance of the ABM decision, we are encouraged in still another way. The fact that it was taken in the manner in which it was taken is heartening evidence that the impact of public debate on the decision-making process is not being measured in decibels. Many years ago we used to tell our country-doctor father, to justify some outlandish request, "The wheel that does the squeaking gets the grease." His response always was, "But it's the empty wagon that rattles loudest."

Washington's view on the need for an enlightened public opinion is as valid as when first uttered. It is good to know that heat is not being substituted for light.—END



The Hubbell Plan

Gentlemen: The article by Louis R. Stockstill regarding the Hubbell pay proposals in your March 1969 issue was to me the most enlightening explanation thus far offered on that plan.

Mr. Stockstill is rather critical of the career force for not urging favorable consideration of the proposal through their Congressmen. One point of which Mr. Stockstill may not be aware is the dearth of qualified personnel in the field to provide explanations and to answer questions. His article has answered many questions for me and my associates. However, there is one paramount feature not adequately covered in his article that is vital to the career force E-7, E-8, E-9, O-4, O-5, and O-6 grades; it is evident that we would have to research personal 201 files for old pay records, then work with a calculator to determine how we stand on retirement pay credits five or six years in the future. To these career force grades, this is perhaps a more pertinent thought than one of immediate cash benefits.

When sample charts on retirement, as well as current benefits, are available to the career force, the reaction by that group may well be an avalanche.

Thank you for the finest article I've seen on the proposals.

COL. W. W. RICHARDS, JR.

Commander

Hq. 4444th Recon Tech Gp (TAC)

Langley AFB, Va.

A Time for Reevaluation

Gentlemen: The article by Herman S. Wolk, "The Military-Civilian Defense Team," in the February issue, is most appropriate in that, without a doubt, now is the "time for constructive self-analysis." For the military, the section devoted to their role in policy-making is of the highest merit and not only warrants serious consideration by those in high-level staff positions, but it also cogently expresses why they must "think deeply about the fundamental interactions of international politics." Steps have been taken to ensure that service academy graduates

are aware of the complexities of today's global political, economic, and military environment. Senior service schools also make an effort to orient upcoming staff officers as to the many facets of planning and decision-making in our time.

However, it would appear that much of what the military has developed over the past decade in the area of plans and programs was nothing more than an academic exercise simply because it was not "relevant to the developing world situation." It is time for the military to properly exercise the talent which exists in the upper-echelon staffs and accept, where practicable, what those intellects can produce: that which is more in consonance with present and future national requirements. This should be encouraged though it breaks with long-established practice or tradition.

As to Mr. Wolk's very refreshing comments in the sections concerning computers and committees, I can only add a hearty amen. All in all, an outstanding article, lucidly written and of great value to those who should care. Much of what Mr. Wolk presented paralleled Mr. Henry A. Kissinger's thoughts (*The Necessity for Choice*) from which I quote: "A society, if it is to remain vital, must be forever alert lest it confuse creativity with projecting the familiar into the future."

COL. PETER E. BOYES

Myrtle Beach AFB, S.C.

ERTS in the '70s

Gentlemen: The opinion of TRW people is that the article titled "Satellites to Gather Earth-Resources Data" [by Irving Stone] in the February 1969 issue of *AIR FORCE/SPACE DIGEST* is an excellent review of the Earth Resources Program elements and the sensor instruments that apply to earth-resources space missions.

Congratulations on putting together correct, concise, and readable information on a difficult subject.

DONALD M. WALTZ

Space Vehicles Division

TRW Systems

Redondo Beach, Calif.

Test—and Test Again

Gentlemen: . . . [The] logic that there is a need for a more intensive effort toward designing, building, and flying a greater number of prototype aircraft is sound ["There's No Substitute for Flight Testing," by J. S. Butz, Jr., February issue]. . . . We learn by doing, and the leap from paper studies to production models of the highly complex flying machines that today's technology permits is a great leap into uncertainty. Equally unwise is the leap from these same paper studies to a prototype per se.

I'm quite sure you realize that Richard Whitcomb's great area-rule concept, and now the supercritical wing concept, did not spring from paper work alone. Surely the theory was applied and tested, and changed, and tested in wind tunnels until that theory was proved to the point of becoming a practical and technically feasible reality when translated to a full-scale, real-world flying machine. The old NACA and now NASA have done a tremendous job in their area of research, albeit at times all too little effort could be applied to aerodynamic and air-breathing work because of the pressures of the rocket and space age.

Applying the proof-tested theory of such work as Whitcomb has done in laying down the basic design of a new aircraft makes fine technical sense. There's another loop in the development link, however, that smart technical people will use en route to that first takeoff from the test runway.

Gen. Hap Arnold, Dr. Theodore von Kármán, and many other wise men of the late 1940s foresaw this need when they went to the Congress and gained approval for the establishment of the National Unitary Wind Tunnel Plan and the Air Engineering Development Center (AEDC) in 1949. Since then, the now Arnold Engineering Development Center has grown to a capital plant worth over \$400 million with thirty-nine test units that can be offered for use by USAF and the other services, other government agencies, and industry. . . .

(Continued on page 13)

SCIENCE/SCOPE

The largest and most powerful communications satellite launched to date was put into synchronous orbit February 9 over the Pacific. Built for the Department of Defense by Hughes, the 1600-pound experimental giant is two stories tall and more than eight feet in diameter. It is so powerful its signals can be received by all types of ground terminals, including those with antennas as small as one foot in diameter. It will be used by the Army, Navy and Air Force to determine the feasibility of using synchronous satellites for tactical communications with small mobile ground stations, aircraft, and ships at sea.

Undergoing space test for the first time is a new concept of spacecraft stabilization called Gyrostat. It enables the DOD satellite -- despite its enormous size and weight -- to spin on its minor axis so that its mechanically "de-spun" cluster of antennas is always pointed toward earth. Construction of the new satellite was directed by the U.S. Air Force Space and Missile System Organization (SAMSO).

A small, speedy, fourth-generation computer, designed to meet the military's highly sophisticated command-and-control requirements in the 1970s and beyond, is being built by Hughes under a multi-million-dollar company-funded program. Basic size is only $4\frac{1}{2}$ cubic feet. It will handle up to five million operations a second and store up to 256,000 words in its memory, and is designed for modular expansion in both hardware and software to meet changing requirements.

A new pictorial area-navigation system is being tested by United Air Lines on its Chicago-New York and Chicago-Minneapolis routes. The Hughes-developed Navigation Director System, with its compact digital computer, uses 35mm film to project navigational charts on a cockpit display.

The seven-inch-diameter screen displays a moving map upon which are superimposed a symbol for the aircraft and all navigational guidance information. System enables pilots to plan a desired course to destination and shows aircraft position and guidance in relation to it. Additional features include display readouts of ground speed, distance, and "time-to-go" to selected check points or destination

Brazil's first satellite communications ground station, which was inaugurated February 28, was built by Hughes under contract with Embratel, Brazil's telecommunications agency. The station will handle 120 two-way broadcasts via Intelsat satellites currently in operation over the Atlantic. Other services available include telegraph, facsimile, and telex. The Brazilian station is expected to be integrated into the 64-nation communications satellite system of the International Telecommunications Satellite Consortium (INTELSAT).

NASA's Project Viking plans to softland an unmanned spacecraft on Mars in 1973. The project calls for two 5,000-lb. spacecraft consisting of a Surveyor-type softlander and a Mars/Mariner orbiter, and will use a Titan 3D-Centaur launch vehicle. One of the softlander's missions will be to determine whether extra-terrestrial life exists. Hughes, member of the Project Viking industrial team formed by Boeing, designed and built the five Surveyor spacecraft that landed on the moon to pave the way for Apollo astronauts.

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There is really little reason why first flights should run into major unexpected problems such as unexpected drag, the inertia coupling effects, or the low-speed control difficulties. . . . Why in the world are these areas not more thoroughly investigated, analyzed from sound experimental data (not just theory), and proof tested en route to first flight when engineering development facilities are available with which to do just that? The great concept and considerable technological advantages of the Skybolt were for all practical purposes scuttled for lack of adequate environmental proof testing which could have prevented its dismal flight performance record. The LR 87 liquid core of Titan III would, in fact, not have ignited at altitude either had its sponsors not caught and solved the problem in environmental test cells before flight—and so the record goes.

I personally spent a good part of my service career in analyzing and understanding Russian design philosophy and the application of that philosophy through the entire development process leading to hardware acquisition. The Russians can't afford to try every idea that comes along, and, therefore, they are very practical realists who must get as much for their R&D ruble as possible. Believe me, there are good and practical reasons why they prototype, and furthermore, why they realize a significant number of first-flight successes. They are great believers in extensive and large environmental test facilities, and they don't shy away for fiscal or other reasons from using the biggest and best facilities that their nation has to offer. It is here that they examine the proof of materials, proof of design, and proof of performance that is necessary for the safety and success of that first flight. It is here that anyone should stop, and change, and check, until hardware can pass the final exam of a full mission duty cycle analysis with real data in an environment similar to what it will see in flight.

You probably recall the recent delay in the supersonic transport development schedule while further wind-tunnel work was done to pin down some slippery technical parameters. A most astute move, and the proper time to solve major problems with probable savings in big dollars and much time later on. General Maxwell and his crew are certainly to be commended. There are some other programs, however, where the rollout or first-flight dates became so highly important as an end objective that the

time or dollars for proper environmental test evaluation just could not be spared. I submit that we cannot afford not to do that environmental testing which is necessary for quality assurance in flight, and I urge using the biggest and best facilities that the nation has to offer for this purpose. To do less is surely stepping over dollars to pick up pennies.

Let's put the values on *performance* of those prototypes and not on superficial goals such as rollout dates or first-flight dates. Furthermore, let's ensure the environmental proof testing of our hardware before we cob the throttle for takeoff. Then let's add to our environmental test facilities as the growing needs of an expanding technology dictate. To do less, or to lean solely on smaller industrial facilities for the big answers to today's big problems is foolhardy.

COL. LEONARD T. GLASER,
USAF (RET.)
Consultant
AEDC
Arnold AFS, Tenn.

UNIT REUNIONS

11th Bomb Group (H) Association

The 9th annual national reunion of the 11th Bomb Group (H) Association, Pacific Theater, 1940 through 1945, will be held in Las Vegas, Nev., June 22 through 26, 1969.

Robert E. May, Sec'y-Treas.
P.O. Box 11
Perrysburg, Ohio 43551

P-47 Thunderbolt Fighter Pilots

The 7th annual reunion of the P-47 Thunderbolt Pilots Association, World War II, will be held at the Wings Club, Hotel Biltmore, 43d & Madison Ave., New York, N.Y., on May 2 and 3. For further information contact

Bob Forrest
P-47 President
16 Overhill Dr.
Madison, N.J. 07940

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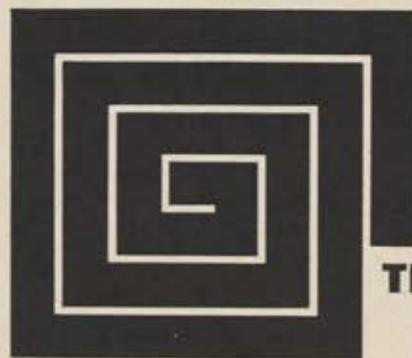
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By Claude Witze

SENIOR EDITOR, AIR FORCE/SPACE DIGEST

A Textbook, for Forty Cents

WASHINGTON, D. C., MARCH 12

For all the brickbats and balderdash flying around the capital these cold and windy days, it still is possible to spot tiny little islands of discretion and common sense. The utterly mad things being said in the discussion about the ABM, which degenerated at most points into a witch-hunt, as described elsewhere in this magazine, make an occasional stab at statesmanship look as high as the Washington Monument.

One example is the unchallenged position of the new Administration, voiced by both the President and his Secretary of Defense, in favor of talking if we can find someone to listen. "We are in an era of negotiation, and we hope the era of confrontation has passed," is the word from the White House and the Pentagon. It is an expression of optimism, to be sure, and there is no man, in uniform or out, who favors confrontation instead of negotiation. Mr. Nixon has said he considers the State and Defense Departments to be Departments of Peace, which means their mission is to resort to bargaining, not to bullets and bombs.

On the horizon, it appears possible that we may have some new diplomatic business with the Russians, despite what we know about their military and space programs, and their open assistance to our enemies in such places as Korea and North Vietnam. The coup in Czechoslovakia was repulsive to the American people, but no more so than the suppression of dissent in Russia itself. Their jails still are crowded.

This whole business of negotiating with the Russians can be as baffling to the average citizen as the abracadabra of tomorrow's weaponry. Senator Henry M. Jackson, who is chairman of a Senate Subcommittee on National Security and International Operations, points out that we have had a good deal of experience with these people, most of it during World War II and in the immediate postwar period. On the theory that it might be useful to distill out of this record what insights have been provided, his staff has compiled a ninety-two-page booklet called "The Soviet Approach to Negotiation: Selected Writings." Copies are available from the Superintendent of Documents, US Government Printing Office, Washington, D. C. 20402. The price is forty cents.

In it, the reader will find some observations by the Russians themselves, but, as Mr. Jackson points out, they are "primitive" and "do not go beyond the superficial and formal discussion of the process of negotiation as viewed from Moscow."

The American contributions, on the other hand, are incisive, but a bit out of date. The Senator hopes, among other things, that his reprint will inspire some new work in the area.

Professor Philip E. Mosely of Columbia University, who worked at the State Department from 1942 to 1946, says that when you start negotiations at anything but the summit, the first thing you have to find out is whether the Soviet representatives have any instructions at all. To do this, you must sit through the entire proceeding, "with its

demands, insults, and rigidities and its always uncertain outcome...."

He found that Soviet experts and diplomats cannot take part in everyday conversations and exchanges, because they can't say anything until they have instructions from Moscow; when they get the instructions they can only repeat what the Kremlin said, with no variation.

Professor Mosely also found that the word *compromise* "is not of native origin and carries with it no favorable empathy. Russians use it only in combination with *putrid*." The Western idea of compromise is "alien to the Bolshevik way of thinking" and to Communist discipline.

Dean Acheson, also quoted in the selections, agrees and cites a case in which he discovered none of his oral proposals had been sent to Moscow. The reason was that his opponent, Mr. Vyshinsky, could not do this without being accused at home of being impressed by what he heard.

Mr. Acheson also dismisses curtly the concept that "as long as we keep them talking, they're not fighting." This, he says, is not so. They are fighting all the time. "They are adopting a tactic specifically prescribed by Lenin to delay the crises while demoralizing and weakening the enemy.... In the present century the Soviet state has perfected



Senator Henry M. Jackson (D-Wash.) offers a concise handbook on how to deal with the Russians. Based on past experiences, it gives the expert view on various pitfalls and perils.

the use of negotiation, including negotiation by mass conference, as a method of warfare...."

He concludes that the Western powers should go to conferences with the Russians, "but it is an illusion to expect much from them, or to identify them with the process of negotiation, in the usual sense of the word."

Another sample comes from Arthur H. Dean, who has wide experience dealing with Communists, including his job as head of the US delegation to the Disarmament and Nuclear Test Ban Negotiations, 1961-1963. He believes the Russian diplomat, stern and denunciatory in formal sessions with large delegations, can be cordial and reasonable in private, off-the-record meetings.

Mr. Dean also says that if we want to arrest the proliferation of nuclear weapons, we must examine the basic political relations of East and West, which are more important to success than the discussions at a conference.

There is nothing in the volume of selections, of course, from the Paris meetings with North Vietnam. That remains an unprinted chapter.

Slowly, the Slots Are Filled

In mid-February, Defense Secretary Melvin R. Laird announced eight more selections for policy-making positions in his Pentagon family, including three for the Air Force. Here are the recent choices:

- John L. McLucas to be Undersecretary of the Air Force. He will replace Townsend Hoopes. Dr. McLucas, like Robert C. Seamans, Jr., the new Air Force Secretary, is no stranger to this branch of the service. He has been serving as President of the MITRE Corp., Bedford, Mass., a major USAF contractor and nonprofit technical adviser, specializing in electronic problems. In the previous Administration, from 1962 to 1964, he was Deputy Director of Defense Research and Engineering for Tactical Warfare Programs, an area in which USAF will make important decisions in the next few years. Dr. McLucas also has been President of HRB-Singer, Inc., and Assistant Secretary General for Scientific Affairs at NATO headquarters in Paris. He was born in Fayetteville, N. C., in 1920, and was educated at Davidson College, Tulane University, and Pennsylvania State University, where he took his Ph.D. in physics in 1950. He served in the Navy in World War II as a radar officer.

- Curtis W. Tarr to be Assistant Secretary of the Air Force (Manpower and Reserve Affairs). Dr. Tarr will replace J. William Doolittle. He has been President of Lawrence University in Appleton, Wis. An educator with some political interests, Dr. Tarr has been an Assistant Dean at Stanford University and an instructor at Harvard. He has had some business experience as vice president of a manufacturing plant in California and once served as a member of the staff of the Hoover Commission. He ran for Congress in 1958. A native of Stockton, Calif., he is in his forty-fifth year. He was educated at Stanford and Harvard.

- Grant L. Hansen to be Assistant Secretary of the Air Force (Research and Development). He succeeds Dr. Alexander Flax, who has left the Pentagon to join the staff of the Institute for Defense Analyses. Mr. Hansen comes from the aerospace industry, where he was employed most recently as vice president for launch vehicle programs of the Convair Division, General Dynamics Corp., in San Diego, Calif. He had been with Convair since 1960, and before that worked for the Douglas Aircraft Co. His experience with military weaponry goes back at least to 1948, when he was test conductor for the Nike program at White Sands Proving Grounds. He served five years in the Navy in World War II as an electronics technician and engineer. Following this, he graduated from the Illinois Institute of Technology. He is an associate fellow of the American Institute of Aeronautics and Astronautics. He is forty-seven years old.

- Dr. G. Warren Nutter to be Assistant Secretary of Defense (International Security Affairs). He will replace Paul C. Warnke. Dr. Nutter is chairman of the department of economics and director of the Thomas Jefferson Center for Political Economy at the University of Virginia. He also has been a professor at Yale. Previous government service by Dr. Nutter was with the Central Intelligence Agency in 1952 and 1953. A native of Kansas, he is forty-six years old and holds A.B., M.A., and Ph.D. degrees from the University of Chicago. He served in the Army in World War II as an enlisted man and fought in France, Germany, and Austria.

- Thaddeus R. Beal to be Undersecretary of the Army. He succeeds David E. McGiffert. Mr. Beal is President and Chief Executive Officer of the Harvard Trust Co., of Cambridge, Mass. He was for many years associated with a Boston law firm. He was born in New York in 1917, graduated from Yale, and took his law degree at Harvard. He served in the Naval Reserve from 1941 to 1945.

- James D. Hittle to be Assistant Secretary of the Navy (Manpower and Reserve Affairs). A retired Marine Corps brigadier general, his military career ran from 1937 to 1960, including service in both the Atlantic and Pacific areas in World War II. Most recently, General Hittle has been a special counsel to the Senate Armed Services Committee. Also a journalist, he has worked as a columnist for the Copley News Service and a commentator for the Mutual Broadcasting System. While in uniform, he was assistant for legislative affairs to Defense Secretary Thomas S. Gates in the last Republican Administration, and legislative assistant to the Commandant of the Marine Corps. General Hittle was born in Michigan in 1910 and graduated from Michigan State University in 1937. During his military career, in 1952, he won a master's degree from the University of Utah. In his new position, General Hittle will replace Randolph S. Driver.

- William K. Brehm to continue in his post as Assistant Secretary of the Army (Manpower and Reserve Affairs). He has been in this position since April of last year. Before that, he was in the office of the Assistant Secretary of De-



Defense Secretary Melvin R. Laird (left) administers the oath of office to Dr. Robert C. Seamans, Jr., Secretary of the Air Force in the new Administration. Mrs. Seamans, in center, the Secretary's five children, and a large group of DoD officials witnessed the February 15 Pentagon ceremony.

fense (Systems Analysis) and served as Deputy Assistant Secretary of Defense for Land Forces Programs. Earlier, Mr. Brehm was corporate director of development planning for North American Aviation, Inc.; executive staff assistant to the Vice President for Planning, Convair Division, General Dynamics Corp.; and a research associate at the Engineering Research Institute, University of Michigan. He was born in Michigan in 1929 and graduated from the University of Michigan with both the B.S. and M.S. degrees.

- Eugene M. Becker to continue as Assistant Secretary of the Army (Financial Management). Mr. Becker has been in this office since June 1967. He came to the Pentagon from New York, where he was Director of the Budget for Mayor John Lindsay. He also has been employed as director of information on municipal securities for the Investment Bankers Association of America and Assistant Vice President of the First National City Bank of New York. He is a vice president of the Carnegie Hall Corp. in New York. A native of Minnesota, he is thirty-eight years old and has degrees from Colgate and Princeton Universities, including a Ph.D. in cultural history and archaeology. He has studied at the University of Paris as a Ful-

(Continued on following page)



Mr. Laird introduces nine members of his new family. First row, from left: Roger T. Kelley, G. Warren Nutter, Thaddeus R. Beal, John L. McLucas, James Hittle. Back row, also left to right, are Curtis W. Tarr, Grant L. Hansen, William K. Brehm, and Eugene M. Becker. The nominations were made on behalf of President Nixon. Full titles of the appointees are in the accompanying text.

—Wide World Photos

bright scholar. He served with the US Army in Europe from 1954 to 1956.

These latest selections leave, at this writing, only five policy-making posts for which Mr. Laird has not named a selection. One of these is the Pentagon's General Counsel, a post now filled by Leonard Niederlehner, whose title is Deputy General Counsel. Technically, the top slot remains open. Other vacancies remaining are for two assistant secretaries of the Army—Installations and Logistics and Research and Development—and two assistant secretaries of the Air Force—Installations and Logistics and Financial Management. Of the twenty-three jobs filled so far, ten are occupied by veterans of the Johnson-McNamara-Clifford Administration.

Among the holdovers, most prominent are the Secretary of the Army, Stanley R. Resor; the Director of Defense Research and Engineering, John S. Foster, Jr.; the Comptroller, Robert C. Moot; and the Assistant Secretary of Defense for Installations and Logistics, Barry J. Shillito. Mr. Shillito served previously as Assistant Secretary of the Navy for Installations and Logistics.

Also, Daniel Henkin is serving as Acting Assistant Sec-

retary for Public Affairs, and Ivan Sellin is Acting Assistant Secretary for Systems Analysis.

Among the newcomers to the Pentagon, not previously mentioned, are:

- David R. Packard as Deputy Secretary of Defense.
- Robert F. Froehlke as Assistant Secretary of Defense for Administration.
- Roger T. Kelley as Assistant Secretary of Defense for Manpower and Reserve Affairs.
- John H. Chafee, former Governor of Rhode Island, as Secretary of the Navy.
- John W. Warner, a Washington attorney, as Undersecretary of the Navy.
- Frank Sanders, from the staff of the House Committee on Appropriations, to be Assistant Secretary of the Navy (Installations and Logistics).
- Robert A. Frosch to continue as Assistant Secretary of the Navy (Research and Development).
- Charles A. Bowsheer to continue as Assistant Secretary of the Navy (Financial Management).
- Robert C. Seamans, Jr., Secretary of the Air Force, as announced in last month's AF/SD.—END

New USAF Assistant Secretary for Manpower and Reserve Affairs is Dr. Curtis W. Tarr, former President of Lawrence University in Appleton, Wis. He will replace J. William Doolittle.



John L. McLucas, a man long associated with USAF problems, is the new Undersecretary of the Air Force. He has been President of MITRE Corp., and served previously in the Pentagon.

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An Aerospace
Capabilities
Report on
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A brief walk through some of the individual Beech facilities gives a suggestion of how big Beech really is... but only a suggestion. We hope we can tell you enough here to make you want to know more about the men, their tools, and the work they have done. So let's walk...

In Wichita...

Beech Plant I in Wichita has 1,283,245 square feet devoted to experimental and line production. The manufacturing and test facilities located here are specifically designed to match aviation and aerospace industry requirements. Associated with this plant, and the hub of all Beech activities, are the Beech Aircraft Corporation executive offices.

Plant II in Wichita houses 125,706 square feet of mass production facilities for world-famous Beechcraft private, business, and military aircraft.

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Located near Plant I in Wichita, the Beechcraft Activity Center is for the use of Beech employees. It has a spacious cafeteria, private dining rooms, a large ballroom, and stage. These facilities, used by everyone at Beech, are symbolic of the happy Beech labor-management relationship.

Liberal...

In the Liberal, Kansas, plants, located on a large municipal airport, the popular Beechcraft Musketeers are built. It's nearly 100,000 square feet of work area is also used for fabrication and sub-assembly of a wide variety of Beech manufacturing needs. Liberal has great potential for expansion.



Wichita, Kansas, Plant I



Wichita, Kansas, Plant II



Beechcraft Activity Center



Wichita, Kansas, Plant III



Liberal, Kansas, Plant

Salina...

The Salina, Kansas, plant, home for production of the Beech Target Missile Systems, is located on 3,300 acres with a jet airport. It is near the intersection of two Interstate highways and has through rail lines serving 4 railroads. There are 441,198 square feet of modern manufacturing floor space with six acres under one roof. Existing facilities include an isolated hazardous storage and assembly area originally designed for maintenance of the Atlas missile and its nuclear warhead, for which this site is still fully qualified. Unlimited utilities—gas, water and electric—and a surplus of high-quality labor combine with the huge space to make expansion capabilities in Salina nearly unlimited.

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Salina, Kansas, Plants



Boulder... Environmental Testing



Boulder... Manufacturing



Boulder... Hazardous Testing



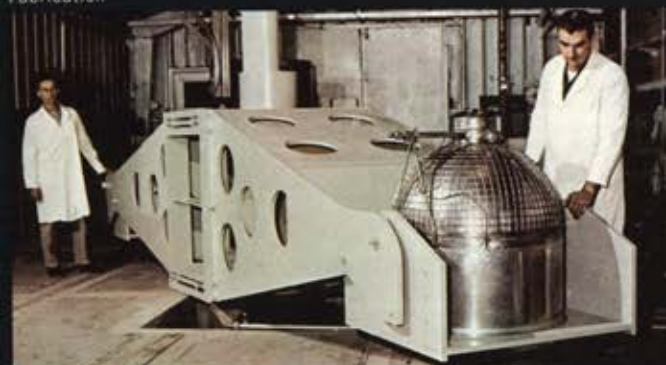
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By William P. Schlitz

NEWS EDITOR, AIR FORCE/SPACE DIGEST

When the 2,000-pound projectiles come crashing down on an unsuspecting enemy encampment in Vietnam they bring devastation and terror.

Then a small aircraft appears overhead and lays down a storm of leaflets.

"Attention, enemy soldiers," the leaflets say, "You have just been under attack from the guns of the US Navy battleship *New Jersey*. You have seen the destruction that attack caused to your bunkers and fortifications. In a few minutes the attack will resume. The only way to save your lives is to surrender now. Give yourselves up and you will be well treated. Surrender quickly—you have only minutes!"

The operation described above is the newest trick in the psychological warfare bag; in this case it is the product of a joint Army-Navy-Air Force team effort that employs the *New Jersey*, Army-prepared leaflets and ground forces, and O-2B Super Skymasters of the 14th Special Operations Wing stationed at Nha Trang Air Base.

The Wing is composed of the 5th and the 9th Special Operations Squadrons, headquartered at Nha Trang but with small detachments scattered throughout the country as needed. The men of these units provide all Air Force psywar operations in Southeast Asia. The 5th is equipped with U-10 Helio Courier short take-off and landing aircraft and C-47s. The 9th flies the O-2Bs and C-47s. Both units rely on two basic tools to get their message across to the enemy: leaflet drops and tapes played over loudspeaker systems. Army psywar personnel prepare the tapes and leaflets.

Because of the nature of the Vietnam War it is impossible to gauge with complete accuracy the effect that psywar operations have on the enemy. But some figures are available.

In 1967, 24,000 "returnees" came over, according to the Air Force psywar people. These carried leaflets or spoke of the loudspeaker transmissions. Early in 1968 the disruptive Tet offensive cut deeply into the "return" rate, and the yearly total was put at 18,000, with the later months attain-

ing returnee rates higher than those of the previous year.

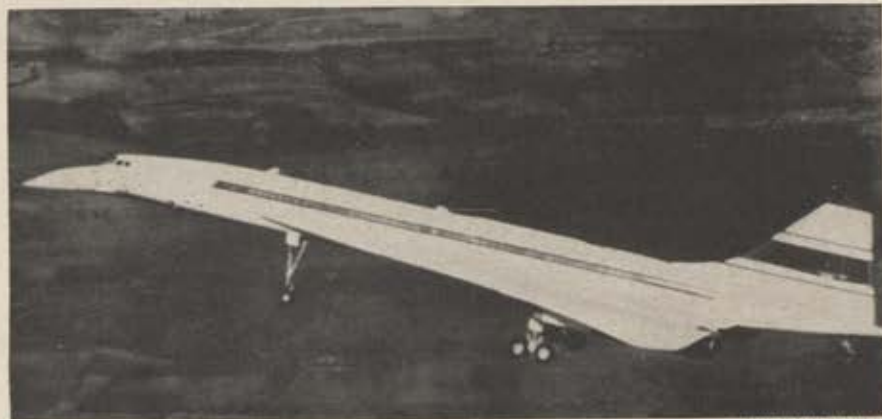
No measurement can be made, of course, of such intangibles as the effect of psywar activities on enemy morale or on the over-all desertion rate, but the psywar personnel move quickly to take advantage of every opportunity that presents itself.

Such was the case during the battle late in February near the Bien Hoa Air Base. The previous day leaflets had been dropped on positions

in the area believed occupied by the 5th VC Division, composed primarily of North Vietnamese troops.

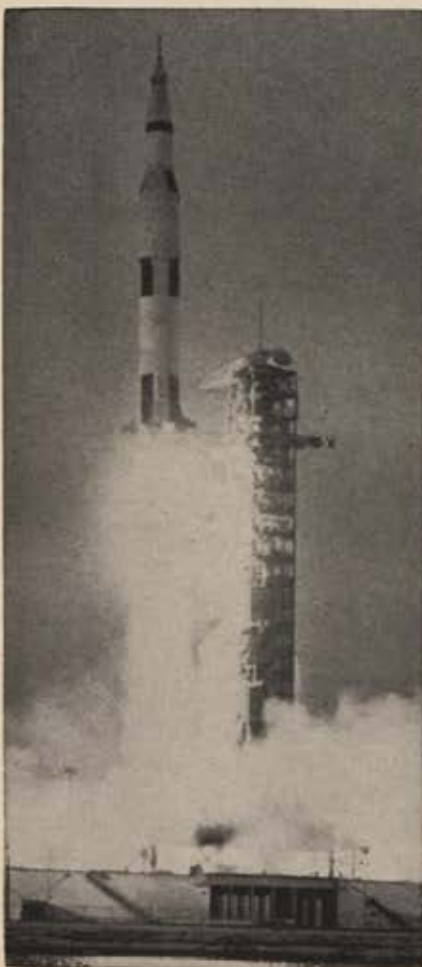
One NV soldier carrying a leaflet gave himself up and agreed to record a tape urging surrender to be played by aircraft to his comrades. Later, among a group of suspects detained was an NV officer, also carrying a leaflet who also agreed to make a tape. Both tapes and new leaflets describing the two men's capitulation
(Continued on following page)

A young soldier holds on to his hat as an F-100 Supersabre from Bien Hoa AB swoops in at tree-top level on a bombing run in a close-support mission for elements of the 1st Air Cavalry Division engaging the enemy northwest of Saigon.



—Wide World Photos

The Western world's first supersonic airliner, the British-French Concorde, in its maiden flight over the countryside at Toulouse, France. The March 2 flight, which lasted twenty-seven minutes, was the first in a planned three-year series of tests. The huge four-engine aircraft did not attain speeds of more than 350 miles per hour although it has been designed to fly at 1,400 mph in service use.



Off to a flaming start is Apollo/Saturn V space vehicle carrying Apollo-9 Astronauts James McDivitt, David Scott, and Russell Schweickart on ten-day earth orbital mission that began March 3. During the mission the problem that caused most concern was Astronaut Schweickart's illness (see story below).

were disseminated to the enemy while the battle was still raging.



Astronauts are human. If any evidence was needed, crewman Russell Schweickart's illness in orbit during the Apollo-9 mission provided it.

From all accounts, there was a big flap at the NASA Manned Spacecraft Center at Houston once ground controllers heard from mission commander James McDivitt that Schweickart had vomited after taking a motion-sickness pill. It was over whether the press, and world, should be told.

The illness messages were transmitted from orbit to ground control on a "private line"—in keeping with Apollo physician Dr. Charles Berry's view that, just as on earth, the right to a private patient-doctor relationship ought to be honored. That seemed reasonable enough. But the decision by MSC chief Robert Gilruth to para-

phrase the private conversations for the covering press corps was questioned by some of his colleagues.

The question had to be referred by phone to Washington for decision by NASA's new Administrator, Dr. Thomas O. Paine. He went along with Mr. Gilruth's policy, and the press was told of the illness and given a summary of the conversations between Apollo-9 and ground control.

The discord marred an otherwise virtually perfect mission, in which the capability of the never-before-space-tested Lunar Module (previously called the Lunar Excursion Module but "excursion" seemed frivolous to those handling nomenclature) to separate and rendezvous with the Apollo mother ship was demonstrated. That capability is crucial to the success of the eventual landing mission.

Also demonstrated was the ability of astronauts to operate independently of life-support umbilical lines, using completely separate life-support backpacks—the eighty-pound portable life-support system astronauts will wear on the moon.

The performance of the Lunar Module, which has had many developmental problems, was excellent. What was achieved in orbit amounted, in terms of path and distance during the separation, to a close simulation of what the module will have to do during the landing mission—descend for the landing and later ascend and

hook up with the orbiting mother ship so that transfer for the voyage to earth can take place. Under present schedules, two more missions lie ahead: Apollo-10, in which three astronauts will fly to the moon and go into orbit, after which two of them will take the Lunar Module down close to the moon's surface without landing and then return to rendezvous with the mother ship for the trip home. After that: Apollo-11, presumed to be the landing mission.

Indisposition has dogged Apollo-7, -8, and -9. There remains the serious question of the cause of these physical upsets, aside from the problem of public disclosure of them.



Another exercise to test the "rapid-reaction capability" of forces based in the US to augment friendly forces in areas under Communist attack took place in March forty miles from Seoul, South Korea.

The operation, called Focus Retina, was conducted at least partially to reassure the South Koreans, who have had to contend with a resurgence of infiltration through the DMZ since 1967 and following the *Pueblo* affair. It also was assumed the operation would not be lost on North Korea, although it was kept well away from the DMZ.

Focus Retina was directed by the US Strike Command and involved



Scheduled to participate in the Paris Air Show (see page 24) that is to begin May 29 is the Swedish Air Force's new STOL multipurpose combat aircraft, the SAAB 37 Viggen, which will arrive at Le Bourget Airport on June 2. On June 7 and 8, the Viggen will be flown by SAAB's chief test pilot, Capt. Eric Dahlström, in several demonstration flights. The Viggen aircraft that is to participate in the Paris show is one of five prototypes now undergoing a series of flight tests.

about 2,500 military personnel from the continental US. The Military Airlift Command directed the airlift part of the exercise from headquarters at Scott AFB, Ill. Seventy-seven C-141s and other MAC aircraft used Pope AFB, N. C., as the on-load base.

Two battalions of the 82d Airborne Division from Ft. Bragg, N. C., near Pope, participated in the exercise with both ground landings and parachute drops. In fact, the operation, spanning 8,500 miles, was billed as the "longest airborne assault in history" and was the first exercise of its type to take place in South Korea, the Air Force said.

The airborne units linked up with ROK troops and US forces that are stationed in Korea and engaged in war games involving a total of about 7,000 men.

Focus Retina originally had been planned for late last year but was delayed presumably because of budgetary problems. In recent years similar exercises have been conducted in Iran, Turkey, Greece, Norway, and Germany.

Also in March, twelve USAF F-4D Phantoms from the 4th Tactical Fighter Wing, Seymour Johnson AFB, N. C., participated as air support forces during Big Boy 69, Norway's winter training exercises for ground forces.



Under initial Air Force funding for a preproduction effort, Northrop Corp.



—Wide World Photos

The second Boeing 747 superjet to roll off the assembly line dwarfs what was once the largest jetliner ever flown, Boeing's Intercontinental Model 707. The new 747 jumbojet, designed to carry as many as 490 passengers or one hundred tons of cargo for distances of 6,000 miles, currently is undergoing an extensive testing program that is not expected to be concluded until the end of 1969.

is building an advanced version of its multipurpose F-5 fighter. The new configuration, bearing the company designation of F-5-21, will feature two 5,000-pound-thrust General Electric J85-GE-21 jets, providing approximately twenty-five percent more thrust than the 4,080-pound-thrust units in the F-5A and -B aircraft currently operational.

Takeoff weight for the F-5-21 will be 15,050 pounds in a clean configuration and 24,140 pounds with an external load. Takeoff distance for these

conditions is 2,050 feet and 5,500 feet, respectively—twenty-two and thirty-three percent improvements, respectively, over the F-5A.

Sea level rate of climb will be 35,200 feet per minute—a twenty-three percent increase. And maximum speed in level flight is projected for Mach 1.6, a fourteen percent improvement. Peak sustained turn rate at 15,000 feet has been increased seventeen percent—an important consideration in "dogfight" encounters—over
(Continued on following page)

NEW BOOKS IN BRIEF

The Art of Winning Wars, by Col. James Mrazek, USA (Ret.). Creativity, says the author in this readable book, is the stuff great leaders are made of. He regrets that our emphasis on tradition and regulation has stifled the versatility that is the guerrilla's greatest weapon. Walker & Co., N. Y. 218 pages. \$6.50.

The Future of Conservatism, by M. Stanton Evans. Rather than reviewing the tenets and philosophy of conservatism, the author analyzes election results, economic factors, party lines, and trends of thought in different age groups and sections of the country. From these, he predicts increasing growth for conservative power. Holt, Rinehart and Winston, N. Y. 304 pages. \$5.95.

The Learning Society, by Robert M. Hutchins. Current educational issues are not the topic here, but the future and direction of education. Dr. Hutchins emphasizes that institutions must redefine their aim to humanize students, rather than turn out fancier contributions to an industrialized nation-state. Praeger, N. Y. 142 pages. \$4.50.

Middle East Politics: The Military Dimension, by J. C. Hurewitz. This scholarly work examines in depth the historical evolution and operating philosophies of civil-military relations and the American and Soviet influences on each of eighteen states in that region. Bibliography and index. Praeger, N. Y. 553 pages. \$11.50.

Nagasaki: The Forgotten Bomb, by Frank W. Chinnock. The story of history's second A-bomb, till now largely obscured by the earlier bombing of Hiroshima and the Japanese surrender, which followed Nagasaki, is well told largely through the recollections of those who survived. World Publishing Co., Cleveland, Ohio. 304 pages. \$6.95.

The Secret War for Europe, by Louis Hagen. "Espionage, after the threat of nuclear war, is today the strongest contributor to . . . the peace of the world." This thesis is illustrated with stories of spy incidents since WW II. Stein and Day, N. Y. 287 pages. \$5.95.

A Sense of Asia, by Sol Sanders. A Far East reporter for twenty years, Mr. Sanders presents a knowledgeable analysis of domestic Asian crises and of America's role in them—that of a revolutionary catalyst that cannot and should not be withdrawn. With index and photos. Scribners, N. Y. 339 pages. \$7.95.

UFOs? YES!, by David R. Saunders and Roger Harkins. According to the two authors, who were fired from the Colorado UFO project, that study has tried hard to disguise its negative prejudice, to credit itself with objectivity, and to hush the raging dissent among its participants. An interesting complement to the report. World Publishing Co., Cleveland, Ohio. 256 pages. \$5.95.

—MARIA T. ESTEVEZ



Northrop engineers working on an advanced version of the F-5 fighter for the Air Force. The new configuration, designated the F-5-21, will feature two 5,000-pound-thrust GE J85-GE-21 jets that are to provide about twenty-five percent more thrust than the engines in the F-5A and -B.

the F-5s now flying. Minimum sustained turn radius at 15,000 feet is increased thirty-nine percent. Ferry range with tanks retained will be 1,735 nautical miles and 2,070 nautical miles with tanks dropped—increases of forty-three and forty-five percent, respectively.

An F-5B model has been fitted with the new 5,000-pound-thrust powerplants and enlarged ducting at Edwards AFB, Calif., and is scheduled to fly this month. This engine-test aircraft will not incorporate all the improvements to be funneled into the F-5-21, not scheduled to fly until mid-1970 for initial tests. Northrop plans to exhibit the engine-demonstration aircraft at the Paris Air Show next month.

The F-5-21 is projected for allied nation service under the US Military Assistance Program or for purchase by these nations as a relatively low-cost fighter. The aircraft is targeted to counteract the impact inherent in the Soviet MIG-21 fighter now in service with many nations.

In the new F-5-21 configuration, numerous improvements will be incorporated, many of which already have been proved in the current F-5s. The F-5-21 will feature an enlarged inlet

and duct system, increased internal fuel capacity (616 gallons) with fire-depressant foam capability, increased wing area, and three increased-capacity (each 275 gallons) pylon tanks.



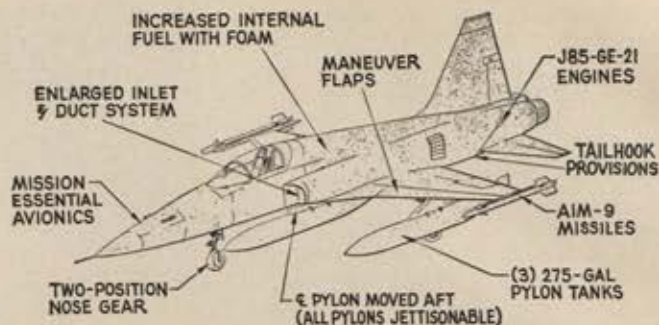
The big scene stealer of the first Paris Air Show in 1909 was an aircraft of French manufacture, the Bleriot monoplane. It had flown the English Channel.

And now sixty years later, the US aerospace industry and various governmental agencies have geared up to participate in the twenty-eighth Paris Air Show, due to open May 29 at Le Bourget Airport near Paris.

This time, with world attention riveted on US space efforts, the major attraction promises to be the presence of several US astronauts and a dazzling display of their hardware, including a Command Module used in a recent Apollo flight.

Appropriate enough, then, is the theme selected for the American pavilion—that of "Countdown Apollo"—for the pavilion's space exhibit will illustrate each step of an Apollo flight, including a lunar landing.

North American Rockwell and Grumman, two basic Apollo contrac-



The F-5-21 is to incorporate numerous improvements that already have been proved in current F-5 versions, now in the service of some fifteen foreign nations. The new model is to have wider intake ducts, wing area increased by about eight percent, and more fuel capacity for pylon tanks.

tors, are to display a host of Apollo equipment never before shown to the public, and other US companies are to demonstrate many products and processes developed with the space age in mind.

On view at the show also will be Boeing's 747 jumbojet, among thirty-five civil and military aircraft scheduled to be exhibited for the first time in a unified area, under ground and flight coordination of the Department of Transportation.

US officials optimistically anticipate resulting sales of about \$40 million, up from an estimated \$25 million generated by the previous show in 1967. About fifty-nine US manufacturers have reserved pavilion space.

Although the Department of Defense has declined to participate directly in the show, it will contribute operational support and aircraft, mainly helicopters and transports, without the emphasis on high-performance fighters of previous years.

Up to now the Soviet Union, as usual, has left everyone guessing as to whether or not it will trundle up its supersonic transport for exhibition.



Ended recently was a month-long



INDEX TO ADVERTISERS

Advanced Technology Consultants Corp.	13
Beech Aircraft Corp.	17-20
Bell Aerosystems Co.	12
Bell Helicopter Co.	70 and 71
Boeing Co., The	1
Caterpillar Tractor Co.	32 and 33
Honeywell, Inc., Aerospace & Defense Group	6 and 7
Hughes Aircraft Co.	11
Hydro-Aire Div., Crane Co.	26
Lockheed Aircraft Corp.	2 and 3
LTV Electrosystems, Inc.	4

Magnavox Co., The, Government & Industrial Div.	8
McDonnell Douglas Corp.	Cover 4
Northern Radio Co.	25
Pratt & Whitney Aircraft Div., United Aircraft Corp.	46 and 47
Ryan Aeronautical Co.	Cover 3
Sikorsky Aircraft Div., United Aircraft Corp.	62 and 63
Sperry Rand Corp., Univac Div.	Cover 2
TRW Systems Group	54 and 55
Vega Precision Laboratories	69
Vitro Corp. of America	48

international conference held in Washington aimed at trying to set up a single satellite system for worldwide communications.

About eighty nations were represented at the conference but the big surprise was the attendance of Russia and the Eastern bloc countries, which have been in the process of building a separate network.

Whether these nations will join in a single global comsat project remains to be seen; the weightiest stumbling block to such a move from their viewpoint is that the established system, Intelsat, is dominated by the US through the Communications Satellite Corp. (Comsat), which has ownership and vote of fifty-three percent and manages the system.

This situation also is under contention by various Western European countries, which are angling to have control turned over to some sort of international organization.

The inclusion of the Eastern bloc nations, of course, would mean the elimination of duplication and rivalry inherent in constructing two global systems. Also important is that it might be technically impossible to communicate between two such systems.



Visiting in the US to deliver a series of talks was retired Japanese Gen. Minoru Genda, until recently chief of staff of the Japanese Air Self-Defense Force. He now serves in House of Councillors. General Genda was a key figure in the Japanese navy in WW II and helped plan the Pearl Harbor surprise attack.



The Intelsat net, with sixty-five member countries, currently provides telephone, radio, telegraph, and TV service via four satellites, two each over the Pacific and Atlantic. A fifth satellite is scheduled to be launched for positioning over the Indian Ocean shortly. Ways also are being examined to expand service into aviation and maritime communications.

According to officials, the US is agreeable to giving the smaller na-

tions a bigger say in Intelsat affairs but is adamant about maintaining Comsat control, because of the complexity of the undertaking.



Of concern for some time has been the profound effect that solar disturbances have on communications, navigation, and radar detection. Such solar activity produces a phenomenon peculiar (Continued on following page)

For Military, Commercial and General Aviation



New! N-420 SSB Communication System

The N-420 was designed to provide reliable HF SSB communications on 34 channels USB/LSB/AME minimum power output 200 watts pep 50 watt AME. The system consists of the TR-420 Transceiver, CU-420 Antenna Coupler and C-420 Control Unit, shown above in its actual size.

The N-420 features are modular construction, light weight, ease of maintenance, and compatibility with

almost any fixed wire antenna design. Field testing has proven that the N-420 meets and exceeds its design parameters. For complete information contact:

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PUMPAD

"Hytrol, Hytrol, Hytrol. I'm getting sick and tired of only hearing about Hytrol Anti-Skid Braking Systems."

We looked up from our typewriter which contained an unfinished ad about Hytrol, only to be impaled by the steel gray glare of the Project Manager for Hydro-Aire Fuel Booster and Transfer Pumps.

"All this brake control stuff is giving my people a group inferiority complex. They're even talking about designing a non-skid pump to get in on the glory."

Here we go again, we thought. Everybody's an ad man. No use telling the guy that he's got nothing newsworthy. Give him a little rope. He'll find out for himself. So we invited him to open up.

And he did.

"You could say that we've built about as many pumps over the years

as anyone. And we've built a far broader range of pumps in-house than anybody; AC or DC powered, turbine, hydraulic motor and engine driven; liquid coolant pumps for space technology and so forth.

"And because it's been so long since you've written about us, you've probably forgotten that in 1954 we turned this industry right on its ear with the lightest, the most reliable and the highest performance aircraft booster pump ever built. Okay, that was 1954. Today, we build a commercial aircraft booster and transfer pump that gives the same performance with less than half the weight and size of the 1954 model. How's that for what you fellows call technological progress?"

We took a deep breath. But to interrupt was hopeless. He loosened his tie and jumped up on our desk.

"I haven't finished. Let's talk about reliability. With pumps, that means shaft and bearings. Well, in over fifteen years, on all those thousands of pumps—or is it hundreds of thousands—we've never had to depart from our original design and construction of the shaft and bearings. With all those millions of service hours. How's that for reliability?"

His face was now bright pink. Eyes slightly glazed.

"You can also write about the fact that our pump design programs are now assisted by computer programming. On our own IBM 360. We program pump motor performance and other design parameters. And we have brand new updated test facilities.

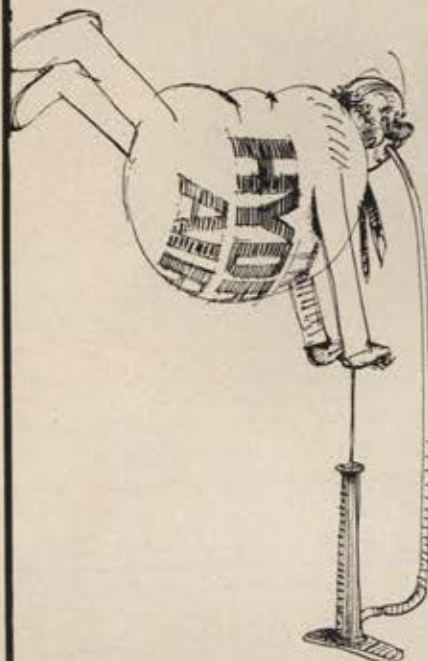
"Now if all that is not very exciting to you, you might just mention that we have fourteen of our pumps on the Boeing 747. The Superjet. Low weight pumps that use less power than any others; that have a highly efficient new liquid seal priming element; that have easily replaced unitized internal parts.

"And finally..."

"You might say we're going after some more business. And you could allude to the L-500, the L-1011 and the DC-10. And you could put in some other buzz words and stuff. And say that we have some surprises in store. Now I don't know too much about advertising..."

That's when he fell off the desk.

"Oh, yes," he looked up. "You might mention we're just half a block from Lockheed and twenty minutes on a traffic clear day from McDonnell-Douglas. And no other pump maker can make that statement either. . . ."



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Fuel Pumps & Valves, Hydraulic Motors & Pumps, Electro-Hydraulic Controls, Temperature Control & Coolant Systems

WORLD CONTINUED



German AF instructor pilot Maj. Peter Cramer gets a warm greeting from his wife Ilse at Luke AFB, Ariz., recently in surprise to honor his 1,000th hour in Lockheed F-104G Starfighter—the Major's 2,000th mission since 1957.

liar to the Arctic region called polar cap absorption (PCA), which is the result of high-energy protons entering deep into the atmosphere along Arctic magnetic lines, and so changing it that radio propagation is interfered with.

By studying PCA, scientists hope to be able to develop techniques to predict the intensity and duration of communications blackouts, which can occur on a global scale.

This summer, an intensive study of PCA will be undertaken by personnel from the Air Force Cambridge Research Laboratories, the US Army Ballistic Research Lab, and the Defense Atomic Support Agency.

Immediately upon the onset of a PCA event, scientists will begin launch of thirty-six research rockets instrumented to measure a wide array of atmospheric conditions and radio transmission properties.

The rockets—Nike Iroquois, Black Brants, Nike Javelins, and Arcas—all will be launched within a thirty-six-hour period from the Churchill Research Range, Manitoba, Canada. No launch schedule of this magnitude has been attempted before.

The Churchill facility, operated by the National Research Council of Canada, and financed jointly by Canada and NASA, has become one of the largest rocket launch sites in North America.

The sun currently is in the active phase of an eleven-year sunspot cycle, the solar energy from which is expected to have pronounced effects on the earth's environment.—END

Cooperation in R&D and mutual assistance in technological commonality will be stressed by the Department of Transportation in dealing with such other government agencies as DoD, USAF, and NASA. Participation by the Secretary of the Air Force in the current intergovernmental evaluation of the SST program is typical of a new era in . . .

Government-Wide Cohesive R&D Policies

By Edgar E. Ulsamer

ASSOCIATE EDITOR, AIR FORCE/SPACE DIGEST

EMULATION of methods and techniques conceived and developed by the Air Force seems to be in the cards for the Department of Transportation which, among other tasks, oversees civil aviation, furnishes air traffic control, allocates use of the airways for military as well as civil aviation, and shares in the national aeronautical R&D effort.

The new Secretary of Transportation, John A. Volpe, in an interview with AF/SD, affirmed that he plans "a far greater utilization of more talent from outside the Department in the research and technology fields" for long-term systems planning and development. "I can see an [nonprofit, nongovernmental] organization in the development field coming into being relatively soon," he explained, "to plan and develop not for one or two years ahead, but to create the system which we will need in ten or fifteen years." Patterned after such Air Force-oriented nonprofits as Aerospace Corp. and MITRE Corp., this proposed aviation development corporation might take charge of all long-term total systems planning and thereby prevent the planning failures which have induced the present crisis level in commercial aviation, Secretary Volpe said.

By contrast, Mr. Volpe, a former governor of Massachusetts and former Federal Highway Commissioner, characterized as "a long-range proposition, something I don't think we will be able to resolve this year" the possible creation of an "over-all corporation which could partially do the operational job the Federal Aviation Administration is doing now." Such an approach (*see AF/SD March '69, page 43*) has been proposed by the Assistant Secretary of Transportation

for Policy and International Affairs, Dr. Paul Cherington. Secretary Volpe acknowledged that an independent agency, structured along the lines of the publicly owned Comsat Corp. and charged with operation of the airways/airport system, may well have merit eventually.

The new Secretary of Transportation stressed that he will intensify and expand the research, technology, and systems planning efforts of his department and that he will do so in consonance and close cooperation with other government departments, especially the Department of Defense and the National Aeronautics and Space Administration.

"First off," he said, "we will be doing a more far-reaching job in research and development, as well as technology, right here in DOT. I feel that every dollar spent on R&T pays big dividends in value received later on. We probably would not be in the critical traffic congestion we are in now had more work been done when the first signs of saturation were manifested."

DOT's new Assistant Secretary for Research and Technology, Secor D. Browne, and FAA Administrator John H. Shaffer, a former TRW, Inc., Vice President, will, along with other experts yet to be added to the staff, help upgrade the R&D effort, according to Mr. Volpe.

The naming of NASA's former Associate Administrator for Research and Technology, James M. Beggs, to be DOT's Undersecretary will facilitate coordinated R&D programming with NASA, and reflects DOT's new, stronger technological and systems engineering orientation, Secretary Volpe said.

(Continued on following page)

Secretary of Transportation John A. Volpe plans to stress intergovernmental cooperation and coordination in the national aeronautical R&D effort, including "a far greater utilization of more talent from outside the Department [of Transportation]."



Assistant Secretary of Transportation for Policy and International Affairs Dr. Paul W. Cherington has proposed utilization of a nongovernmental organization to assist in the development of the airways/airport system patterned on the relationship of the Air Force with MITRE Corp. and the Aerospace Corp.



Also, he emphasized, "my close personal friendship with [Secretary of Defense] Mel Laird will help maintain the strongest possible ties with DoD" and result in far greater cooperation between the two Departments than has been the case in the past.

As for the mix between in-house R&D effort and commissioning such work with other government agencies or industry, Secretary Volpe said no exact determination has as yet been made other than that "we are looking for a happy medium."

He termed as symptomatic of the Nixon Administration's policy of government-wide cooperation in the technology field the current reevaluation effort of the SST program. "The President, who names the members of this group charged with conducting the final reevaluation, will include a high-ranking representative of the Department of Defense so that we will have the full benefit of DoD's thinking on what value the SST program may have from a military point of view." (Secretary of the Air Force Robert C. Seamans, Jr., has since been named to the SST review panel, which is chaired by DOT's Undersecretary James M. Beggs.) The previous Administration had categorically denied that the SST program had any direct or indirect value from the standpoint of defense—a position often questioned privately by many military and civilian leaders.

Mr. Volpe explained that cooperation with other government agencies in terms of R&D effort initially would consist "of far greater coordination to make certain that whatever one agency does is made available to all the others with similar technical concerns." Further, he stated, the technological spin-off potential would be given greater weight than in the past, including possible joint efforts. One of these areas, he said, might be the Light Intratheater Transport (a V/STOL design as envisioned at this time), which, in the view of the Air Force, may have direct civilian application. "It is vital that all agencies have full inputs into programs which promise to spin off technology of value to them," he stated.

As for DOT's most pressing problem, a pending decision on how vitally needed funds for the airways/airport system should be obtained, Secretary Volpe said the new Administration had "not yet totally committed" itself, in spite of seemingly favoring the aviation user fund system. The previous Administration generally had favored funneling taxes derived from aviation activities into the government's general fund. Indus-



DOT Secretary Volpe, left, congratulates new FAA Administrator, John H. Shaffer, a former vice president of TRW and eleven-year veteran of USAF. A lieutenant colonel and combat pilot, he worked on B-47 and B-50 programs.

try, by contrast, had urged adoption of a pay-as-you-go taxation, feeding a special fund patterned after that created by President Eisenhower to pay for the Interstate Highway System. Advocates of this approach cite the requirement of having to raise anywhere between \$7 billion and \$11 billion to accommodate civil aviation's needs and growth within the next decade—an amount Congress is not likely to make available in time without clear schedules for capitalization borne by the users.

"If you want to get a job done," Secretary Volpe said in support of the user fund, "you have to set [incremental] target dates and spell out how and when you want to reach your objectives. It helps if you have a constant source of revenue available to carry out these objectives. While I am not committing myself to a user-charge policy at this moment, it probably is the method which best ensures achieving the expected goals. . . . However, I am open to other approaches."

The Department of Transportation at this time is reevaluating the proposed severe curtailment of air traffic in the eastern part of the country, but as yet has not been able to decide whether such a rationing of aircraft movements will have to go into effect this summer or not, he said. Secretary Volpe stressed that while DOT, under his stewardship, would be most sympathetic toward rescinding any restrictive regulations concerning commercial and general aviation, he would under no circumstances compromise safety considerations. "To the contrary, we will, if anything, be even more stringent on all matters pertaining to the safety of flight," he pointed out.

Over-all, Secretary Volpe said, the Department's top-priority problem is aviation, both in "its short-term and long-term aspects." Stressing that other forms of transportation may pose serious problems, he said that "our cities may strangle in traffic problems but they won't strangle this year. In the case of air [transportation], however, if you don't act in a relatively few months, this is exactly what will happen. . . . The team we are assembling here will see that action is taken in time," he emphasized.—END

The appointment of former NASA Associate Administrator for Research and Technology James M. Beggs as Undersecretary reflects, according to Mr. Volpe, DOT's new, stronger technological and systems engineering orientation.





By Stefan Geisenheyner

AIR FORCE/SPACE DIGEST EDITOR FOR EUROPE

Britain's Aerospace Industry Maps Its Future

A plan for the future of Britain's aerospace industry was published by the Society of British Aerospace Companies (SBAC) on February 7. SBAC is the traditional spokesman for more than 450 British aviation and space firms. The plan is unique in that it is the first time in Britain's industrial history that a national industry, speaking with one voice, has produced a blueprint for its projects and programs, planning ahead for more than a decade and counting on the British government to adopt its aims.

The paper, which runs to over 6,000 words, surveys in depth the industry's contribution to the national economy and technology, and concludes with a list of projects it says should be realized in order to reap the most benefits for Britain and its aerospace industry.

A number of highlights from this paper centering on military projects are of special interest. Recommended is that development of the VTOL Harrier fighter-bomber and the Jaguar trainer-fighter be continued, leading eventually to hardware that should appeal to all European nations and that should contain enough additional flexibility to create a worldwide market for the aircraft throughout the 1970s.

For instance, the paper notes, an advanced combat aircraft to replace the F-104G, the Canberra (B-57), the Buccaneer, and ultimately the Phantom II should be ready for entry into service in the second half of the 1970s. The RAF and the air forces of other European NATO nations will be faced with an updating of their flying equipment by that time. In the early '80s the same aircraft could appeal to other nations that today have relatively advanced and modern air forces. Therefore, the plan insists, it is of utmost importance that such a program for a new aircraft be undertaken soon, since there is a likely chance the demand will be filled by the US aerospace industry, which is driving for the same markets.

Other than this advanced combat aircraft, SBAC's blueprint proposes an advanced supersonic trainer with limited battlefield capability, military front-line transports including tactical support helicopters, and a replacement for the present generation of light primary jet trainers in use throughout the world.

SBAC's plan puts particular emphasis on the projection of new engines for use in the next decade. The British engine industry holds a unique position in the current world market in that its engine designs power many foreign-built aircraft, and SBAC believes that vigorous steps should be taken to maintain this position.

Although British airframe designers have the unquestionable right to look for the best engine for their products on a worldwide basis, British engine manufacturers should be given the first opportunity to offer engines for all aircraft manufactured in the UK, SBAC believes. Furthermore, British-designed engines should be developed specifically for foreign aircraft when the opportunity arises.

The policy of many foreign governments precludes the acquisition of British-manufactured airframes but this does not extend to engine purchases and, therefore, it is both

technically and commercially desirable for the British engine industry to compete in these markets, the paper contends.

The blueprint points out that military engine programs provide the best basis for advanced hardware. For instance, the engine for the above-mentioned European advanced combat aircraft should be built in Britain so that the nation's industry can compete technically with the advanced engines being developed by the US's Pratt & Whitney and General Electric for the FX aircraft under study for the US Navy and USAF.

The experience gained during construction of such an engine for the European aircraft, especially that concerning the very high temperature and pressure phenomena, is essential for the construction of modern engines for civilian use. SBAC's plan envisions that VTOL aircraft will be required in large numbers both for military and civilian use in the late '70s. Particular emphasis should be put, therefore, on development of engines suitable for VTOL opera-

(Continued on following page)



The British aero-engine industry has been most successful in its export efforts. The Rolls-Royce RB.211 shown in this picture is slated to power Lockheed's 1011 airbus. This turbopan is of a novel three-shaft design offering much improved maintenance conditions, excellent economy, and relatively uncomplicated construction. Engines of this type hold the promising prospect of helping to maintain British manufacturers' leadership in the field of jet engines.

LETTER FROM EUROPE

tions so that Britain's industry maintains its present lead in this field.

Finally, SBAC believes a sound R&D program aimed at far-reaching goals must be established. Noise reduction, temperature technology aerodynamics, and new materials are emphasized as sectors that should receive particular attention.

In the guided weapons field, SBAC recommends several new projects considered essential to national defense that also would be marketable abroad. The blueprint calls for continued development of surface-to-air guided weapons for ground and ship defense against aircraft and missiles at all altitudes.

The ability to offer a complete range of weapon systems that covers the entire altitude spectrum is a central reason for Britain's present export lead in this field. SBAC suggests specifically the development of a new high-altitude weapon system if continued high export figures for missiles are to be maintained. Additionally, SBAC mentions the necessity to develop an effective ship-to-ship missile system together with a new air defense weapon for small vessels.

To complete SBAC's list are particulars concerning a new antitank missile, standoff tactical strike weapons, and a short-range tactical missile that doubles as a ground-to-ground and ground-to-air weapon.

In this whole field SBAC recommends continued applied research to ensure the formulation of realistic and smooth-running programs covering research, development, and subsequent production.

The entire paper, which also contains material covering civil aircraft, space efforts, and equipment, is of considerable interest. The adoption of its guidelines by the British government certainly would contribute greatly to the establishment of a healthy aerospace industry on the old continent.

None of the relatively small European nations currently is capable of sustaining an aviation industry strong enough to compete successfully with the US or USSR's aerospace



The VTOL fighter-bomber Hawker Siddeley "Harrier" is currently the most promising product of the British aerospace industry. About one hundred of this type are on order for the RAF. Future improved versions of the aircraft are expected to rack up sales throughout the Western world.

efforts. Close cooperation on a multinational level and based on sound planning would give Europe the opportunity for a revival of its prewar standing in the aviation world. The British aerospace industry's blueprint for its future has come at a time that may prove crucial to the aerospace industry in Britain and in Europe.

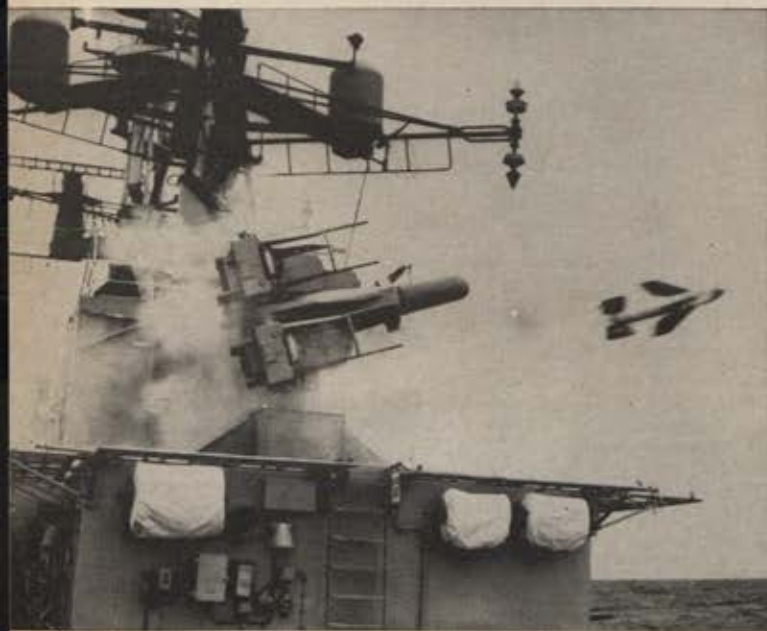
Messerschmitt-Boelkow's BO-105

For several years Messerschmitt-Boelkow, a Munich-based company, has been working on the design and development of a light multipurpose helicopter suitable for military as well as civilian use. The aircraft, which features several novel design components, has progressed now to the series production stage, and first deliveries are to take place this year.

The BO-105 is a light aircraft in the two-ton class. It is equipped with a jointless rotor system using Boelkow-developed bonded glass-fiber blades. The blades have been tested extensively on other helicopter designs and were found to possess an extremely high life span, the company reports. The rotor hub is made of titanium, and two MAN-Turbo 6022-A3 shaft turbines of 375-hp takeoff rating power the aircraft.

The company describes the turbines as of a simple rugged design that will run on anything from aviation gas to kerosene. A top speed of 156 mph can be attained and the helicopter will climb at six feet per minute on one engine, according to MB. Empty weight is 2,354 pounds, and a total payload of 2,706 pounds can be carried over 400 miles. The jointless rotor system gives the helicopter an excellent stability in the air, MB says. Greater shifts of the center of gravity will not impair the unusually good flying properties.

From the outset the BO-105 has been planned as a true multipurpose aircraft. It is accessible from the front as well as through a large rear loading door. As an ambulance it can carry the pilot, a doctor or attendant, and two stretcher cases. For military use, the rear loading door can be removed and weapons—machine guns or aiming devices for guided missiles—can be installed. As a light transport helicopter it will comfortably seat five persons, MB says.



Fourteen navies throughout the world use the British-made Short "Seacat" close-quarter air-defense guided missile, which also has limited ship-to-ship capability. SBAC's blueprint envisions continued development of the weapon. The photo shows the missile being fired from HMAS Yarra.

So far the BO-105 has proved a success. Even before the series production had started, thirty orders and options had been booked. But most promising for the future seems to be Boeing/Vertol's decision to acquire one BO-105 for demonstration purposes in the US. Vertol also has taken an option to manufacture the helicopter in the US under license. Boeing/Vertol's BO-105 project manager is Mr. Robert Titus, who headed the company's branch in Bad Godesberg, Germany, for several years.

Russia, Czechoslovakia, and Uranium

It has long been somewhat of a mystery precisely why the USSR invaded Czechoslovakia in late August of last year. To the Western mind at least, the irrational behavior of the Russians was attributed since to a variety of motives all centering around military and political factors of a relatively short-range nature. But none of the theories put forward seemed to justify the severity of the Soviet move.

Early this year a new theory originated in NATO headquarters which offers a very acceptable solution. Uranium, necessary for all nuclear research and construction of atomic weapons, is a rare commodity in the Soviet Union but is available in quantity in the CSSR. The USSR obviously could not afford to lose these resources to the West.

It seems surprising that in the vast territory of the USSR few rich uranium deposits are in evidence. They are located near Lake Baikal in the region of Kazachinskoye and Slyudyanka. The mines, however, are not sufficient to satisfy



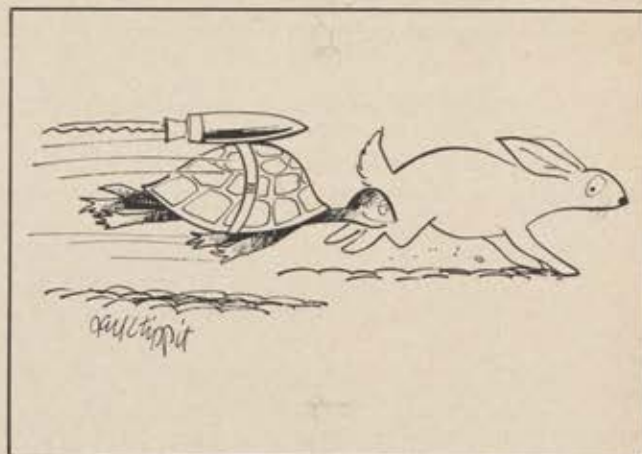
The BO-105 utility helicopter is the first larger German rotorcraft design. The two-ton helicopter features two engines and a rigid rotor. Its performance figures are exceptionally good. Boeing/Vertol has worked out an agreement to manufacture and sell the BO-105 in the US.

the steadily increasing demand for uranium ore by Russia's civilian and military programs.

The USSR, therefore, had to locate or develop other sources. Radioactive substances, for instance, can be extracted from sea water, and an industrial complex to do this is in operation at the Pechora River delta, east of the Kola peninsula. But this is costly and inefficient just as is another process—that to extract uranium from monazite-rich sands in Tashkent. Monazite contains uranium in spurious amounts and processing it is difficult.

All such processes yield low-grade uranium in minimal quantities and at extremely high cost. The discovery, appropriation, and exploitation of other uranium sources, therefore, became mandatory if the USSR were to keep its excellent position in the nuclear arms race.

From the very beginning of the Soviet expansion in 1945,



the uranium mines in conquered lands or territories allied to her were put under jurisdiction of the USSR. Soviet engineers and workers plus a great number of slave laborers exploited uranium deposits wherever discovered. This also was true even for sources yielding only low-grade ore in limited quantities.

For instance, in Bulgaria such a mine is still in operation where only twenty-five Soviet workers dig for a minimal daily amount of ore. In Poland a somewhat larger mine is exploited exclusively for the USSR, and in Hungary a mine near Pesc is likewise Russian property. Other mines are worked in Romania in the Transylvania mountain range and in Eastern Germany near the Czech border.

However, the major uranium deposits found in the East bloc were located in Czechoslovakia, near Carlsbad and Joachimsthal, in Příbram, east of Pilsen and Ilmeno-Rutil. Some Czech sources claim that about thirty fully loaded freight trains rolled eastward daily in the late 1950s. In the early 1960s the mines were exhausted of their low-grade ore and the flow of uranium to the USSR dwindled to a trickle. It became urgent to discover new deposits.

At that critical moment, when the USSR's nuclear program was about to experience a slowdown, a political possibility offered itself which could—if properly handled—relieve the USSR for a long time of any uranium supply problem. The Congo had gained its independence from Belgium and the rich uranium mines of Katanga were available to the power that could gain the friendship of the new Congolese government.

East and West fought bitterly for this goal. When the champion of the USSR, Lumumba, was assassinated by the rebel regime of Katanga, it became clear that the Russians had lost and that Katanga would cater to Western needs for uranium.

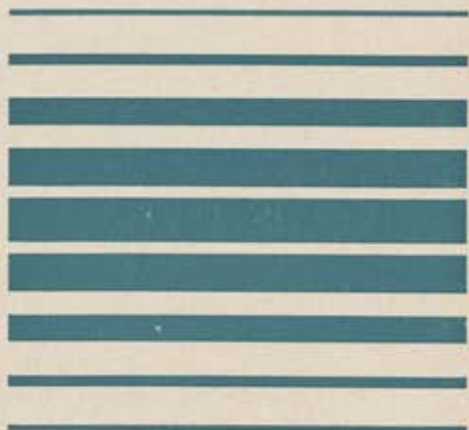
Russia's hopes of finding another uranium source outside the East bloc vanished. Just when the situation became desperate, new uranium deposits were discovered in Czechoslovakia.

Today uranium ore of high quality is mined in quantity in the Bohemian Forest, at Kutná Hora, southeast of Prague, and in the mountain ranges dividing the country from Eastern Germany. In view of the Soviet desperation for uranium, the explanation that the USSR could not allow a defection of Czechoslovakia certainly is plausible. It is known today that the Czechs did not intend any major breaking of ties, but the danger alone was sufficient to send the Red Army to protect major uranium deposits.—END



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President Nixon has decided on the limited deployment of an antiballistic missile system. The nation has not seen such an intense wave of emotionalism engulf any issue since the troubled era of Joseph McCarthy. Much of the criticism of ABM deployment seemed to dismiss the most relevant factor—the importance of an ABM system to national security. Since that criterion should be a prerequisite to any proposed national defense project, and since responsible evaluation and criticism are vital to the national interest, the matter raises a serious question concerning . . .

AIR FORCE

APRIL, 1969

The Fight Over the ABM: Debate or Witch-Hunt?

By Claude Witze

SENIOR EDITOR, AIR FORCE/SPACE DIGEST

IN THE fortnight that preceded President Nixon's final hours of travail over the decision to deploy an antiballistic missile (ABM) system, Washington was the scene of an ideological uprising unmatched in the memory of this generation.

To begin with, there was no *debate* about the ABM issue. Some people called it a debate. In truth, it was a verbal orgasm staged by frustrated critics of all that is military, who saw in ABM a "war figure." Their flagellation of this image brought out the worst in otherwise calm and sensible men. For sheer unreasonableness, the things they said have had no equal in this capital since attorney Joseph Welch, moved to tears during the so-called Army-McCarthy hearings, asked Senator Joseph McCarthy if he had no shame.

It should not be necessary to point this out again, but the lines, if there were any, were drawn between those who would spend money on social security and those who would spend it on national security. Yet, that generality, like all generalities, is false. There were traditional liberals, or at least men who never falter when it is time to vote funds for liberal causes, who looked at the threat and said we must start on ABM. There were men, reputed for years to be reactionaries, who screamed epithets at the military-industrial complex and pictured the Pentagon as a monstrous coliseum full of war-makers.

The press did not distinguish itself. There were moments when genuine news was thrown into the laps of reporters and they (or their editors) ignored it while their personal sympathies interfered with the flow of professional juices.

The outstanding example of this came on February 20, when Melvin Laird, Secretary of Defense, testified before the Senate Foreign Relations Committee. He spoke there about the Fractional Orbital Bombard-

ment System (FOBS), known to be under development in Russia. He spoke of it as "... the new FOBS system, which is being *deployed* by the Soviet Union at this time" (*emphasis added*).

Not many days later, on March 2, Senator Henry M. Jackson appeared on "Meet the Press." There he was grilled by a less than friendly reporter from the *New York Times*, who wanted to know why ABM deployment should not be delayed while we seek an arms agreement with the Russians. One of the reasons Mr. Jackson cited was FOBS, and he said, "They [the Soviets] have now *deployed* that system, which is a first-strike system, not a retaliatory system."

If there has been a headline announcing that Russia is deploying a system capable of putting bombs in orbit, in violation of an already-existing treaty, it has not been in any American newspaper that we have seen.

While we are on the subject, Senator Jackson, who has an untarnished liberal record on spending for social welfare programs, and who never has made a speech in favor of water pollution, or ghetto living, or war itself, also told "Meet the Press" that the Russians are continuing to improve their own ABM system and have it now in the "third phase of deployment." This is a deployment program that started in 1962. Further, he said they are building Polaris-type submarines in series production, "which was something we had not anticipated as of six months ago."

That was more news, but, like the FOBS item, not designed for the anti-ABM scenario.

Mr. Jackson also said he believes that "on a military basis and on a diplomatic basis . . . we must move ahead in order to protect the security of the United States and not leave this country naked." Later, he added that "the Soviet Union is the one that has accelerated this race. They are the ones that moved first on the ABM. I think if they really have no first-

strike intentions they should not complain about the right of each side to protect their own deterrent, and this is what we are trying to do."

The Senator placed great emphasis on this factor of deterrent protection. On the subject of agreement with the Russians at this time, he came up with the suggestion that an agreement on ABM deployment, or nondeployment, might be the "best hope." Even there, there are problems because Moscow seems to be orienting its ABM to cover a possible Chinese attack in the 1970s. In the area of pure speculation, Mr. Jackson feels "maybe they would be willing to reach an agreement with us whereby there would be a limitation as to the number of ABMs which would cover them in connection with an irrational move on the part of the Chinese Communists against Russia as well as against our own country."

It is since his appearance on "Meet the Press" that the Sino-Soviet pot has started to boil over with serious border incidents and anti-Chinese demonstrations in Moscow. Mr. Jackson has not been asked for a revised opinion.

The *Congressional Record* contains a paucity of support for the ABM, such as that given to the TV audience by the Senator from Washington. In both the Senate and the House, the floor time was taken up almost exclusively by the incensed opponents, the men former Defense Secretary Clark Clifford characterized as "primarily concerned with the economic and social costs of the program" as contrasted with those "who are primarily concerned with the threat." Even what the opponents said, however, was not fully reported in the press. The oversights, significantly, included accounts of the most unbalanced opinions placed in the *Record*.

One of these has to be the astounding speech made in the House of Representatives on February 26 by Representative Bertram L. Podell, a liberal Democrat from New York City. It is impossible to improve on his own language:

"The military-industrial complex of this country," he said, "is preparing its greatest coup, one that will make all previous robbery of the public purse seem like petty thievery. I refer, of course, to the ABM



—Wide World Photos

Dr. Daniel Fink, former Deputy Director of Research and Engineering for the Defense Department, testified before the Senate Foreign Relations Committee. He fears a delay in the ABM program because of Soviet advances in weaponry.



—LePelley in *The Christian Science Monitor*; © TCSPS
"OKAY, WHERE DO YOU WANT IT?"

system. It will stop little, accomplish less for the people it is supposed to protect, and only serve to enrich those who are already perpetrating astronomical assaults upon national solvency in the name of national defense."

He then reviewed some of the statements made by ABM critics and came up with some conclusions that are reminiscent of the late unlamented Senator Joseph McCarthy. Mr. Podell boiled it down:

"What it boils down to is simple," Mr. Podell declared. "A vast complex of defense-oriented firms have made a fortune from supplying armaments to the US government. Their lobbyists swarm in this city as bees around a hive. A steady stream of high-ranking officers from all military services find employment in high places among these firms when they leave the service. . . ."

Then Mr. Podell put a finger on his list of evils for which he holds the defense industry responsible:

"In return for this, and because of this insanity, our waters have grown more polluted; our air is becoming increasingly dangerous; our transportation network is grinding to a halt; our cities are cesspools of poor housing, crime, narcotics addiction, and filth; and we are on the verge of racial conflict which will assume the form of urban guerrilla warfare."

No doubt this came as good news to industries previously blamed for air and water pollution, and guilty thereof. The other social ills mentioned, their existence denied by no reasonable man, remain equally remote from the exclusive responsibility of the people who design and build airplanes, missiles, and the equipment used for space exploration. What Mr. Podell is saying is that the aerospace industry, and that industry alone, has created our social ailments. No fellow member of the House endorsed his indictment, but some of them came close.

(Continued on following page)

Another New Yorker and Democrat, Representative Leonard Farbstein, told the House why he voted against the ABM. The reason is that on the same day the appropriation came up for a vote in the last session, "young men were demonstrating in front of the city hall in New York because they had no jobs." Mr. Farbstein looked at this suffering, contrasted it with the case for the ABM, and concluded that "the needs of our people come first." The Congressman then reviewed the case against ABM. He found it technologically not feasible. He found it undesirable, mainly because its real aim is to secure more money for what President Eisenhower, President Nixon's chief mentor in government, called the military-industrial complex. He found it will prolong the arms race "at the expense of our cities and of the poor and underprivileged."

Finally, Mr. Farbstein concluded that "a comparable investment in cleaning up our cities, air, water, and so forth, training our youth for jobs, strengthening our natural resources, and attacking the misery that breeds disorder both in our own society and in the developing countries will do far more to build American security and our leadership for peace."

At another point in the House discussion, not a debate, but a lengthy recitation by ABM opponents, Congressman Henry S. Reuss, a Wisconsin Democrat, indicated he thinks the United States erred when it deployed so many ICBMs in the first place and that ABM deployment would be another error. Like many Americans, Mr. Reuss feels this is the time to start negotiating with the Russians about disarmament, but he does not agree with Defense Secretary Laird that there first must be progress in Paris, where the Vietnam talks are under way, and in the Middle East.

Talks with Russia should start now, Mr. Reuss says, "before contractors get a vested interest in the deployment of the ABM." He then turned the demand for social action over to the contractors by name:

"If we do not deploy the ABM, this will, no doubt, disappoint those units of the industrial complex—Western Electric, General Electric, McDonnell Douglas, Raytheon, Martin-Marietta, and some others—that have been banking on a multimillion-dollar program."

"I would hope that the scientific genius of these great industrial companies could instead be turned loose on the great problems of the American people, to problems of air and water pollution, the problems of new methods of building homes and schools, and working toward some of the great scientific breakthroughs which are so desperately needed."

There was no one on the floor, that day or since, to give a listing of what these and other companies in aerospace have done and are doing in these areas. The Aerospace Industries Association (1725 De Sales St., N.W., Washington, D. C. 20036) has available a report on the subject, entitled "Aerospace Technology: Creating Social Progress." A copy will be sent free to anyone who requests it, including Congressmen. One can say in passing, however, that no other segment of American industry is doing as much or nearly as much.

The House discussion of February 26 was led by

Representative Jeffery Cohelan, Democrat of California, who acknowledged at one point that "our little group" circulated a letter inviting House members to take part in the assault. He regretted that ABM proponents did not accept the challenge with any enthusiasm. To Mr. Cohelan's credit, it must be said that he eschewed the tendency of his confreres to blame the national security requirement for all the social ills the nation laments, but he did betray his own conviction that nuclear parity, not superiority or sufficiency, is a reasonable goal. The floor leader for the House assault said only that "defense expenditures can no longer be treated as sacred cows." But he also regretted that technology threatens to "coax us off the plateau" where both sides stood "relatively secure in the credibility of their deterrent." He did not refer to the news that the Russian ABM, the Russian FOBS, and the Russian MIRV, fired from Russian submarines, represent technological advances.

More typical than Mr. Cohelan's view was that of Rep. Frank Thompson, Democrat of New Jersey, who appeared most incensed at the military side of the complex, because the Army saw a need to educate the public on the ABM program "much the same way detergents and automobiles are sold in commercial advertising." This, Mr. Thompson said, did not give the citizens a fair break. Said he: "They ought to have the right to determine whether they want decent housing and decent schools for their children, rather than more rockets and missiles."

One of the few voices of reason was raised by Representative Durward G. Hall, Republican of Missouri, himself a physician and member of the House Armed Services Committee. Dr. Hall opined that too many people have taken sides in this discussion who are not well informed about the Sentinel system. After discussing some of its promise as a defensive system, he then put his finger on the opponents who would spend the money instead on rebuilding cities and



—Sanders, in *The Milwaukee Journal*, with permission
 "WELL, I BELIEVE THERE ARE SUCH THINGS AS UNDERIDENTIFIED FLYING OBJECTS."

financing social projects. "I suggest," he said, "that this particular question is not relevant to the basic issue of national security." It may have been the most incisive comment of the entire House discussion.

Serious discussion in the Senate got under way on February 4, when a bipartisan group led by Senator John Sherman Cooper, a Republican from Kentucky, made speeches urging the Nixon Administration to reconsider the ABM deployment ordered by Robert S. McNamara before he left the post of Defense Secretary. On February 6, Mr. Laird announced a freeze in construction and a review of the program. In between, on February 5, the House Armed Services Committee told the Pentagon it would hold hearings on the Army's plans to acquire Sentinel sites in the Chicago and Seattle areas.

It was at this point in early February that the opponents of ABM, for the most part legislators and scientists, cheered on by a wide range of traditional opponents of our military effort, started to plan the outburst that was to hit Washington before the end of the month. To them, the military-industrial complex and the horrendous figures of men in uniform were, generally, an easier target than the more basic issues that seemed clear to men like Congressman Hall.

It is not necessary here to hold forth at length on the nitty-gritty technical arguments about the Sentinel system. The experts disagree on its capabilities, its possible cost, its general effectiveness. To many observers, this part of the dispute is less important than the philosophy of national security that tempers our national decision. Some of the experts, it is suspected, have their technical opinions warped, to one degree or another, by what even Donald Brennan cannot define as anything but "attitude."

Dr. Brennan, who hails from the Hudson Institute and pleads for an ABM, does not believe our defense effort involves any kind of unending spiral or arms race. He says it ain't necessarily so. If we think the United States must be able to kill 74,000,000 Russians and if they put up an ABM that will prevent us from doing it, then the answer is that we must increase our offensive forces. That's what Secretary McNamara set out to do, and it is not unreasonable to charge that he was escalating. To Dr. Brennan, it would make more sense to deploy an ABM and forget about this fixation that we have to kill a certain number of Russians. The idea is to deter a Russian attack on the United States, and this is one of the reasons President Nixon and the Strategic Air Command, to mention only two adherents of the idea, believe peace is the mission of the Defense Department.

It was about two years ago, at the Air Force Association Convention in San Francisco, that AFA adopted a Statement of Policy taking issue with the McNamara thesis that more missiles and warheads, "a solution advanced by the same leaders who have repeatedly warned against provoking an arms race," would prove our salvation. AFA looked at the "electromagnetic shield-type defense," an ABM tool that Russia had tested with high-altitude nuclear explosions denied to us under terms of the nuclear test-ban treaty, and expressed concern about the vulnerability of our ICBMs.

"We are concerned," the AFA Statement said then, "about the possibility of a Soviet antiballistic missile system which would not permit our warheads to reach their targets."

That was in 1967. The last posture statement offered by Secretary McNamara was the one that accompanied the current, Fiscal 1969, budget. It cannot be interpreted as anything but a plea for Congress to accept a standard of parity with the Russians in strategic strength. There was no disposition to do this on Capitol Hill, and Mr. McNamara later endorsed the "thin" ABM, which he said was designed to deter the Chinese, if not the Russians.

Incidentally, Mr. McNamara estimated that a "relatively small number of warheads detonated over fifty Chinese cities would destroy half the urban population



—Wide World Photos

Gerard C. Smith, head of the Arms Control and Disarmament Agency, tells Senators he does not believe deployment of ABM will harm arms-agreement talks with the Soviets.

(more than fifty million people) and more than one-half of the industrial capacity." This, certainly, contributed to his credibility gap. For our strategic arsenal, the job should be easy.

Returning to the Senate, it is interesting to note that Edward M. Kennedy of Massachusetts, brother of John and Robert Kennedy and a close personal associate of Robert McNamara, is in the forefront of the effort. As Democratic Whip, potential presidential rival of Mr. Nixon in 1972, and darling of the New Left in his own party, Mr. Kennedy is in a position to make political capital out of the ABM dispute.

He started on February 19 by declaring that the review of ABM promised by the Nixon Administration would not be dispassionate, exhaustive, and conclusive. His remedy is to ensure a dispassionate, exhaustive, and conclusive study by commissioning Dr. Jerome B. Wiesner of the Massachusetts Institute of Technology and Professor Abram Chayes of Harvard to write a report.

Now Dr. Wiesner and Professor Chayes both worked for the Kennedy Administration, as scientific and legal advisers. They are known opponents of the Sentinel system, which explains why "Meet the Press," which is under some compulsion to present both sides of a public question, had them on the air March 9, a week after Senator Jackson's appearance. In that

(Continued on following page)



—LePelley in *The Christian Science Monitor*; © TCSPS

program, Dr. Wiesner said flatly that Sentinel "won't work" and that his report on the subject for Mr. Kennedy will come from people who are "not part of the bureaucratic machinery," such as he and Professor Chayes were only a few years ago. They made it clear to the TV audience that their dispassionate study starts with the consideration that military men have been making the weapons decisions for too long. Dr. Wiesner says the decisions should result from considerations that go through the "responsible democratic process." He did not say which process he thought was in effect during the Kennedy and Johnson years. It was in that period that the proved military decision-making process, involving weapon evaluation and source-selection board procedures, was brushed aside, to the distress of men in uniform. If Dr. Wiesner has met Dr. Alain Enthoven, the Pentagon's recent, unlamented Assistant Secretary for Systems Analysis, he did not betray it. He did, however, make the flat statement that our Minuteman silo installations, whose operational readiness is the responsibility of the Air Force, do not need ABM protection "at this time."

Another major political angle to the ABM controversy centers around a number of congressional committees and their jurisdiction. A key figure is Senator Stuart Symington of Missouri, a former Secretary of the Air Force, now a member of both the Armed Services and Foreign Relations Committees.

New Chairman of the Armed Services Committee is Senator John Stennis of Mississippi. In moving to the position, he would, under normal circumstances, be expected to surrender his post as Chairman of the Preparedness Investigating Subcommittee. He did not. Mr. Stennis has retained that chair and, in doing so, has prevented Senator Symington from advancing to the seat.

Mr. Symington is opposed to the ABM program. He told the Senate recently, with a straight face, that the cost of this program could exceed \$400 billion, a figure that is four or five times the most extravagant thus far suggested. Senator Stennis has announced that the full Armed Services Committee will examine the ABM issue, and he has promised to hear from both sides in the dispute.

In the face of this, Senator William Fulbright, of Arkansas, also a foe of ABM, has named a subcommittee of his Foreign Policy Committee, "to make a detailed review of the international military commitments of the United States and their relationship to foreign policy." The chairman of the subcommittee: Senator Symington.

The lineup here has brought the comment from at least one Capitol Hill sophisticate that there is an accident loose, waiting for a time to happen. Mr. Stennis feels strongly that the ABM question is in his jurisdiction. The appearance of Mr. Symington at the head of a Foreign Policy inquiry that seems surely destined to get into military affairs—the ABM as well as other issues—does not rest well with the veteran from Mississippi.

The Fulbright insistence that ABM is a matter of concern to him was brought out at the February 20 session, where Mr. Laird testified. The subject of the hearing was the Nonproliferation Treaty, but the testimony dealt with this only in a passing sense. Mr. Fulbright used the meeting to probe the ABM issue. This performance was repeated on March 6 when a Fulbright subcommittee on disarmament held a hearing on the Sentinel system. It was chaired by Senator Albert Gore of Tennessee.

On top of this, the House Armed Services Committee will hold hearings, as will also a Subcommittee on National Security Policy and Scientific Developments of the House Committee on Foreign Affairs. It is headed by Representative Clement J. Zablocki of Wisconsin.

Other committees that will take a look at Sentinel are the Joint Atomic Energy Committee, and the defense appropriations subcommittees of both houses.

While President Nixon was struggling with this, his first major encounter with a volatile issue, both Congress and the press continued to seethe. The output is almost exclusively anti-ABM; much of it is vituperative, and too much of it, in the political arena, is demagogic.

Of course, a major stimulant behind the congressional outbreak, in addition to the general uprising against military opinion, is the reaction of alarmed constituents over the location of Sentinel sites near some cities.

There have been town meetings, in places like Boston and Chicago and Libertyville, Ill., where the citizenry is asked to express an opinion, and listen to a great many of them. On the basis of what they read and hear, in the circumstances described above, they cannot be blamed for not knowing more about the requirement for an ABM and the capability of the Army's proposed system. The indignation, then, finds its roots in the alleged peril of having nuclear weapons in the neighborhood. It remains a fact that some of these sites have been housing the earlier Nike system, and nuclear warheads have been nesting there for several years. There is no record of any nuclear device having been triggered accidentally, and there is nothing new about this ABM that should alter that record.

It is fortunate that, unlike people, weapons know no emotional stress.—END

Paced by the technology and manufacturing techniques pioneered by the Air Force's C-5 Galaxy, a family of new superjets—the so-called trijets—is coming into being. While more than two years away from full airline operations, these new aircraft have already established themselves as the dominant type of the 1970s. By combining high operating efficiency with unprecedented flexibility they claim to be the . . .

First All-Purpose Plane Since the DC-3

By Edgar E. Ulsamer

ASSOCIATE EDITOR, AIR FORCE/SPACE DIGEST

WHAT started out a year ago as a high-risk venture—the development of advanced-technology, high-capacity, wide-bodied supertrijets—is turning into a sales success story. At this writing a combined total of 323 Lockheed L-1011 TriStars and DC-10s, valued at more than \$4 billion, was on order or under option. The industry expects sales of as many as 1,400 aircraft (worth about \$21 billion) within the next ten years, not counting possible cargo or twin-engine variations.

Two principal factors are helping sales of the supertrijets. The aircraft represent the first all-purpose airplane since the DC-3, and, while still two years from airline service, are developing into “families” of air-

craft capable of covering wide segments of commercial aviation, varying from 200 to 6,000 miles in range.

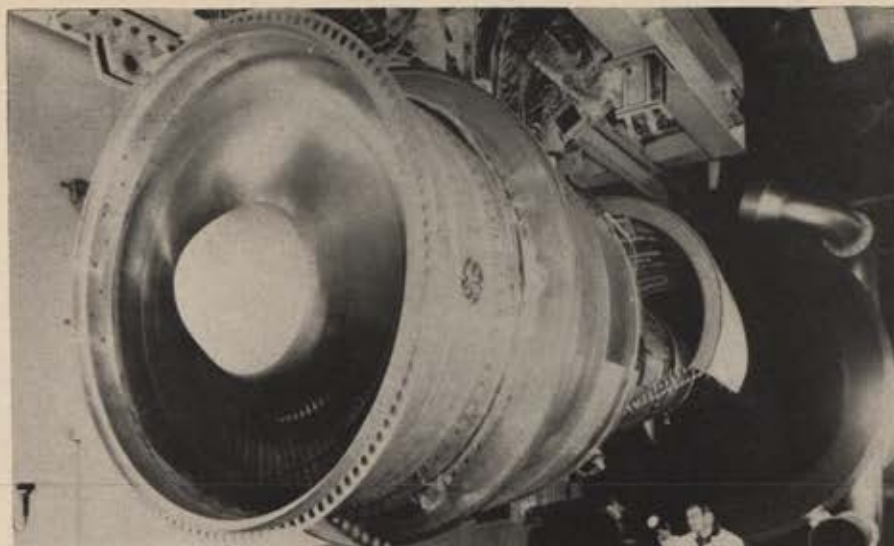
Further, the supertrijets combine low operating costs (primarily through use of advanced-technology, high-bypass-ratio engines, pioneered by the Air Force for the C-5) and a new level of passenger comfort made possible by the roominess of the wide-bodied design.

Remarkably similar in size and performance, the L-1011 TriStar and the DC-10 accommodate from 250 to more than 300 passengers.

Two developments late in 1968 brighten the supertrijets' future. Air Canada became the first foreign
(Continued on following page)

Lockheed's L-1011 TriStar features streamlined service for passengers. A unique underfloor galley and cart service system recently underwent trial demonstrations in full-scale aircraft mockup. Stewardesses are shown serving from carts in main coach compartment. A similar system will be used by the McDonnell Douglas DC-10.





Shown in a test cell at General Electric's jet engine plant, Evendale, Ohio, is this CF6 turbofan engine built for McDonnell Douglas's DC-10 trijet. Test program for the engine is running smoothly, with the aircraft itself expected to enter service in 1971.

airline to buy a supertrijet, ordering ten of the Lockheed L-1011s. And a McDonnell Douglas DC-10 Series 20 (a special 5,100-mile-range model) entered the long-haul market when it took Northwest Airlines' order for fourteen aircraft with options for fourteen more. Lockheed also competed for the Northwest order with an intercontinental model of its L-1011, but did not offer a Pratt & Whitney engine as requested by the airline. As a result, both companies enter 1969 with basic and special long-range versions of their respective trijets.

The Lockheed L-1011 TriStar

Lockheed-California Co. Vice President and L-1011 Program Manager, Robert A. Bailey, whose airplane now leads the box score with 181 orders and one option, told *AIR FORCE/SPACE DIGEST*, "Everything is moving full speed ahead. We have 3,400 people, including 2,500 engineers, assigned to the program. Our \$100 million facilities program is well under way. We have released the first detail drawings to manufacturing. We have let subcontracts for about \$1 billion. And we will roll out on schedule in September 1970."

Certification and first delivery of the L-1011, which can accommodate between 250 and 345 passengers, are scheduled for the fall of 1971.

The development program of the Rolls-Royce RB.211-23-03 engine is, according to Mr. Bailey, "right on schedule, and no unexpected serious difficulties have been encountered." The first engine went on test in August 1968, ahead of schedule, and three more have entered the test program since, he said.

ENGINE SPECIFICATIONS FOR THE SUPERTRIJETS

	General Electric CF6	General Electric CF6-50	Pratt & Whitney JT9D-15	Rolls-Royce RB.211
Takeoff thrust	40,000 lb.	47,300 lb.	45,500 lb.	40,600 lb.
Cruise thrust	9,100 lb.	10,840 lb.	10,400 lb.	9,267 lb.
Engine weight	7,350 lb.	8,100 lb.	8,400 lb.	6,353 lb.

The L-1011 Intercontinental Model

Lockheed, at this writing, is attempting to achieve a consensus among potential airline customers on the configuration and performance of an intercontinental model of the L-1011 TriStar, according to Mr. Bailey. As a result, some specifications remain fluid for the intercontinental TriStar, while others can be considered reasonably firm. Three pivotal criteria, Mr. Bailey said, are:

- Use of the Rolls-Royce RB.211 Dash 28, with a takeoff thrust of 47,000 pounds;
- Range of about 5,000 miles with about 270 passengers; and
- Gross takeoff weight of about 490,000 pounds.

The intercontinental TriStar will cost at least \$1 million more than the basic model (or about \$16 million).

Lockheed, according to Mr. Bailey, is not actively engaged in designing growth versions of the L-1011 to compete directly with the Boeing 747 four-engine, ultra-long-range aircraft. "Of course [with the intercontinental model], we will be nibbling into the 747 territory a bit more than was the case with the basic 3,300-mile-range trijet," he said.

The Three DC-10 Models

McDonnell Douglas, which won the first trijet order when American Airlines committed itself to twenty-five DC-10s and options for twenty-five more, currently holds orders and options for a total of 141 aircraft, according to J. C. Brizendine, Vice President and DC-10 Program Director. According to McDonnell Douglas market analyses, about 1,300 supertrijets will be sold by 1980.

McDonnell Douglas has officially entered the intercontinental market with its DC-10 Series 20 and Series 30 models, Mr. Brizendine said.

In October 1968, Northwest Airlines announced fourteen orders and fourteen options for the 5,100-mile-range, 490,000-pound-gross-takeoff-weight model of the DC-10 employing Pratt & Whitney engines (the JT9D-15, a variation of the JT9D-7 used on the growth models of the Boeing 747). This was followed in No-

member by three orders by Trans International Airlines.

At this time, Trans International has not yet chosen between the Series 20 and Series 30 versions of the DC-10, the difference between the two aircraft being either the Pratt & Whitney JT9D-15 engine of 45,500 pounds of thrust on takeoff and 10,400 pounds during cruise, or a growth version of the General Electric CF6-6, which powers the standard medium-range DC-10. The CF6-50 will have a takeoff thrust of 47,300 pounds and a cruise thrust of 10,840 pounds.

Long-range cruise speed of either the P&W- or GE-powered intercontinental DC-10 is Mach .82, according to Mr. Brizendine.

McDonnell Douglas, Mr. Brizendine emphasized, considers its first two models of an intercontinental supertijet only the beginning because "for the second half of the 1970s we are projecting an entire family of DC-10s designed around engines of between 50,000 and 55,000 pounds of thrust." These aircraft, he said, "represent growth in range, growth in passenger capacity, and growth in a combination of these two factors."

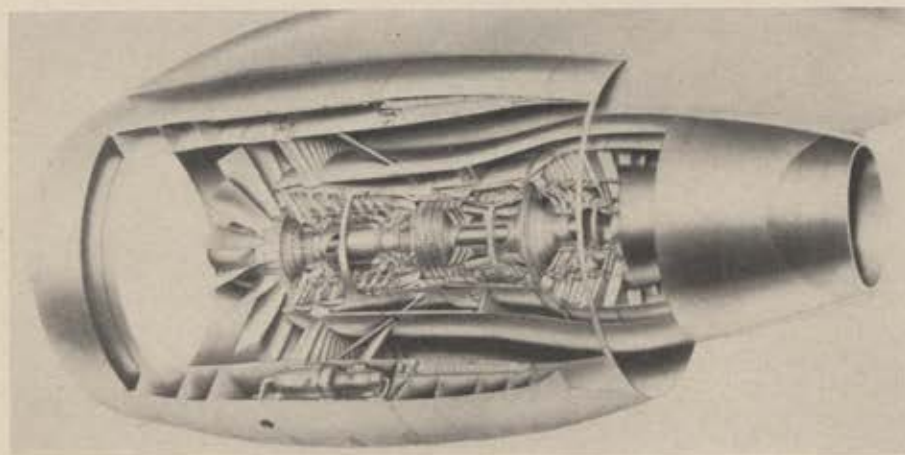
"We are looking, at this time, at a range growth of up to 6,000 nautical miles, and we foresee stretching the present design by up to fifty feet, which would give us an airplane capable of accommodating more

than 400 passengers in a mixed first-class/economy-class configuration," the DC-10 program director said.

"This will make the DC-10—in terms of passenger capacity—bigger than the 747. The aircraft we are looking at approaches a gross weight of 600,000 pounds, and we will have to modify and enlarge the present wing by giving it more wing area and by chord and span extension, both of which we know can be done," said Mr. Brizendine.

As for cargo aircraft, derived technologically from but essentially quite different from the DC-10, Mr. Brizendine stated that his company would have such an airplane available once the market had developed sufficiently. Two designs, a four-engine and a twin-engine cargo aircraft, known as the C-4 and the C-2 and based on the DC-10 wing design and basic technology, are currently under consideration, according to Mr. Brizendine. In addition, a six-engine aircraft with a gross takeoff weight of more than one million pounds is being studied for possible use in the more distant future.

As did his competitor, Mr. Bailey of Lockheed, Mr. Brizendine told *AIR FORCE/SPACE DIGEST* that Japan Air Lines and a number of European airlines are likely to commit themselves to substantial supertijet orders during 1969, with the same applying to the majority of the as yet uncommitted US carriers.—END



Cutaway shows design features of the Rolls-Royce RB.211 turbofan engine that will power the L-1011. It is scheduled to generate between 40,600 and 50,000 pounds of takeoff thrust, depending on model choice. The engine incorporates three-shaft layout for simplicity and economy.

AND WHAT ABOUT BOEING IN THE AIRBUS MARKET?

The biggest question mark concerning future developments in the so-called airbus market (which eventually may include wide-bodied aircraft other than trijets) is the presently vague policy of the Boeing Co.

The company has recently stepped up its airbus efforts and is concentrating on designs that incorporate later technology than was available to the designers of the L-1011 and the DC-10. Boeing is pursuing a range of design options including twin-, trijet, and four-engine approaches and range capabilities from 1,250 to 3,700 nautical miles under the heading of a new 767 program.

In discussions with the airlines, which the company hopes will result in the emergence of a final design in the near future, models for short-haul, intermediate-range, and international operation are being offered. Passenger capacity range is between 180 and 250. The twin-engine design could use Rolls-Royce RB.211, Pratt & Whitney JT9D,

or General Electric CF6 engines, each of which produces more than 40,000 pounds of thrust on takeoff. Each is capable of powering aircraft weighing about 260,000 pounds.

The 767 trijet configuration, in addition to two conventionally placed engines, features a boundary inlet for its third engine, which forms the fuselage's aft end. The trijet would be available in an intercontinental model with a New York-Paris range, a takeoff weight in excess of 300,000 pounds, and a 200-passenger capacity. Engine thrust requirement is about 30,000 pounds, which would necessitate either substantial changes in existing engines or completely new designs.

The four-engine model of the 767 differs only slightly from the three-engine model in terms of weight, range, and payload. All models are priced at about \$12 million and offer similar operating costs.

Old Dogs Teach New Tricks...

With a strategic commitment on a global scale and an air war to be fought in Southeast Asia, the Air Force's need for properly trained pilots is more crucial than ever before. Alleviating the situation is the quality of today's pilot instructors, many of whom are "old hands" who have logged thousands of flying hours in and out of combat. Student pilots, faced with the complexities of sophisticated aircraft, are learning that in . . .

Pilot Training— Experience Is the Best Teacher

By TSgt. Gerald O'Hara, USAF

MOST people think of today's US Air Force pilot as a dashing and debonair young man. Some do fit this description. But, in the aerospace age, the sometimes forgotten "old man" in the cockpit still has a firm hold on his place as one of the most significant factors in keeping USAF strong and professional.

These older pilots—men in their mid-thirties to late forties—have been flying all types of aircraft in the Air Force arsenal worldwide—during peace and war. They not only have been tested under enemy fire, but their vast over-all experience in flying all types of equipment provides a valuable reservoir of knowledge for new pilots to draw on.

These combat-tested experienced pilots are helping to see that newcomers to flying receive the best possible training through the Air Training Command's Undergraduate Pilot Training (UPT) program at nine bases in the United States.

At Moody AFB, Ga., more than one-third of the T-37 instructor pilots (IPs) of the 3552d Pilot Training Squadron and about as many T-38 IPs from the 3553d PTS have seen combat in Vietnam. Others are Korean War veterans. Some have had combat experience in both conflicts.

Many of these instructor pilots have several thousand flying hours and more than ten years of flying experience in various aircraft—irreplaceable credentials for those teaching the techniques of flying to student pilots, many of whom will end up at the controls of some of the most sophisticated aircraft in the world.

Such a sprinkling of older instructor pilots among the

younger ones sets the pace in today's Air Force UPT program.

Moody IPs who fly the 400-mph T-37 primary jet trainer average thirty years of age, and instructor pilots using the more advanced supersonic T-38 average twenty-nine.

Putting Experience to Work

One of the "older heads" who has served as a T-38 IP flight commander at Moody since his return from Vietnam in April 1967 is Maj. J. D. Tindall. He was thirty-five when he flew 100 F-105 Thunderchief fighter-bomber missions against some of the most heavily defended targets in North Vietnam and during his career has accumulated more than 3,600 flying hours—250 of them in combat—in T-28, T-33, F-84E, F-86F, F-100, and F-105 aircraft.

"My total flying experience helps me quickly recognize the abilities of student pilots," says Major Tindall, who now is Chief of the Standardization Evaluations Section of the 3553d PTS.

Although Major Tindall does not see combat experience as a necessity for instructor pilots, he believes an instructor's over-all flying experience makes him a more accomplished pilot and thus better able to provide the student with the best possible training.

Moody IPs have a combined total of more than 313,000 hours of flying experience, including 17,874 combat hours, in numerous types of aircraft. The individual averages are 114 combat hours and about 1,955 flying hours for each IP.



Lt. Col. Walter D. Moss, Jr., Commander of the 3553d Pilot Training Squadron, gets ready to board a T-38 for a flight with a student pilot. With close to 9,000 flying hours in both conventional and jet aircraft, Colonel Moss has helped to train thousands of student pilots during his nine years in the Air Training Command.

The 3553d's Commander, forty-year-old Lt. Col. Walter D. Moss, Jr., says his instructor pilots can fly any aircraft and mission the Air Force can come up with . . . with no problem whatsoever. "Today, the efficiency level is reached and maintained by instructor pilots so the product—trained pilots—has to be better," declares Colonel Moss, a veteran of fifty-five B-26 combat missions in Korea during 1952.

"They're fine pilots, and the knowledge they maintain is fantastic," the Colonel says. "The quality of pilot training has increased—no comparison with that of fifteen years ago."

With eighteen years of military service, Colonel Moss himself has logged more than 8,739 flying hours in prop-driven and jet trainers and in cargo and bomber aircraft.

During this time, in which he spent nine years with Air Training Command, Colonel Moss has worked with thousands of student pilots.

He rates today's student pilots as twice as good and with twice the knowledge of those of the early 1950s era.

The Colonel points out that several students completing the Moody UPT program have gone directly into the front seat of two-seat RF-4Cs, F-4Cs, and single-place F-105s—three of the Air Force's finest aircraft—as aircraft commanders . . . a tribute to the kind of training student pilots receive.

400 Pilots Per Year

Moody graduates nearly 400 student pilots each year after completion of the twelve-month UPT school. As one class completes its training, another takes its place so there is a continuous cycle of eight classes annually.

No longer do students seek to win their commissions as second lieutenants and their wings at the same time—all have earned their commissions as officers before they start flight training. And, unlike many of their predecessors, all student pilots hold a four-year college degree.

Air Force student pilots include graduates of the Air Force Academy, Air Force Reserve Officers Training Corps programs at many of the leading colleges and universities in the country, and Air Force Officer

Training School (individuals who had previously been graduated from a college or university). Air National Guard officers (from reserve units) and a limited number of officers of the US Marine Corps are also trained at Moody.

In addition, a limited number of military personnel from allied nations are trained under the Military Assistance Program, some to learn to fly and others for technical training.

Most of today's students have had no previous flight experience when they come to Moody for what may be the most demanding year of their life.

UPT students receive three weeks of preflight, which consists of physical training, principles of flight, aircraft engineering, aviation physiology, and military subjects. The newcomers then receive about thirty hours of training in the lightweight, propeller-driven T-41A aircraft.

This phase of the training is given at the Valdosta (Ga.) Municipal Airport under civilian contract prior to advancing to jet aircraft training on base in the T-37 and T-38.

The changeover to jet aircraft introduces students to a combination of the Air Force's finest jet trainers and experienced teachers, which together provide the highest caliber training in history.

Fledgling pilots receive ninety hours of primary jet training in the T-37 and then begin 120 hours of final-phase training in the supersonic T-38.

"The students are well motivated," says Maj. Charles
(Continued on following page)

FLIGHT SAFETY AWARD TO MOODY AFB

On February 20, Lt. Gen. Sam Maddux, Jr., Commander of the Air Training Command, presented the ATC Flight Safety Achievement Trophy to Col. Clarence S. Parker, 3550th Pilot Training Wing Commander. The award covered the period August 17, 1967, through January 1, 1969, and recognized a total of 123,312 accident-free flying hours at the base, involving 82,800 aircraft sorties. During this period a total of 479 pilots were graduated.



In a pretakeoff conference, Maj. Charles A. Boatwright (left), a T-37 flight commander, and Maj. John T. McCambridge, 3552d Pilot Training Squadron operations officer, make final preparations for a cross-country flight to check out flying routes. The majors are two "old hands" who are giving student pilots the benefit of their extensive flying experience during training at Moody AFB, Ga.

A. Boatwright, "and they give 105 percent effort to the program."

Major Boatwright, a thirty-three-year-old T-37 flight commander in the 3552d, flew 214 AC-47 "Puff the Magic Dragon" missions in Vietnam before coming to Moody in June 1967. He feels beyond question that his combat experience helps in teaching student pilots.

An instructor with combat experience or one with vast amounts of flying time in various aircraft has four or five ways to teach, while IPs with only a short time in the cockpit have only the textbook approach, Major Boatwright points out.

On one occasion, Major Boatwright's AC-47 was shot down on takeoff from Bien Hoa AB, Vietnam. One engine was hit by enemy ground fire. The Major was able to land in a field near the runway. All seven crew members escaped serious injury. "Such an experience can easily be applied in teaching," he says. "In some cases, students learn more from a real-life experience than from the textbook approach."

Heavy Work Schedule

The heavy work schedule of student pilots includes 236 hours on officer subjects, consisting of leadership responsibility, heritage, career development, drills and ceremony, physical development and conditioning, marksmanship, and counterinsurgency.

About 357 hours are also devoted to academic subjects, including aircraft engineering in the T-37 and T-38 aircraft, aviation physiology, principles of flight, flying safety, navigation, airmanship, oral and visual code weather.

As demanding as the student pilot training is, the work schedule of IPs is just as demanding and at times exasperating, says Lt. Col. Lou E. Bretzke, Commander of the 3550th Student Squadron.

"One of the prime qualifications for an IP is dedication," Colonel Bretzke observes. He is a forty-one-year-old, nineteen-and-one-half-year service veteran



Discussing aerial maneuvers with three student pilots undergoing undergraduate pilot training is Maj. J. D. Tindall, thirty-seven-year-old T-38 flight commander who has accumulated more than 3,600 flying hours. The major has flown one hundred F-105 Thunderchief fighter-bomber missions over North Vietnam and has been awarded the Silver Star as well as three Distinguished Flying Crosses.

who has logged a total of more than 3,750 flying hours.

The students have to be dedicated, too. T-38 training includes comprehensive instruction in formation, contact—traffic patterns and aerobatics—flying, instruments, and navigation. Of the normal nine-hour student work day, an average of seven hours is spent with a T-38 IP, who works with three to four students each day. Briefings, debriefings after flights, and classroom study are part of the daily routine.

During training in the three UPT aircraft at Moody, students learn to judge speed and how to adjust to it. Once this is done, students should be able to fly any aircraft in the inventory.

IPs agree that their work requires patience, an understanding of people, and a friendly but firm relationship in dealing with absolute fairness with students.

The training job has its rewards. Maj. John T. McCambridge, the Operations Officer for the 3552d PTS, says simply, "I love my work." And when he adds, "There's no better way to serve my country," you know he means it and that it sums up the feelings of most IPs.

But most satisfying of all is the finished product—students who are no longer students, but qualified pilots ready to begin flying the combat- and support-type aircraft employed by operational Air Force units around the world.—END

ABOUT THE AUTHOR

TSgt. Gerald S. O'Hara was a staff sergeant when he wrote this article for AF/SD. His promotion came through on March 1, just as he was leaving on TDY to attend the base newspaper editors' school at Fort Benjamin Harrison, Ind. Sergeant O'Hara has served at Moody AFB, as wing noncommissioned officer in charge of information, for a little more than a year. He came to Moody after service in Southeast Asia.

THE SPACE AGE IN PERSPECTIVE

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SPACE

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Speaking of Space

By William Leavitt49

For NASA, March—with its successful Apollo-9 mission and the long-awaited appointment of a new chief, the respected Dr. Thomas O. Paine—was a good month. But even as manned spaceflight proceeded, strong pressures were developing for a vigorous *unmanned* applications-satellite program.

The Last Lonely Inch

By J. R. Allietta56

Most of the world does most of the world's business using the metric system, which has distinct logical advantages over the so-called English system of inches, feet, miles, etc. But the US still clings to the far more difficult English measurements. Should we?

Mariner-6—On Course to Mars

A SPACE DIGEST Photo Feature59

While world interest was fixed on the complex manned Apollo-9 orbital mission, a complex unmanned probe coasted toward our red neighbor planet, first of two Mars probes scheduled for 1969.

Space Debris: Keeping Track of Space Junk

By Harold R. Williams60

Since 1957 and Sputnik, space has gotten "crowded" with leftover hardware from completed orbital missions. It's a complicated job to keep track of this junk, and the celestial litter presents more problems than one might think.



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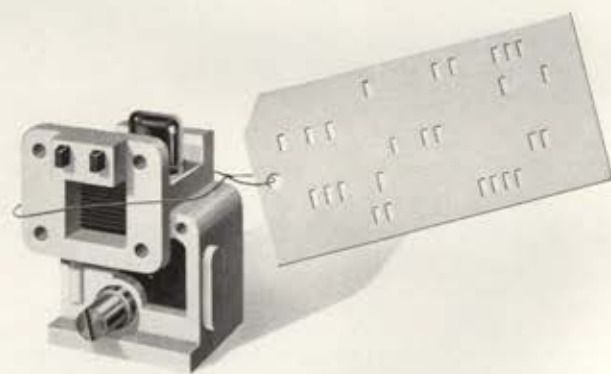
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Speaking of Space

For NASA, March—with its successful Apollo-9 mission and the long-awaited designation of a new head, the respected Dr. Thomas O. Paine—was a good month. But even as the manned spaceflight program proceeded toward the climactic moon landing this summer, strong pressures for a vigorous unmanned applications-satellite program were developing . . .

Needed: A Beefed-Up Applications-Satellite Program

BY WILLIAM LEAVITT

Senior Editor/Science and Education

THE month of March, which for most of us was a dreary winter blast, was a happy time for the National Aeronautics and Space Administration. The space agency not only successfully completed the unnervingly complex Apollo-9 mission in which the crucial ability of the lunar-landing module to rendezvous with the Apollo mother ship was demonstrated in earth orbit; it also got an Administrator. NASA's new chief turned out to be none other than Dr. Thomas O. Paine, the one-time Navy submariner and former head of General Electric's "think tank," GE Tempco, in Santa Barbara, Calif., who had been Acting Administrator since back in October 1968 when the redoubtable James E. Webb left the agency.

Dr. Paine's appointment to head NASA was an-

nounced by President Nixon at a White House ceremony at which Astronaut James Lovell was accepting an award for all three of the men of Apollo-8 from the National Space Club based in Washington. The President, in announcing the designation of Dr. Paine as NASA Administrator, said that he had looked all over the country for a new NASA chief and had discovered that the best man for the job was the soft-spoken engineer-administrator who had been filling the post on an acting basis for the past several months.

As noted on these pages last month, when the question of the NASA succession had not been decided by the President, Dr. Paine had brought to NASA important qualities that seemed right for the agency in its present period of evolution. His appointment, it was suggested, would help to depoliticize the space agency



—Wide World Photos

After serving several months as Acting NASA Administrator, Dr. Thomas O. Paine was named Administrator of the space agency in early March by President Nixon at a White House ceremony at which the Apollo-8 astronauts were honored. Dr. Paine's appointment came during Apollo-9.



—Wide World Photos

Apollo-8 Astronaut James Lovell receives the Goddard Space Trophy from President Nixon, awarded to the three members of the Apollo-8 crew at the White House March 5. The trophy, commemorating rocket pioneer Robert Goddard, is awarded annually by the National Space Club.



Among the luminaries on hand for the Apollo-9 launching March 3 were, left to right, Apollo-8 Astronaut Frank Borman, Air Force Secretary Dr. Robert C. Seamans, Jr., and Vice President Spiro Agnew, who heads the Space Council.

at a time when quiet analysis of the future of the US space program, rather than hoopla, seemed the wisest approach to charting a balanced space effort for the 1970s.

With all due respect to the achievements to date in manned spaceflight, so soon to be climaxed by the landing flight to the moon this summer, there continues to be little doubt that the pressure is on for a conscious effort to produce economic and societal payoff from the space program. Dr. Lee DuBridge, the President's science adviser, has launched a study of the requirements for a balanced US space program for the next ten years that would provide early benefits for earthbound man while at the same time advancing scientific knowledge of the near space around our planet, and knowledge of the moon and planets. Dr. DuBridge and NASA are also considering the conclusions of a large and distinguished panel of specialists in disciplines ranging from communications to hydrology, which was organized by the National Academy of Sciences, the National Academy of Engineering, and the National Research Council to study the potential of a large-scale unmanned applications-satellite program for the years ahead. The NAS-NAE-NRC panel, in a lengthy but highly readable report, which is available from the Na-

tional Academy of Sciences in Washington, endorsed a much more vigorous unmanned-satellite program designed to extract data and benefits in a wide range of fields including earth-resources survey, weather analysis, and data management, among many others.

All this might not be particularly noteworthy if the panel had not also declared that applications satellites and their potential benefits should *not* be justified in the context of manned spaceflight. The panel declared in that connection that "we believe that the manned program has provided technological developments of importance to many aspects of spaceflight and the use of space. It is expected that this will continue. In particular, the large booster program, tailored to the requirements of particular earth orbit, will find applications in the orbiting of heavy payloads for a variety of purposes.

"Additionally, this program will provide significant opportunities to test sensors and to prove out techniques useful to applications considered by this study. However, the use of manned vehicles per se does not at present appear necessary or economically desirable for the operation of the various space-applications systems considered by this study. We believe that the systems proposed for providing near-term practical and economic benefits to the US public and to mankind generally will be achieved more effectively and economically with automated devices and vehicles. Manned programs must be justified in their own right; they cannot be justified in terms of space applications."

Before making this declaration, which will not go down well with the manned spaceflight enthusiasts at the space agency who have, it must be admitted, in recent years carried off most of the money and glory in the NASA program, the NAS-NAE-NRC panel went so far as to declare that in its view "the present space-applications program is too small by a factor of two or three, if we measure it in the light of the substantial opportunities that can be pursued effectively only if financial support is increased.

"Additional funding," the panel then added, "would permit expansion of the applications program, and would enable the nation to proceed toward critically needed investments in preparation for future operational applications systems. NASA would be able to carry certain work through the spaceflight operational experimental phase, so that both the potentials and the problems of future systems could be thoroughly understood."



Starkly dramatic against the night sky, the 363-foot-high Apollo Saturn V vehicle that lifted the Apollo-9 crew into orbit for its complex March mission stands bathed in spotlights as it is readied for its thunderous assignment.

Underlying such statements is not only the conviction that, understandably, in the excitement of the Apollo program, unmanned applications satellites have suffered from lack of emphasis, but also the realization that enthusiasm on Capitol Hill for funding large-scale follow-on-to-Apollo manned spaceflight programs is low. Thus the pointed urging that applications not be geared to manned programs.

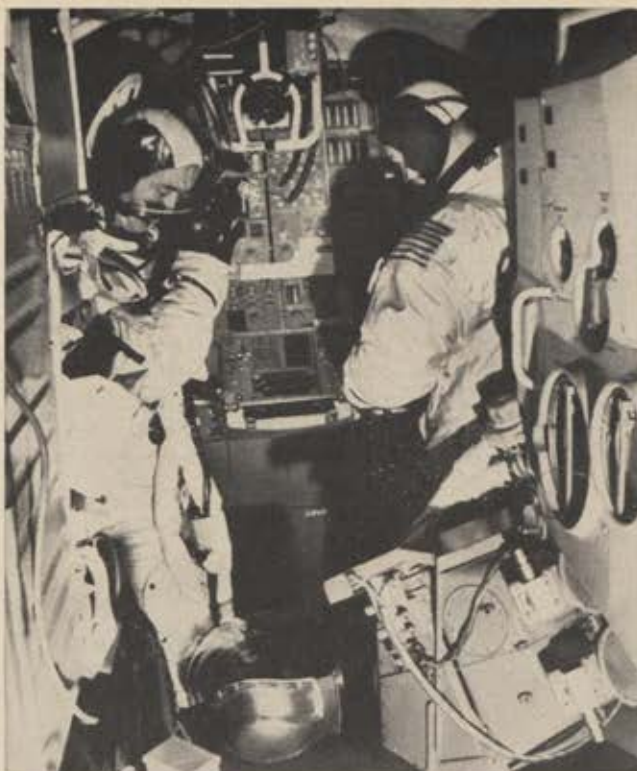
While it is often the case in Washington that distinguished panels pass in parade year after year and that most of the time their recommendations are unheeded and added to the archives, it seems clear that, in the present environment, what the NAS-NAE-NRC panelists are advocating is in tune with the political and technological times.

Research Strike—What Next?

It's a sign of our times that practically everyone is angry about something, whether it's the spiraling cost of living, or the burden of taxes, the decline of education, the sonic boom, or discourtesy of store clerks and parking-lot attendants, among the many other annoyances of this troubled era.

Now a new protest group has been formed, a collection of academics on various prestigious campuses who have banded together to protest what they view as an immoral involvement by universities in military-oriented research. To underscore their protest, they successfully organized a kind of one-day research strike in early March on various campuses across the country, from Massachusetts Institute of Technology, in the East, to the University of California at Berkeley, in the West.

Concurrent with the "strike" there were seminars at which faculty and students on various campuses held intellectual love feasts at which people bemoaned the idea of defense-oriented research on campus and called for a greater devotion of university research talents to the wide range of nonmilitary public problems that plague the country. Some of the academic critics insisted that the research work stoppage for a day was not so much an attack on federal sponsorship of university research as such—the federal government sponsors three-quarters of all university research—as an insis-



Standing room only is the rule in the Lunar Module. Apollo-9 commander James McDivitt, left, and LM pilot Russell Schweickart go through their paces in the LM simulator at the Kennedy Space Center, Fla., prior to the real thing.

tence on what Professor Ronald Probst, an MIT mechanical engineer, called redressing an imbalance.

"It is not our intention," Professor Probst said, "to sever connections with the Defense Department." What the professor said he wanted, rather, was a greater academic emphasis, presumably funded by the federal government, on nonmilitary research. He told an MIT gathering that many members of his department at MIT, who had formerly worked on military and aerospace research projects, had converted their laboratories to research on such problems as environmental pollution, medical engineering, and desalinization. Actually, Pro-



Traditional pre-mission hearty breakfast of steak and eggs gets eaten in what looks like a relaxed manner by Apollo-9 Astronauts David Scott, Russell Schweickart, and James McDivitt on the morning of the March 3 earth-orbital mission.



To get to the booster at Kennedy Space Center's Launch Complex 39A, you must travel about eight miles from the crew quarters building. In this photo, Apollo-9 crewmen, from left, McDivitt, Scott, Schweickart, walk to the van.

fessor Probststein's views represent the moderate wing of opinion in the protest movement; there are others who want military research kicked off campus *in toto*.

There are some important issues at stake here. For one thing, one may ask without questioning the sincerity of the academic protesters (and these are not all nihilistic long-haired students who want to tear the "system" down) whether the academic freedom they value so highly is not threatened by demands that military research be reduced to impotence on campuses or driven off completely. There are many academic specialists who have both the skills and desire to work on military problems and who see nothing immoral about performing such research. Should they be deprived of the right to work on such problems? Or should they be reduced to a sort of pariahhood by their colleagues who have for years themselves enjoyed the direct and indirect benefits of federal largesse and who now want out? This is a kind of reverse McCarthyism. As for the universities themselves, which have certainly benefited



Relayed to earth from orbit, this was television-eye's view of Apollo-9 crewmen, Russ Schweickart, left, and Jim McDivitt, right, aboard the Lunar Module during early phase of mission, when docked LM and mother ship orbited.

from federal money, it is one thing to do as Harvard University did many years ago—adopt a policy of not accepting any classified research contracts—and be willing to pay whatever penalty in loss of federal money that may accrue, and another thing to try to dictate to a research customer, on ideological grounds, what research requests it will accept on the basis of some formula of so much "dirty research" and no more.

The questions faculty and student protesters say they are raising are the role of the university in society and the matter of "responsibility" in science. If the universities, after long years of relative somnolence with respect to social problems on their own doorsteps, want to devote more of their talents to nonmilitary public problems, all to the good. At long last, they will be working toward what the student activists call "relevance" to the real world. But, regrettably, the real world also continues to include the problems of war and peace, problems that cannot be wished away by assertions that they are "dirty." Some of the most imaginative thinking on military problems has come from university campuses, a phenomenon that goes back really to the research en-

listment for the duration by academics during World War II. To universities and their people in that time of trial, working on military problems was seen as clearly moral and in the public interest.

Why the new view? Presumably there is a feeling that by doing military-oriented research, or even allowing it on campus, researchers are, on the one hand, somehow making a world conflict more likely, and, on the other hand, are somehow shortchanging society in its effort to find solutions to pressing social problems. Neither proposition holds much water. Few wars in history have been ignited by the existence of arms or the study of military/political problems. Most wars have, rather, been the consequence of irrational miscalculations. Indeed, it is reasonable to suggest that defense research, particularly policy research, can help prevent such miscalculations. As to shortchanging nonmilitary requirements of society, there is no logical reason why academics who have the skill and inclination to devote themselves to such endeavors cannot do so. There are sources of money, not only federal, but also from state and even local governments, as well as the many private foundations, that are prepared to distribute largesse. In fact, a good deal of research on nonmilitary problems has been done at universities lately. Any self-respecting large campus these days has some sort of urban-problems research center or task force.

What it all comes down to is a question of whether or not universities and their talents should devote part of their talents and energies to national needs. If the answer is yes, then defense is one of those needs.

And Whither the Think Tanks?

Universities are not the only place where research gets done or where there is ferment.

In the years since World War II, through hot and cold war, a sizable and prestigious collection of special-purpose analytical and technical-management organizations, operated on a not-for-profit basis, has been sponsored by the military services. Their function has been to provide assistance to military planners and decision-



North American Rockwell photo shows Apollo-9's docking subsystem, comprised of a probe, left, and a drogue and tension tie and docking ring. Probe is attached to the Apollo command module docking tunnel through which the astronauts transfer into the LM after the drogue portion is removed.



The Defense Department is preparing a policy which, if approved, would allow government-sponsored not-for-profit "think tanks" like RAND Corp. (left) of Santa Monica, Calif., to take on up to twenty percent of their business in nonmilitary fields.

makers in the design of weapon systems, the development of military/political strategy, and a host of other specialized defense problems.

The most famous of these defense-oriented "think tanks" is, of course, the RAND Corporation of Santa Monica, Calif. (see *"RAND—The Air Force's Original Think Tank,"* AIR FORCE/SPACE DIGEST, May '67). But there are several other such institutions, including, among others, the US Army's Research Analysis Corporation (RAC); the US Navy's Center for Naval Analyses (CNA); the Department of Defense's Institute for Defense Analyses (IDA); also the Air Force's Analytic Services Incorporated (ANSER), MITRE Corporation, and Aerospace Corporation. MITRE and Aerospace Corporations, as AIR FORCE/SPACE DIGEST readers will recall from articles that have appeared on these pages, concentrate on technical planning of, respectively, command and control, and missile and space, systems for the Air Force.

All the organizations listed above, scattered around the country from Massachusetts to California, have in common the fact of US government sponsorship and existence in a state of sheltered government captivity. They were established to serve public, primarily military, purposes, and are primarily financed by federal money. Until relatively recently they rolled along their analytical and advisory tracks untroubled by fiscal and other storms that swirled in the outside world.

A few years ago this calm was dissipated by congressional criticism, particularly of the Aerospace Corporation, of the management of the think tanks, and Congress placed ceilings on their funding. More recently the think tanks, notably the Institute for Defense Analyses, have borne a series of attacks from the campus New Left as centers of "war research" that student activists have proclaimed immoral and inappropriate to academia, which has been a prime source of staff and expertise, "in-house" and for consulting services, to the think tanks.

IDA was a particular target during the Columbia University campus disturbances, attacked as a symbol of university involvement with the defense think tanks. Student and faculty pressures at Columbia and other colleges forced a withdrawal of official university sponsorship of IDA, which had been put together by a number of prestigious universities for DoD.

These and other pressures have spurred a good deal of self-examination among the think tanks as to their

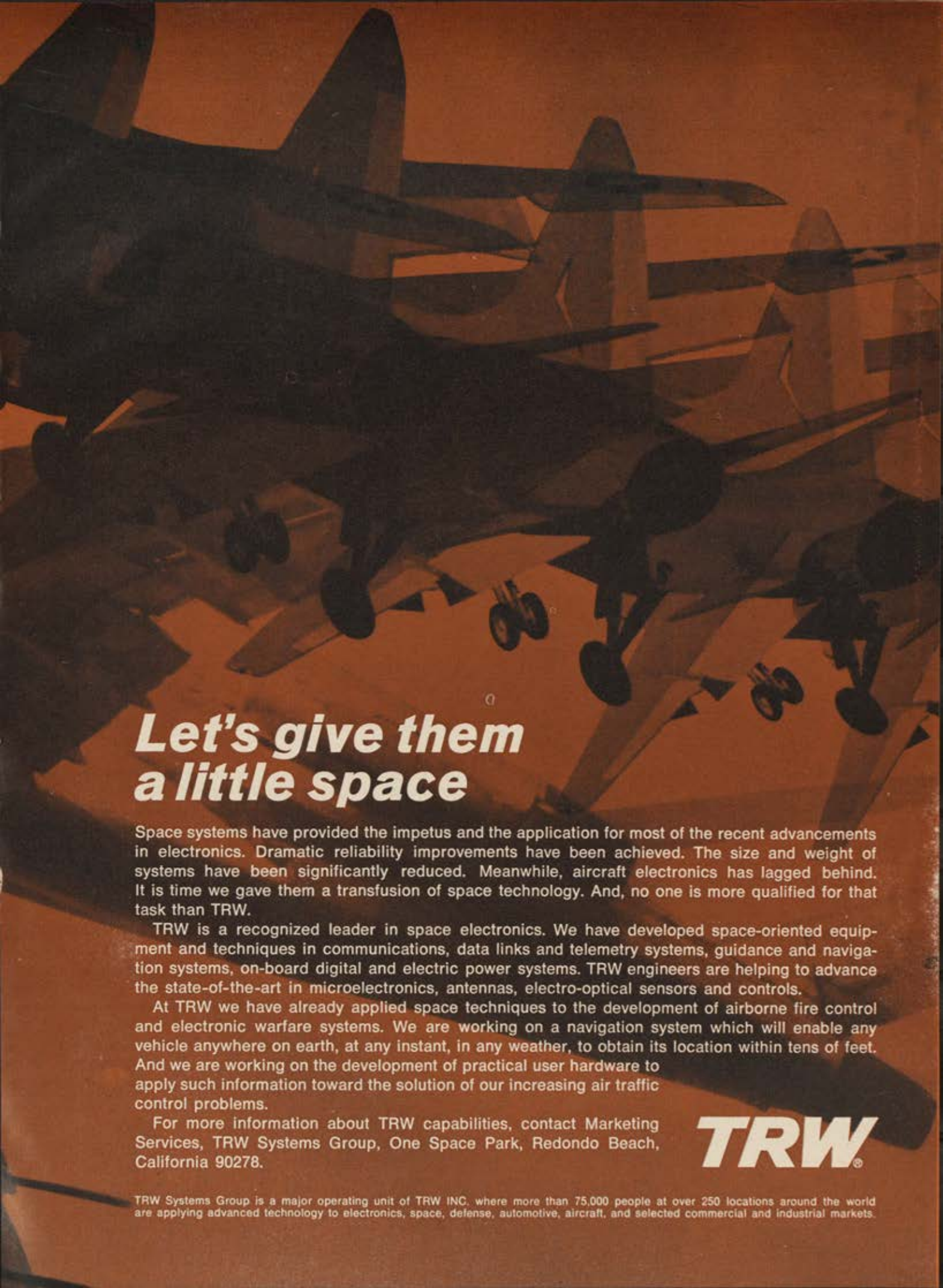
future roles. Caught in a funding squeeze as a result of the congressional ceilings placed on them and sensitive to the criticism leveled against them as purveyors of counsel to the military, they have in recent years started to look around for new analytical and technical fields to conquer. Increasingly, the think tanks have focused on the widely discussed array of nonmilitary public "Great Society" problems—urban transportation, environmental pollution, education, and all the rest. Slowly but surely, with various degrees of assent from their prime sponsoring military agencies, they have begun to enter these fields. One recent dramatic example, among many, of such involvements was the announcement that the RAND Corporation would, with North American Rockwell as a partner, analyze the increasingly confused operations of the stock market.

The entry of the once exclusively military-oriented government-sponsored not-for-profit think tanks into such nonmilitary fields has not been without controversy and has usually involved fairly delicate consultations with sponsoring military agencies with a view to ensuring that the original purposes of the think tanks would not be compromised. At the same time, there have been internal differences of opinion in the think tanks as to the competence of their staffs in nonmilitary fields and the transferability of think-tank analytical skills over to the nonmilitary fields. But in the main, the movement of the think tanks into the nonmilitary fields has been cautious but inexorable.

Now, for better or worse, a specific policy is in the works at the Defense Department, which will officially encourage the think tanks to take on up to twenty percent of their business volume in nonmilitary contracts. The proposed policy, being submitted to the new Defense Secretary, Melvin Laird, is described as a recognition of the think tanks' funding problems under the congressionally imposed ceilings and as a recognition of their desire to work on nonmilitary problems. DoD also is confident that a maximum of twenty percent involvement by the think tanks in nonmilitary work will not dilute the think tanks' contributions to military problem-solving. Presumably the proposed policy also reflects a vote of confidence by DoD that the think tanks can make a useful contribution in nonmilitary areas.

At any rate, if the policy is approved, a major new chapter in the history of these unique collections of brainpower will have opened. How well they will do in their new arena will be interesting to watch.—END





Let's give them a little space

Space systems have provided the impetus and the application for most of the recent advancements in electronics. Dramatic reliability improvements have been achieved. The size and weight of systems have been significantly reduced. Meanwhile, aircraft electronics has lagged behind. It is time we gave them a transfusion of space technology. And, no one is more qualified for that task than TRW.

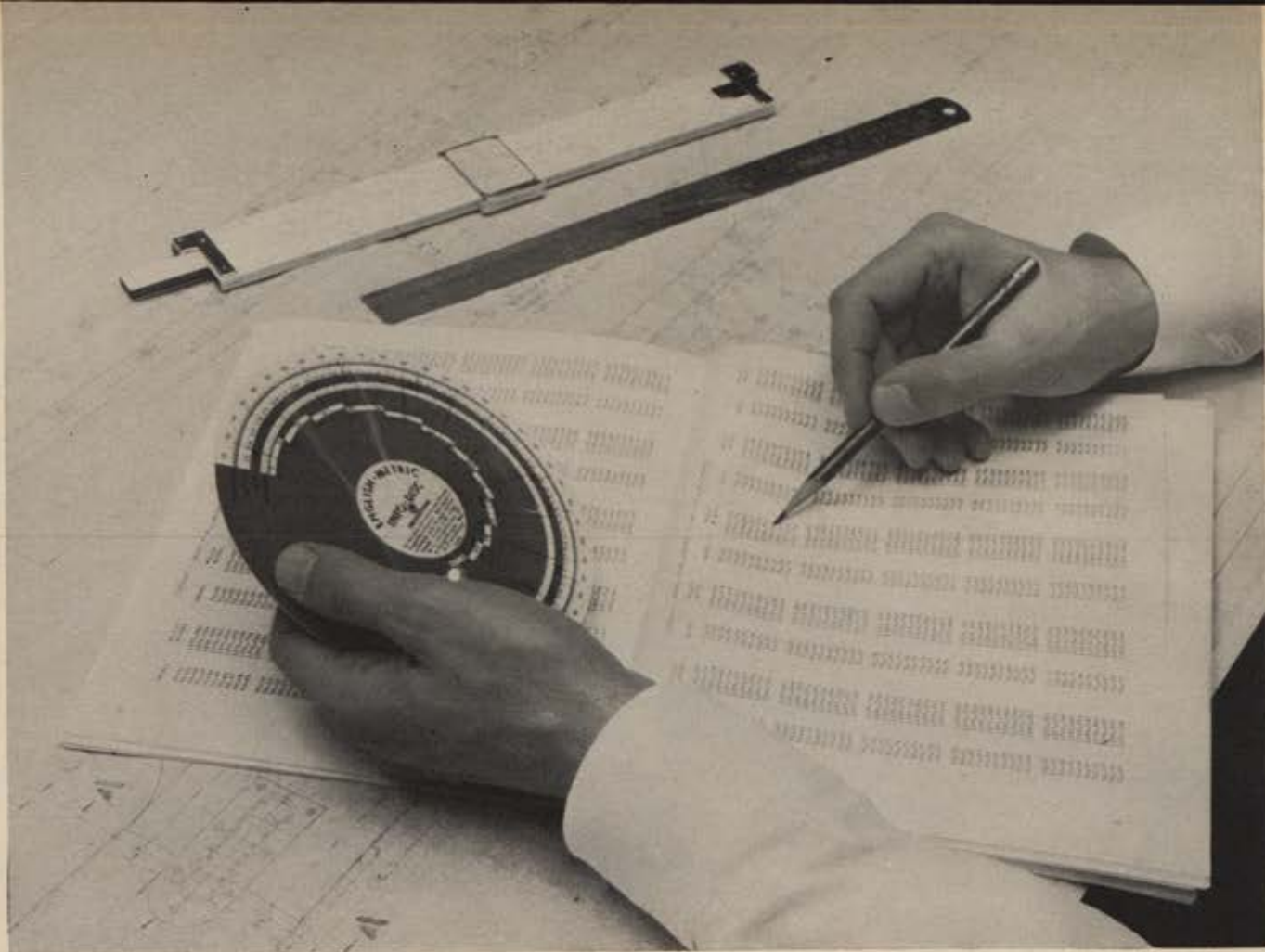
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Ninety percent of the world's people conduct three-quarters of the world's trade using the metric system, which has distinct logical advantages over the so-called English system of inches, feet, miles, etc.—which even the English are abandoning. But the US still clings to . . .

The Last Lonely Inch

BY J. R. ALLIETTA

THE vast engineering and scientific community of the United States is becoming uneasily aware that it may be suffering from the loneliness of the victorious long-distance runner.

The nation is jogging ahead into one technical victory after the other, but when it looks over its shoulder in the fields of weights and measures, nobody's there. The United States is almost all alone in adhering to inches, feet, yards, miles, ounces, pounds, and tons.

Ninety percent of the world's people conduct three-quarters of its trade using the European-originated metric system, a fact that is increasingly worrisome to our national planners as those figures grow annually.

Recently, at the request of the US Air Force, the Columbus (Ohio) Division of North American Rockwell performed a study to investigate the feasibility of applying the foreign system to the design and production of a major advanced airborne weapon system.

A task force composed of design and manufacturing specialists at the division spent six weeks studying the human, mechanical, and technological problems involved in attaining a familiar goal using unfamiliar methods.

Some Defense Department observers have stated that the exploratory project could be an indication of this country's willingness to join eighty-odd other nations in using a system they feel is faster, more accurate, and easier to learn and use.

Most military experts are bullish about the effects that commonality in design and operation of sophisticated armaments would have on mutual-assistance alli-

"A uniformity in the weights and measures of the country is among the important objects submitted to you by the Constitution and if it can be derived from a standard at once invariable and universal, must be no less honorable to the public councils than conducive to the public convenience."

—GEORGE WASHINGTON
October 25, 1791, to Congress

ances, where the US supplies a large proportion of the weapons its treaty partners use.

But to justify what has been estimated conservatively as a \$10 billion program in switching to a system which still holds mysteries for ninety-nine out of 100 Americans, there must be better reasons than weapons commonality.

What is there about the metric system, aside from the blunt fact of its overwhelming scientific popularity, that recommends it for adoption by this country?

The system, like all measurement units and standards, is arbitrary. While considered to be inherently more logical, it offers no increased accuracy over the English system. It does, however, permit faster and more accurate scientific calculation and, according to educators, can be learned in about twenty-five percent less time.

Vague Antecedents

So-called English weights and measures (which the English call imperial) have long and very vague antecedents, dating back to the Phoenicians. Often history becomes entwined with folklore, as exemplified by the belief that the yard originally represented the distance from shoulder to fingertip of King Henry I—thirty-six inches.

Nor is the English system noted for its internal logic, since its units are not related to each other. Originally the foot was probably the length of a human pedal extremity as revealed by reference to similar, but differing, units in European historical documents. The statute mile derived from the Roman *mille passum*, a thousand

"No one proposes to change the sizes of useful things, but merely to designate them in language of measurement known to the whole world."

—DR. SAMUEL W. STRATTON
First Director of the US Bureau of Standards

paces, the Roman pace being a double step of about five feet.

Metric measurement was started in France in 1790 as an attempt by the revolutionary National Assembly to establish a system suitable for all times and all peoples. The Assembly therefore proposed to base the system upon permanent natural standards.

The term metric derives from *mètre*, a unit of length about thirty-nine inches, originally intended to represent a ten-millionth part of the distance from the equator to the North Pole at the longitude of Paris. Units of area, volume, and weight are all related to the meter. The unit of mass, the gram, is the weight of a cubic centimeter of water at the temperature at which water is most dense.

Being a decimal system, every multiple or submultiple of a unit is related to that unit by a power of ten. For example, a millimeter is one-tenth the length of a centimeter, and a kilometer is a thousand times the length of a meter. No such relationship is possible in a system where a foot and a mile have so little in common.

Ironically, the metric remains this country's only officially recognized measurement system, having been formally approved by Congress (but never actually adopted in practice) in 1866. To this day, there exists no official foot or pound in the National Standards Bureau vault; the units are known there only as fractions of the referential metric standards.

Move to Metric

In 1875, with the signing of the Treaty of the Meter in Paris, most of the world's technically advanced coun-

HOW THE WORLD HAS TAKEN TO THE METRIC SYSTEM

France	}	1790-1800	Paraguay	}	1900-1920
Belgium		Iceland			
		San Marino			
The Netherlands	}	1800-1820	Belgian Congo		
		French Indochina			
Luxembourg	}	1820-1840	Denmark		
		Guatemala			
		Costa Rica			
Greece	}	1840-1860	El Salvador		
Algeria			Nicaragua		
Puerto Rico			Honduras		
Monaco			Venezuela		
Colombia			Cambodia		
		Panama			
Portugal	}	1860-1880	Surinam	}	1920-1940
Italy			Philippines		
Ecuador			Poland		
Chile					
Peru			Malta		
Bolivia			Haiti		
Spain			Morocco		
Brazil			Afghanistan		
Germany			U.S.S.R.		
Hungary			Libya		
Liechtenstein	}	1880-1900	New Guinea		
Czechoslovakia			China		
Netherlands			Turkey		
Antilles			Iran		
Austria			Lebanon		
Switzerland			Syria		
Mauritius			Iraq		
		Thailand			
Seychelles					
Norway			Indonesia		
Cuba			South Korea		
Yugoslavia			Albania		
Romania			Egypt		
Argentina	}	1880-1900	Japan	}	1940-1960
Sweden			Jordan		
Bulgaria			Dominican Republic		
Finland			Israel		
Uruguay			Sudan		
Tunisia			India		
Mexico					
		Great Britain		1960	

—Source: Metric Association, Inc.
2004 Ash St.
Waukegan, Ill. 60085

tries gave international recognition to the metric system.

Japan and Great Britain, both great trading nations, have elected to join the metric migration in the past few years. Japan completed an orderly changeover in 1966, a year after Britain embarked on a conversion program expected to be accomplished in 1980. Her departure leaves only Canada, South Africa, and Australia besides the US as major industrial powers that continue to use English measures.

Debate over adoption of a metric system has persisted from this country's earliest days, when Thomas Jefferson, a respected engineer and architect as well as statesman, submitted to the House of Representatives an unsuccessful proposal that the metric system become the one and only officially recognized measurement system of the United States.

In the intervening years, Congress has exhibited little enthusiasm for metric adoption. Between 1896 and 1966, well over a hundred bills relating to weights and measures made their way into, but not through, the legislature. In the summer of 1968 Congress finally passed a bill, sponsored in the House by Rep. George Miller of California and in the Senate by Senators Clai-

"A UNESCO survey on the educational achievements of thirteen-year-olds in twelve countries shows that the arithmetical achievement of English schoolchildren was significantly less than that of children from other European countries. It attributes the disparity to the excessive use of fractions and outmoded units."

—METRIC ASSOCIATION, INC.

borne Pell of Rhode Island and Robert Griffin of Michigan, which authorized a comprehensive metric measurement study.

The National Bureau of Standards will determine the effect on this country of increasing worldwide metric usage, and make recommendations for response by industry and government. The bill also authorizes the Secretary of Commerce to study and recommend an improved measurement system for both the US and international use.

Senator Pell claims continued adherence to the English system is costing the US from \$10 to \$20 billion yearly because foreign markets are becoming increasingly prejudiced against nonmetric American goods.

There also exists considerable pro-switch sentiment within the noneconomic sector. An Ohio State University professor of Aeronautics and Astronautics, Dr. Rudolph Edse, is German-born, with equal facility in both measurement systems. He notes a heightened interest in the metric system within his field, resulting from reports of foreign aerospace activity, largely Soviet. Faced with the tedious translation of data from such reports, Dr. Edse views metric adoption as "the only reasonable course of action—and the sooner, the better."

By common, if not statute, law the US has always been at least partly metric-oriented. Our pharmaceutical firms measure in grams, and the optical industry uses millimeters to describe focal lengths (but the industry uses customary units for lens diameters, in order to fit tubes and mountings which in the US are in customary dimensions). Sports car owners routinely rate engine

displacement in liters and perform maintenance with metric tools purchased from American mail order houses.

For years the US Army Map Service has depicted distances on its charts in both kilometers and miles. The National Aeronautics and Space Administration in 1963 began requiring contractors to make research and development reports using metric units. The system has produced no serious problems to date.

Until recently, American dominance in such industries as automobile tires, oil drilling, aircraft, and computers has enabled producers to call the tune in furnishing US-gauged products to foreign users. Increasingly, however, sophisticated foreign technology threatens these formerly unassailable strongholds.

To cope with the threat, some major industries turn out products which perform to customary and metric standards alike. Others franchise metric-capable foreign firms to produce appropriately dimensioned products.

An example of a mixed (or transitional) approach to the standards standoff is the design of the Anglo-French supersonic transport, the Concorde. Working side by side, engineers and technicians from both countries put together the sleek swept-wing jet using their respective measuring systems.

Mounds of Data

The NAR Columbus Division task force, during its research on the feasibility of metric measurement, amassed mounds of data from machinery firms, material suppliers, manufacturers, and institutions with either real or theoretical metric experience.

The researchers were able to identify three key factors involved in metric feasibility: hardware, being the tools, machinery, and materials needed for production; software, the blueprints, computer programs, and punched tape for automated machinery; and education, or what one of the study leaders defined as getting people to "think" metric. None of the factors was regarded as a significant obstacle to feasibility.

Should Congress, the final arbiter, decree the metric conversion, it will not happen overnight. For the scientific community, the transition will be swift. For the vast bulk of Americans, however, it will be a gradual process, a time of erosion during which the old familiar English units of measurement will gradually slip from sight and join the ranks of the once-remembered.

Regardless of the time element, a metric changeover will directly affect the daily lives of more than 200 million Americans, influencing the way we calculate everything from lunch meat to lung capacity.

The titanic expense and effort which the switch would demand may be a small price to pay for this nation's survival in the arena of world competition.—END



J. R. Allietta, a former Navy Phantom pilot and program analyst with the Navy in Washington, is editor of North American Rockwell's Columbus Division's weekly publication, Take-Off, and public relations coordinator at NAR Columbus. The above article is reprinted with permission from the Winter 1968 issue of Skyline, a corporate publication of North American Rockwell.

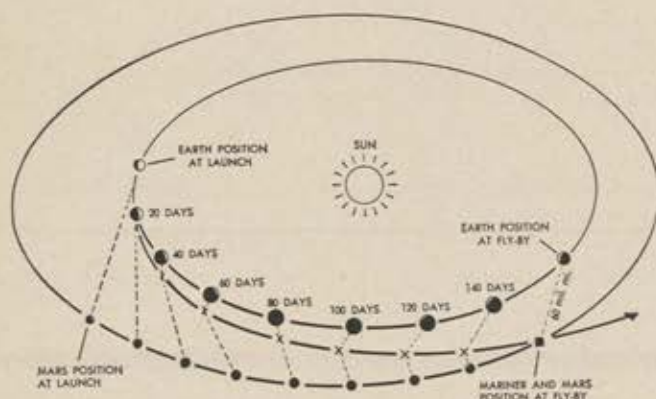
While world interest was primarily focused on the complex manned Apollo-9 mission in earth orbit, another Mariner unmanned probe headed toward the red planet Mars, targeted for a summer 1969 rendezvous with our cratered neighbor world...

Mariner-6— On Course to Mars

While the world watched Apollo-9 and its exciting series of manned maneuvers in earth orbit, NASA's Mariner-6 Mars probe, launched from Cape Kennedy, Fla., February 24, soared toward its celestial target millions of miles from earth. The probe will arrive at Mars on July 31.

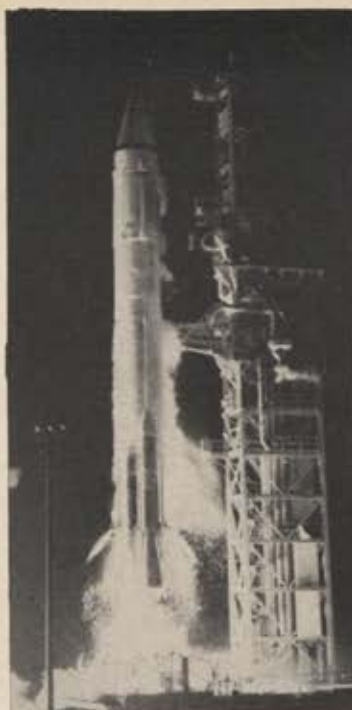
The first of two 1969 Mars probes (a Mariner-7 was scheduled for launch in late March), Mariner-6 will take photos of the red planet and then sweep as close as 2,000 miles to Mars, on an equatorial path, for "close-up" shots of the surface as well as instrument analysis of the Martian environment. Its follow-on, Mariner-7, will also take full-planet shots as it approaches Mars and then fly by at around 2,000 miles altitude in a polar path.

Compared with the predecessor probe, Mariner-4, which discovered the Martian craters, Mariners-6 and -7 carry three times as much instrument payload. NASA points out, too, that the data-transmission capacity of the 1969 Mariners is about 2,000 times that of Mariner-4. If both Mariners-6 and -7 do their jobs fully, some 200 photos will be the payoff.—W.L.

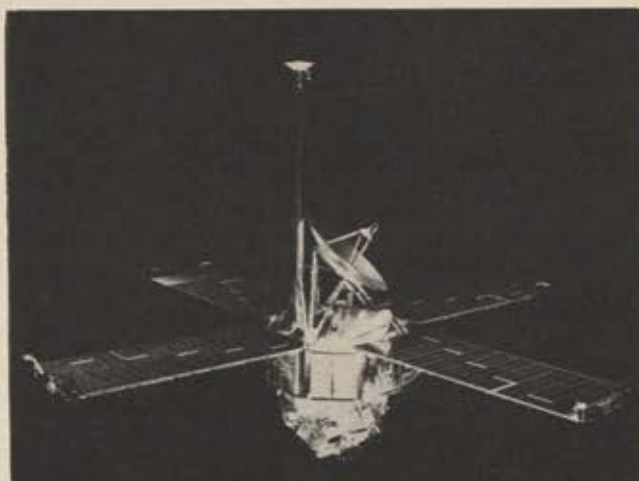


Schematic above shows the great cosmic sweep between earth and Mars that will be covered by Mariner-6, now en route to the red planet, and its follow-on twin, Mariner-7, scheduled for launch from Cape Kennedy, Fla., in late March. Mariner-6 is scheduled to arrive at Mars July 31.

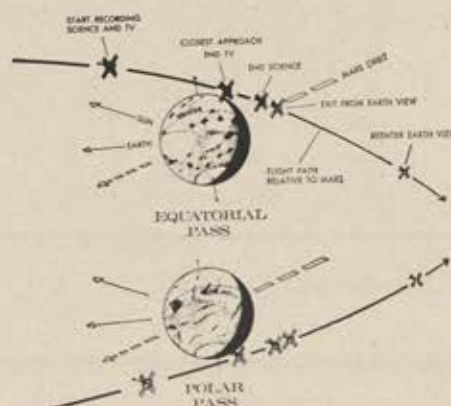
SPACE DIGEST/APRIL 1969



With a powerful push from an Atlas-Centaur booster, Mariner-6 soars skyward February 24 for the start of its multimillion-mile voyage to earth's neighbor planet. Atlas-Centaur boost power allows three times the instrument payload that was carried by Mariner-4 a few years ago in its highly successful Mars trip.



It's hard to see in this photo, but emblazoned on Mariner-6's outer surface, under the right-hand solar panel, is the Great Seal of the United States. This spacecraft and its twin, Mariner-7, carry TV cameras and other instruments.



As shown in this drawing, Mariners-6 and -7 will get mighty close to Mars. Mariner-6's scheduled path, top of drawing, will take the probe through an equatorial fly-by, and Mariner-7 will pass close to the red planet in a polar path. The combined coverage is expected to yield considerable data.

Since Sputnik, orbital space has become a kind of junkyard for a sizable collection of man-made hardware—used-up satellites, pieces of satellites, and other leftovers from long-completed space missions. The North American Air Defense Command keeps track of every object at least thirty inches in diameter but the litter does present problems . . .

Space Debris: Keeping Track of Space Junk

BY HAROLD R. WILLIAMS



YOU can't see them, but floating over your head are more than 1,300 pieces of space flotsam and jetsam. A few are performing valuable service—communications, weather forecasting, and reconnaissance—but most of the objects are just plain—but expensive—junk.

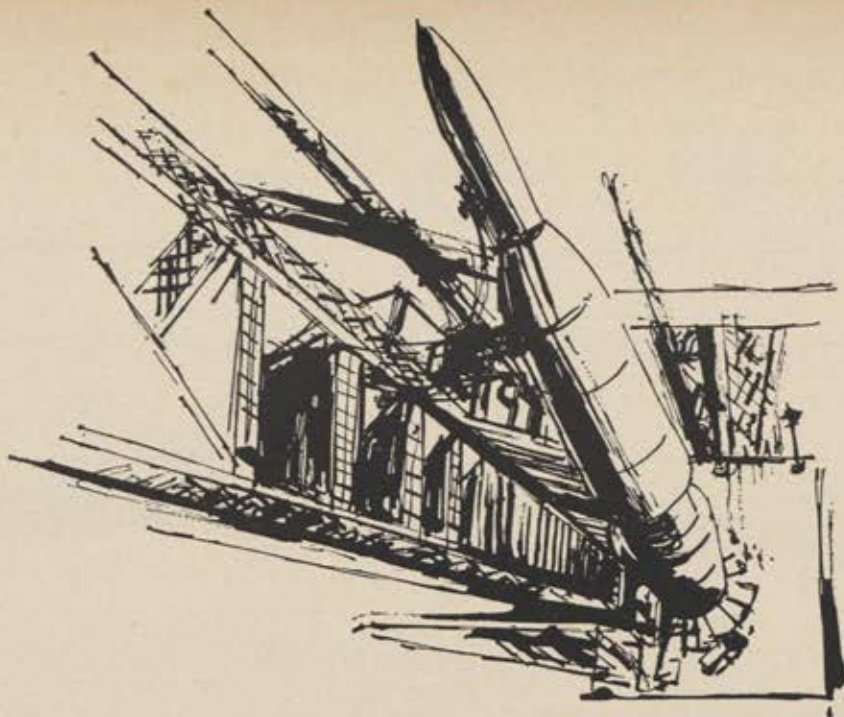
Sputnik I, still in orbit with an estimated lifetime of more than 10,000 years, started it all on October 4, 1957. The United States followed with its first satellite, Explorer I, also still in orbit and expected to stay there about as long as Sputnik I. Since the two earliest satellites, the United States and Russia have placed thousands of objects into orbit.

Most satellites placed into orbit are designed to come back to earth and burn up in the atmosphere. But sometimes things go wrong. For example, a Russian rocket attempting an interplanetary mission blew up when re-ignition was tried and sent more than 500 separate pieces into orbit, most of which have reentered.

All objects thirty inches in size or larger are tracked, catalogued, and assigned a radar signature by the North American Air Defense Command (NORAD) in Colorado. NASA's Goddard Space Flight Center in Maryland keeps track of all objects in space, including Russian missions, and publishes a monthly satellite situation report. The latest report counted 1,358 objects in orbit, most of which are garbage.

Not all the garbage is rocket hulks or jagged chunks of metal. Astronaut Ed White lost a glove. Later Gemini flyers dumped food wrappers, used umbilicals and oxygen tanks, and other items not needed. A camera, flight-plan book, and several photographic plates were lost in space during Gemini-10.

A project called West Ford was the worst case of space litterbugging. A capsule containing more than 400 million small copper needles was opened 2,000 miles above the earth on May 10, 1963. Each needle was 0.7 inch long and 0.001 inch in diameter. The experiment



was to try to bounce radio signals from the needles instead of using jammable communications satellites. The needles stayed in a dense cloud for several weeks, and then they spread out, eventually forming a ring completely around the earth, stretching from pole to pole. Experiments halted when the needles spread so far apart that tracking became impossible.

The most debris from one launch still in orbit are the 217 pieces from a United States Titan III launch on October 15, 1965. In 1961, the Russian satellite Omicron I left 211 objects still in orbit. Pieces from each launch are returning to burn up in a fiery reentry.

But not all the objects in space burn up. Some survive the intense reentry heat. Debris has crashed in Africa, South America, and Arizona, and hundreds of jagged pieces have gone down in oceans around the globe. John Glenn displays on his desk a piece of the Atlas rocket that sent him into orbit, and several pieces of metal from a Russian spacecraft were recovered in the north central part of the United States.

It is this debris reentering the atmosphere that has been called a danger to peace by renowned British astronomer Sir Bernard Lovell.

Sir Bernard, Director of the Jodrell Bank Observatory, says misidentified space debris could cause a world war. He says that space is being polluted by man-made objects that could be mistaken for ballistic missiles and start another war by mistake. Lovell says at the present rate of launchings, more than 2,500 objects could be floating in space in the next ten years.

He has recalled one serious incident during the Cuban missile crisis in October 1962. It was the same Russian rocket mentioned earlier that exploded upon restarting. Lovell said, "This cloud came toward Alaska, where it was picked up by the Ballistic Missile Early Warning System. It might for the moment have looked like a mass intercontinental missile attack." He said computers revealed the cloud was harmless "but the potentialities for misidentification were there."

Although there are hundreds of pieces in orbit, none have collided as far as is known. Gemini astronauts reported seeing several large unidentifiable objects.

NORAD, knowing where each object is at all times, reported what the object was. None of the pieces came close enough to be recognized or considered dangerous.

However, NASA is studying the possibility of space debris coming back to earth and striking inhabited areas. Almost \$1 million have been spent on the study, but no results have been announced as yet. The closest a piece has struck near a populated area was in 1967 when a metal sphere smashed to the ground in Mexico near a small village. After an examination by NASA scientists, it was identified as coming from a Gemini adapter section.

Space is a tempting place to dump things, and some plans have been suggested by scientists that sound fantastic, but may still be logical. Some engineers have suggested that the world's growing population will someday demand a heavenly garbage dump. They argue that by the time such a plan is needed, the cost of launching will be much smaller than it is now. Why not load up a rocket with garbage, they ask, and send it into orbit? The garbage would disintegrate upon reentry and the world would have a solution to a serious problem.

Present plans in Apollo call for even more space litterbugging. Two parts of the Saturn V booster will be left in orbit by moon-bound astronauts. Once on the moon, the astronauts leave that alien soil in the ascent stage of the Lunar Module. After it has rendezvoused with the Command Module, the LM ascent stage will be left to circle the moon. When the Command and Service Modules come closer to earth, the Service Module will be discarded and left to circle the earth.

—END



Harold R. Williams, a former science writer for the Associated Press, is president of Space Associates, a Houston, Tex., public relations firm, and has been reporting the space age for a number of years. The above article is reprinted with permission from the January 1969 issue of Rendezvous, a monthly publication of Textron's Bell Aero-systems Co., Buffalo, N. Y.



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LETTER FROM LOS ANGELES

By Irving Stone

WEST COAST EDITOR, AIR FORCE/SPACE DIGEST

DoD Plots New Contracting Procedures

The long-sought goal of practical and equitable contractual arrangements between the Defense Department and the aerospace industry has not been approached as rapidly as either had projected. But indications are that renewed effort on both sides may hasten attainment of this goal.

The complexities of the problem are mirrored in the current initial-phase competition for the total-package procurement of the Air Force's F-15 air-superiority fighter (formerly called the FX). Three aerospace companies—Fairchild Hiller, McDonnell Douglas, and North American Rockwell—are engaged in an intensive definition phase (Phase 1B) to support proposals for the follow-on Phase 2 encompassing design, development, test, and evaluation (DDT&E), and finally production of a sizable number of the fighters.

The importance and magnitude of the program is evidenced in the \$9.6 million the Air Force is paying each of the three contractors for the definition effort, scheduled to end July 31. Following evaluations and negotiations, Phase 2 is scheduled to commence January 1, 1970. The Phase 2 portion of the program (the acquisition phase) originally was projected by the Air Force as a fixed-price-incentive (FPI) procurement. But it is indicated that this will be changed to more equitably recognize the over-all uncertainties or risks the contractor will meet in developing and producing the complex F-15 system.

F-15 Change Possibility

It's likely that some form of cost-plus-incentive-fee (CPIF) arrangement will be allowed to be proposed for the DDT&E portion of Phase 2 of the F-15 program, with fixed-price-incentive fees for successive targets (FPIS) applied to the initial test aircraft and the production aircraft. It's also probable that an additional incentive—an award fee—may be allowed, based on a subjective evaluation by the Air Force's F-15 System Project Office (SPO) of the production aircraft's system performance.

This arrangement would be a distinct improvement over a straight FPI contract for the entire acquisition phase, but industry probably won't be completely happy with it. The reason is that under the formula to be applied for the successive targets, the probability of recovering losses incurred in the early part of the program when the risks are high is minimized because the ceiling (program dollars) will remain constant.

But it is a big jump from the restrictions of the FPI arrangement applied to high-technical-risk, high-production programs. Some of these in the past have been conducted with heavy financial losses to the contractors, schedule delays, and limitations on government reassessment of program goals.

If the F-15 procurement does become a total-package FPI arrangement, it will be following the Navy arrangement made with Grumman for the F-14 ship-based fighter. To do otherwise could arouse some very strong comment in Congress. Also, the Air Force has the advanced manned

strategic aircraft (AMSA) on the horizon, and it may want to apply an FPI contract to that program as well.

Meanwhile, the problems of contracting continue to be aired against the current contracting philosophy. This includes the government's desire for the performance it projects to meet a potential threat, to keep costs down, and to provide realistic schedules; and industry's position that it wants to produce the best article, wants to make a reasonable profit considering the uncertainties (the known unknowns and the unknown unknowns, as they are called in the aerospace industry) involved in any advanced program. Industry would be willing to assume a reasonable share of the risks but doesn't want to stick its hand in a sack not knowing whether it will come up with an incentive reward or a penalty in the form of a heavy loss through no fault of its own.

Mock Session on Risks

In an attempt to assess the ramifications of these risks in weapon system acquisition of total-package procurement, the Fifth Educational Conference of the South Bay Chapter of the National Contract Management Association was held recently in Los Angeles. Program chairman was W. Austin Davis (Lt. Gen., USAF, Ret.), Vice President of North American Rockwell's North American Aviation Division. The program was directed by David M. F. Lambert, NAR's Director of Contracts and Pricing.

In the main the program was comprised of mock sessions dealing with negotiations in the case involving the procurement of the hypothetical "F-20 VTOL fighter." Constituents for the negotiations included three hypothetical teams—a government team, including a systems engineering consultant for government; a potential prime airframe contractor supposedly performing a six-month, \$11.5 million contract-definition study (Phase 1B) to prepare an FPI proposal for an eight-year program covering design, development, test, and production of 500 of the new "F-20s"; and a potential associate prime contractor for the attack radar.

Covered in the negotiations was the gamut of considerations involving technical, contractual, and interface risks, and possible alternate contractual relationships offered by the industry teams as more equitable and realistic than the straight FPI anticipated for the acquisition phase (Phase 2).

Participants constituting the specific teams included representatives of various Air Force offices and aerospace companies, welded into groups so realistically that if it weren't known that these were mock sessions they could have passed for actual negotiation sessions. Such discussions undoubtedly will help promote improved contractual relationships.

The Over-all View

Contractual philosophy applicable to both government and industry was expressed by guest speaker Lt. Gen. John W. O'Neill, Commander of Air Force Systems Command's Space and Missile Systems Organization (SAMSO). General

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- ☐ Other Civilian

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- ☐ Engineering
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- ☐ General Aviation

Other Industry or Business ☐

Professional

- ☐ Educator
- ☐ Lawyer
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O'Neill likened risks in weapon systems acquisition to the predicament of the deep-sea diver who received a frantic call on his intercom: "Come up at once—the ship is sinking." Frequently, in trying to balance the risk factor in military procurement, there seems to be about the same choice of unpalatable alternatives, General O'Neill emphasized.

Government thinking on the assessment and assumption of risks is neither cut and dried nor unanimous, he said. Underscoring that the views expressed were his own, not necessarily those of the government, General O'Neill acknowledged that in some respects an awkward age had been reached—with the government too experienced to undertake procurement the way it did for the old systems, but "not smart enough" to do it completely right for the new ones.

The characteristic of change treading on the heels of change, typified by the Minuteman ICBM program, greatly compounds the difficulties of all contracting, complicating the problems of establishing realistic incentives, because of the number of the uncertainties and changes involved, General O'Neill pointed out.

For some years the government has been trying to cast an increasing percentage of defense contracting in the fixed-price-incentive mold. Properly applied, this type of contract will give better value for the defense dollar and also can yield higher profits to the contractor who is able to deliver, the General contended.

"We want to see industry make reasonable profits from this system. We don't like to see losses. Industry losses under incentive contracting are not gains for the Department of Defense or the taxpayer. . . . We have realized as our experience with fixed-price-incentive contracting grows that many procurements call for highly individualized solutions. Fixed price is not a blanket that can be thrown over an arbitrary percentage of our procurements. Each contract must be carefully tailored to achieve the best results in terms of end product and the most equitable balance of risk between government and contractor," General O'Neill explained.

A most important factor in accomplishing this customized contract shaping, General O'Neill emphasized, is active

participation of the line managers—the program directors in government and industry—in the selection of the type of contract to be used and any special clauses it will contain.

"Industry has also been making a hard, honest effort to make incentive contracting work. We are fully aware of the economic factors that have occasionally tended to pressure contractors into underestimating the degree of risk to which they were committing themselves, with unfortunate results for both the contractor and the government.

"I don't think these pressures, however great, ever justify buying in, because the results are always very bad. I also think that when a contractor believes that the form of contract we are proposing is wrong, he should say so," the General declared.

It's clear that work on these contract problems is in a period of transition and solutions that are not working are not here to stay. General O'Neill feels that the trend is toward some sort of middle ground that will favor the use of cost-type contracts—possibly with carefully structured incentives—for development work and fixed-price-incentive contracts for production. This may be possible, he said, if "the gap between the two types of contracts can be bridged in one procurement. . . .

"Any procurement risks that become an intolerable and destructive burden on the aerospace industry are likewise intolerable to the Department of Defense. We must continue to work together to cut them down to size, and to ensure that government contractors meet our needs in an environment which provides the opportunity to earn the full and fair profits essential for health and growth in our economy," General O'Neill said.

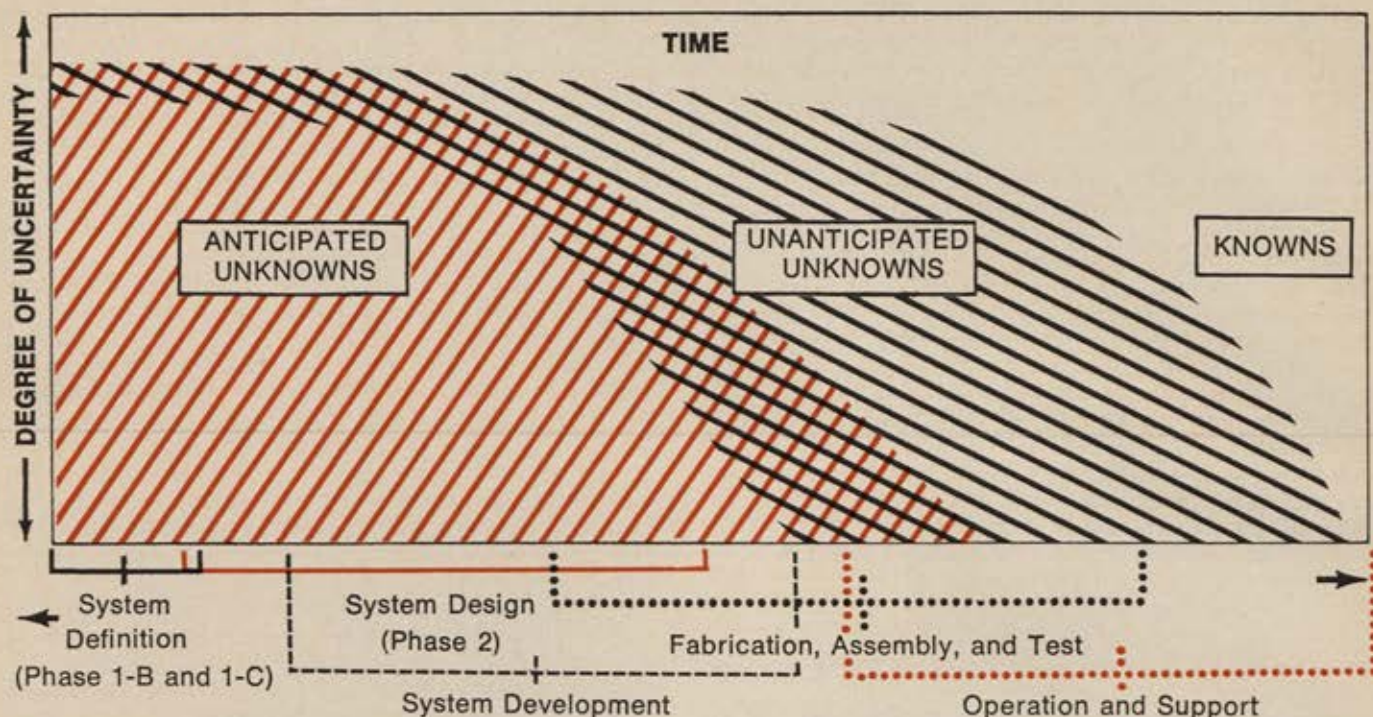
Industry Slants

The industry viewpoint, in general, certainly agrees with the precepts stated broadly by General O'Neill. However, with respect to the actual establishment of procurement conditions, industry feels that there are simple though basic approaches that must be resolved in the relationship between technical reality and contractual practices.

(Continued on following page)



Lt. Gen. John W. O'Neill (center), Commander of the Air Force Systems Command's Space and Missile Systems Organization, shown in a recent visit to AEDC's Rocket Test Facility. At left is Brig. Gen. Gustav E. Lundquist, Commander of Arnold Center. Joel Ferrell, chief of RTF for ARO, Inc., explains test equipment.



The importance of the realities of technical uncertainties inherent in weapon systems development being recognized in contractual agreements is underscored by this chart based on aerospace industry experience. The chart shows the technical task of identifying "unknowns" and their conversion to "knowns" for the period beginning in the definition phase (Phase 1) of the program and progressing through the succeeding Phase 2 for testing, development, and production. As is indicated, at some point after operational deployment the curve on the chart approaches zero unknowns. Rate at which uncertainty is reduced is indicated by the slope of the curve. Note that the time span is broken into its various segments beginning with the system-definition phase and overlapping as they move progressively to the final phase, operation and support.

It's clear that technical development involved in the creation of current and projected aerospace and weapon systems can't be defined with off-the-shelf hardware. Certainly, if all the technology required for such a program had to be defined at the very inception of the program, the system would be obsolete by the time it became operational, and, as such, would constitute no defense against a more sophisticated development of a potential enemy, industry feels.

As currently practiced, the early contract-definition phase of a program relies on a large amount of paperwork analysis combined with some limited hardware developments to project, in detail, the succeeding engineering development together with its pace and the amount of funding it will require. Yet, this approach is related to a DoD directive that imposes the requirement that the procuring agency should not contract for engineering development until the required basic technology is sufficiently established and that primarily engineering effort rather than experimental effort is necessary.

Obviously, the contract-definition phase as practiced currently does not ensure an adequate technical baseline for a fixed-price-incentive type of contract for engineering development.

It's basic that, in any development program requiring pushing the state of the art, uncertainties will emerge, some slight, some critical, until the development program is ended. Some of these uncertainties or risks won't be revealed until long after the system becomes operational. This would indicate that the contracting parties—government and industry—should have an arrangement in which these uncertainties or risks could be reassessed as they emerge so that the operational objective may be achieved with realistic schedules and cost. The statement of the requirement alone obviously doesn't achieve the systems

operational objective but, rather, the requirement is validated only as the result of a constantly changing process involving technology related to the realistic desires of the customer (the military).

For these general reasons, application of a fixed-price-incentive arrangement in a total-package procurement of a system isn't considered logical at a point in the program when the bulk of engineering development still remains to be accomplished. And it's felt that this type of procurement doesn't distinguish between degree of sophistication required for different systems such as transports, advanced fighters or bombers, or revolutionary electronic systems.

Studies of successful aerospace industry programs have disclosed that many technical unknowns were not and could not have been identified until the projects were in their development and test stage. Also, it was determined that analytical studies, no matter how extensive or well conducted, could not have revealed sufficient data to identify many of the unknowns. Tests of actual weapon system hardware were required to reveal many unknowns not identifiable at the beginning of the development programs.

AIA Analysis

A recent report of the Aerospace Industries Association concerning essential technical steps and related uncertainties in DoD weapon systems development has established a relationship of technical unknown to known transitions, based on the experience and judgment of senior engineering managers from a cross-section of the aerospace industry.

The degree of technical uncertainty has been represented in a curve (plot) as a function of time over the course of system definition, design, development, fabrication, assembly and test, and operation and support. The slope of the curve indicates the rate at which the technical

uncertainty is reduced during the development cycle. The over-all view is that the uncertainty is greatest at the beginning of the program and diminishes to nearly zero after a period of operational deployment of the system.

Thus, as the development program proceeds further into design, and as hardware components and subsystems are developed and tested in the laboratory, the pace at which additional unknowns are identified and resolved accelerates. When the initial design is completed, the rate of identification of unanticipated unknowns tapers off.

As the first system test vehicles are developed and initial tests are accomplished, the rate increases. And as the test programs proceed, the identification of unknowns again decreases to a low rate. The impact of the risks is not limited to the prime aircraft contractor, since the effect of the failure to recognize properly the degree of residual technical uncertainty is greatly intensified through the chain of prime/subcontractor relationships.

Thus, it is industry's belief that DoD policy should be revised to recognize that technical uncertainties in weapon systems acquisitions are a major factor to be considered in determining the appropriate contract method selected for each weapon system.

Alternatives Suggested

At this recent National Contract Management Association conference in Los Angeles, some contractual alternatives to the FPI type of contract were suggested as being more appropriate for the high-technical risk, high-production programs. One approach considers a single contract combining two types of arrangements—cost-plus-incentive fee (CPIF) and fixed-price-incentive (FPI)—for Phase 2 (acquisition). The CPIF arrangement would be applied to the high-risk content running approximately from the beginning of the phase through design, development, test and evaluation, and partly into the fabrication and assembly phase (production). The FPI arrangement would follow on the heels of the CPIF relationship and would apply to the balance of the production phase as well as to any production options.

Under this arrangement there is no price ceiling with respect to the CPIF portion, allowing more technical innovations to be explored by the contractor without penalty. In addition, it allows the government to adjust the program to conform to the latest threat information during CPIF period.

Another approach also applies one contract to cover the various portions of Phase 2 (acquisition). At the beginning of Phase 2—in the design, development, test and evaluation portion—an FPI arrangement is used, and at some succeeding point in Phase 2 a cost, ceiling, and profit formula is utilized to negotiate for the succeeding increment of production. This establishes a new target ceiling with respect to cost and profit, which is applied at other specified time intervals for succeeding production.

A third approach considers two separate contracts—one for design, development, and early production, and a second contractual arrangement for follow-on production. The contract extending to early production would be CPIF and, at the end of this portion of Phase 2, negotiations would be conducted to establish an FPI arrangement for application to the remainder of the production phase.

Against this total background of technical risks and fair compensation, there seems to be no hard and fast approach to achieve a contractual meeting of the minds between government and industry. It appears that each procurement—based on the content of technical unknowns—will have to be negotiated as an individual case, since an FPI arrangement for a total-package procurement would seem to be outdated.—END

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On April 25, 1967, following a storm of controversy that lasted several years, Canada passed an historic piece of legislation, the intent of which was to create a single, unified military service. In this article, the author, a veteran of and expert on Canadian military affairs, describes the current state of the armed forces consolidation and contributes some pointed commentary concerning the progress of unification vis-a-vis the goals set forth by the original planners . . .

Canada's Military Unification— A Progress Report

By Air Vice Marshal Robert A. Cameron, RCAF (Ret.)

Illustrated by Canadian Forces Photos

WHAT was military unification in Canada really all about?

Was Canada not making a respectable defense effort? Were Canadians not getting enough bang for their buck? Was excessive overhead depriving them of adequate modernization? Was the management system outdated? Were the civilians losing control of the defense establishment? Would the burden of self-defense seem less onerous if an all-marching-flying-sailing military man could be bred? Or was unification just an attention-getting gimmick to help hoist its architect, former Canadian Defense Minister Paul Hellyer, to the top political job in Canada?

The author, Air Vice Marshal Robert A. Cameron, spent thirty-five years in the Royal Canadian Air Force before his retirement in 1966. More than eight of those years were spent in Washington, where he provided technical liaison with the aerospace industry. Another eight years he spent in Europe, as Military Adviser to the Canadian Delegation at NATO and as Canadian Military Representative at SHAPE. This is the second article AVM Cameron has written for AF/SD on the Canadian military consolidation. The first, "Canada's Military Unification—Greater Efficiency or Chaos?", appeared in the February '67 issue. AVM Cameron also has written extensively on NATO.

One thing that can be said with some certainty is that in the experiment unification was launched with one or two principal goals in mind. Subsequently it seems to have developed into a sort of MIRV-type missile capable of attacking any target of opportunity—including most of those alluded to above. (See "Canada's Military Unification—Greater Efficiency or Chaos?" by the same author, Feb. '67, AF/SD.)

The most reliable indication of the original aims can probably be found in the covering *White Paper on Defense*, released in March 1964. In arriving at its recommendations, this document draws heavily on the findings of a *Royal Commission on Government Operation*, which had just previously published its report.

The essence of the Commissioners' criticism of defense policy was that, in the growing range of common activity among the three services, coordination and efforts to economize were ineffective because of an outdated organization at the top. They concluded, therefore, that all these overlapping areas should be transferred for executive management to the existing Chairman of the Joint Chiefs of Staff.

However, Mr. Hellyer, the father of Canadian unification, decided that this was not going far enough. In his *White Paper*, he identified the fundamental considerations for sound defense as: (a) central operational control and effectiveness; (b) streamlining of procedures; (c) straightforward decision-making; and (d) a reduction in overhead."

And to achieve these aims here are his punch lines:



Canada provides land, sea, and air forces in support of NATO. Here, four CF-104 Starfighters of Canada's Germany-based 1st Air Division fly over HMCS Bonaventure of Maritime Command. The aircraft are from the 430th Strike/Attack Squadron based at Zweibrücken.

"Following the most careful and thoughtful consideration, the government has decided that there is only one adequate solution. It is the integration of the armed forces of Canada under a single Chief of Defense Staff and a single Defense Staff. *This will be the first step toward a single unified defense force for Canada.*"

Name of the Game

There you have it. The principal requirement was apparently better management and reduced overhead. The idea of a "unified," as opposed to "integrated," force was tossed in almost as an afterthought. It appears in the conclusions without any preamble as to why it was necessary. Yet somewhere along the way

"unification" clearly became the No. 1 target for the Defense Minister.

At first, Mr. Hellyer seems to have made a clear distinction between the terms "integration" and "unification." But then he changed his line and started claiming that to differentiate between them was merely semantics. "You can't have one without the other," he said. But the weight of opinion on this is against him. Most authorities now think of military integration as the "control and coordination of environment-oriented combat forces, with common support as necessary." And this seems to be both desirable and attainable.

Unification, on the other hand, has come to be regarded as an extension of integration. It aims at a force of professional neutrals, with military plans un-

(Continued on following page)

New green walking-out uniform for all elements of Canadian Forces is being issued. Left to right: Sergeant of air element; Captain, land element; and Leading Seaman.



New green walking-out uniform for Canadian Forces' women currently is under trial. The uniform is of lighter shade than men's and has miniaturized insignia for feminine look.

prejudiced by sectional beliefs and pressures. The means to this end are such things as common indoctrination; common uniform, ranks, and procedures; extensive cross-training; great objectivity, and the like. What this would amount to is defense without the pain and vicissitudes of human nature. Such a goal is, of course, a pipe dream. And it was by attempting to ignore the fundamental difference between this and integration that finally cost the Minister most of his senior officer support.

Against this background, let us see what is happening to defense in Canada. But first, a brief résumé of events between 1964 and '68 to put the subsequent material in perspective for the reader.

Chronology

The White Paper heralding unification appeared in March 1964, with reorganization scheduled in three phases. The single Chief of Defense (CDS) and his integrated headquarters staff were authorized on July 16 of the same year. A unified command structure was approved in June 1965, and detailed planning for the various components got under way immediately thereafter.

Though there was no apparent urgency to legislate the army, navy, and air force out of existence, Mr. Hellyer decided to strike for this additional goal while he seemed to have the public with him. But it was only after a knock-down, drag-out battle which manifested itself in public debate, in the press, on the airwaves, and very vociferously in the parliamentary forum, that he managed to get the Unification Bill creating a single military service passed on April 25, 1967.

When the Canadian government changed, early in 1968, Mr. Hellyer left his Defense post and became Minister of Transport, where he still serves. His successor as Minister of Defense is Leo Cadieux, who had previously been Mr. Hellyer's Associate Minister. Mr. Cadieux is understandably committed to continuing the unification process, but also he is known to place great importance on individuals and on keeping good morale in the service. So the assumption is (and evidence to date confirms it) that he will both seek more advice from his staff and listen when it is offered. Such being the case, it is not surprising that after the tensions and turmoil of 1966-67, the atmosphere in defense has radically changed from top to bottom.

Where the Action Is

Of the major commands, unification has scarcely touched the composition and function of Air Defense, Transport, and Maritime Commands. Canada's NATO forces—a mechanized army brigade in Northern Army Group and an air division integrated with 4th ATAF—are similarly going along much as they had before.

However, Defense Headquarters in Ottawa, the logistics support organization, Training Command, and to a lesser extent Mobile Command, all reflect the impact of unification. So it is in these areas that we must look for the action.

Unification has made an impact on Defense Head-



Demolition teams of the Canadian ground forces don gear prior to boarding a CH-113A helicopter for an airdrop.

quarters in four respects that are worth comment: increased togetherness, potential for better decision-making, more aggressive management, and a major organizational weakness.

It is evident that soldiers, sailors, and airmen are seeing more of each other at Defense Headquarters than ever before. By and large they appear to be working comfortably together. Some even profess to like it. And there is less and less reference to the shotgun aspect of the association.

Better Decisions?

Turning to the process of decision-making, there can be little argument that with one reservation about overcentralization at the top, which will be discussed below, the situation has been improved substantially.

In the past, Canada theoretically had the means of spending its defense budget wisely. But, in practice, plans were conceived in single service groups and moved up through single service channels for ultimate approval by the Minister (not necessarily in Chiefs of Staff session). Frequently, before the merits of any one project vis-à-vis that of another service could be analyzed objectively, pressures for its adoption were almost irresistible. The net result was a lot of horse trading at the top rather than intelligent arbitration—a feature which the unification purists found most distressing.

With the present arrangement, few projects will ever see the light of day without immediate scrutiny by dispassionate eyes. It can be expected that, all the way up channels, a plan will be sniped at by those with competitive proposals, be modified somewhat, and hopefully improved thereby. If it ultimately gets the green light, there thus should be more chance of it fitting harmoniously into the total jigsaw pattern for defense.

More Management

Management is another area at Defense Headquarters where unification has had a considerable and useful effect. Of the three services before 1964, the Air

Force was perhaps the best administered—and for a very good reason. Since it spent the major share of the defense budget, Air Force officers were under more pressure than colleagues to manage their millions efficiently. To do this, they sought plenty of advice from the USAF, which had a similar responsibility, but for billions in spending.

Certain RCAF innovations had been adopted by the other services before 1964. More have since been adopted by the unified management. New ideas from other sources have been added. And, as of now, most everyone in defense seems to have developed a healthy respect for modern management plus a greater disposition to go along with its dictates.

Organizational Weakness

What many people regarded as one of the most glaring weaknesses of unification is the one-to-one, military-civilian coupling at the top of the organization. On the one hand we have a Minister of Defense, who may have little or no background to qualify him as a defense expert, face to face with a military man who has the whole military hierarchy under his authority.

In such a situation, two great dangers exist. A strong military Chief might dominate the Minister and enforce his prejudices, thus making the principle of civilian control a rubber-stamp travesty. Or a strong and poorly advised Minister could dominate a subservient military Chief, which would be equally as disastrous for the country's defense policies.

Happily, it wasn't long before both Mr. Hellyer and his Chief of Defense (CDS) recognized this weakness in the system. So first they sought a more flexible arrangement by forming a council of all field commanders. But this stabilizing forum practically died aborning because it was so unwieldy. In its place the CDS now has begun to include the senior soldier, airman, and sailor in the field in most of the important discussions.

So, with certain weaknesses in the system yet to be ironed out, a satisfactory advisory group for the Minis-

ter and the CDS seems to be emerging. Reference to these three prestigious field commanders will provide an essential expertise and guidance on environmental doctrine. It will be neither a *de jure* nor *de facto* return to the old, and much-criticized, independent Chiefs of Staff system. But by giving our military trade unions a strong voice at the top, it will help avoid the potential extremes of one-man control. (And incidentally, it will give Canadian professional military men the same sort of management participation that is fast becoming a universal pattern even for college students!)

Common Support

In the common-support area, the administrators and logisticians have been struggling mightily to create a genuine unified look without resorting to stupidities.

Before the Unification Act, Canada had common Chaplain, Legal, Dental, and Medical services. To this group have been added Recruiting, Public Information, Pay, Food, Intelligence, Security, Meteorology, Field Engineering, PXs, Static Communications, Personnel and Supply Movement, and Supply as it relates to a variety of common-user items, etc. And so far as one can see, nobody is any the worse thereby.

However, when we turn to technical supply and support functions, then the march to unification gets tougher. Despite the efforts of many earnest people, success in harnessing this logistics monster has been only marginal. Fundamental to any real unification of supply is a common catalogue and cataloguing process. Both these projects have been in the mill for some time and soon should be a reality. A completely unified and computerized supply system has been defined in considerable detail but implementation is many years away.

But even granting the availability of these logistics tools, authorities are under few illusions; they are very cautious about forecasting the extent to which the supply services ultimately can be unified.

The story on technical engineering and maintenance
(Continued on following page)



Mobile Command troops plod into deep snow after landing in CH-113A Voyageur during winter exercises taking place in Canada.

support is about the same. The only real unification has been in general philosophies and procedures and where the combat arms have such common requirements as helicopters, motor transport, ammunition, etc. Otherwise the pattern pretty well follows triservice lines, pulled together with integrated management at the top. One feature dictating that this arrangement may well continue in the future is the fact that defense must deal with separate aircraft- and ship-building industries, and continue to provide much in-house engineering talent for design and support of many naval and army requirements.

Within limits, coordination of the necessary cellular staff organization presents no problem. However, people are finding that important requests frequently have to be processed upward through three levels, each bossed by officers without a basic training appropriate to the subject matter. Can intelligent objectivity result in such circumstances? Many people doubt it. Add the effort to cross-train officers starting at captain level and all NCOs, and it's easy to understand why plenty of frustration and confusion exists.

A final word on the logistics organization concerns Maintenance Command. It was one of the six commands originally created but recently has been disbanded and its functions are now Defense Headquarters Control. The ostensible reason for this is economy of overhead. But authorities also plead that too few experienced personnel now are available to create a viable two-tier materiel organization. If this is so, then it reflects one serious weakness of unification anticipated by many, *i.e.*, by broadening the span of individual responsibilities, reduced expertise must be accepted. And the area where this trade-off can hurt most conspicuously is, of course, on the logistics side of the house.

There is another angle of this switch that is worth mentioning, and which will have a familiar ring to many US logisticians. The RCAF was the only service with a materiel command in the old days. And it was an air force-oriented management that decided to incorporate such an organization in the unified command structure. However, the senior air officers concerned with this decision soon gave way to army colleagues with no experience in operating a two-tier materiel system, and dissolution of the Command has followed. So I suspect that, however much it may be denied, personalities played a considerable role in this organizational revision.

Training

Perhaps the most convincing and satisfactory area of unification is the basic-training function. Previously the air force had a separate command to control training, whereas the army and navy direction went from their respective headquarters in Ottawa to schools and other training cells throughout the country. With unification, an integrated training command was built out of the old air force namesake in Winnipeg. Thus far it seems to have been a resounding success, both economically and functionally.

There are many reasons for its economic success. The air-training requirement was shrinking and thus



Mobile Command troops remain on alert after off-loading from Air Transport Command Hercules on the island of Vieques in the Caribbean. Regular exercises are held to keep UN standby troops ready for deployment on peace-keeping missions that may be required anywhere in the world.

created capacity in the air command and staff. In the army there was duplication of effort due to the Corps organization. The navy trained on both coasts with the two centers being separated by 3,500 miles. And in all three services, vis-à-vis each other, considerable duplication existed in basic training for the soft trades—pay, accounting, food services, physical education, secretarial, language requirements, etc.

Functionally, the Command has succeeded by a concentration of available talent so that basic training and career advancement is much better than organized heretofore. Success in this respect has gone hand in hand with a substantial simplification of the military trade structure—from an original 300 trades in the three services down to about 100 in the unified force. Worth noting is that so far as can be seen at the moment the quality of the product reaching units after any subsequent operational training that may be necessary is equally as good as before.

Mobile Command

One of the six functional commands established during the reorganization of Canada's armed forces was Mobile Command (MobCom). Any country can have a MobCom without unification, and many do. But in Canada, with army and air force units newly and permanently associated for all purposes, MobCom more than any other has come to be the very incarnation of our unification experiment. And this is so despite the fact that Maritime Command has long had an even more substantial air force element associated with the navy.

The integration and operation of the component parts of the Command have progressed without significant trouble. It is, of course, good that more emphasis is being placed on tactical air warfare. One notes, however, that with economy as a target it makes little sense for MobCom to support its relatively small air element for the sake of a principle when it could be

done cheaper by either Air Defense or Transport Commands that are close by.

Critics of the Command also point out that, although flexibility was similarly one of the aims, the equipment program has resulted in just the opposite. By striving for great mobility, there came a switch to lighter weapons and a very restricted capability to fight. (One wag has noted that MobCom is at least well enough equipped to keep peace in the Montreal Hockey Forum whenever the Maple Leafs and Canadiens take things too seriously!)

However, the serious criticism of MobCom is what it seems to have done to over-all defense policy. Hitherto Canada has been firmly wedded to the concept of defense via alliances and interdependence. However, the Command's unification theme has directed thinking and planning more at operations where Canada can field a composite force of its own. This in turn has emphasized the peace-keeping role and tended to undermine support for the real basis of our security, i.e., NORAD and NATO.

Overhead

How has unification worked out in the fight against overhead? It hasn't. The trouble is that you can't knock overhead down and have it stay down, as Mr. Hellyer led many people to believe. It has a nasty and perennial habit of self-resurrection.

Having volunteered to work within a fixed budget for five years, with an unrealistic increment for inflation, the Minister had little alternative but to cut personnel in an effort to make ends meet. However, with two expensive pay hikes to retain personnel that remained after an unplanned loss following the disastrous drop in morale of 1966, plus inflation increasing faster than had been allowed for, defense in 1969 is back where it was in 1964—no money in sight for modernization.



Boarding an antisubmarine Sea King helicopter on the flight deck of the Maritime Command's destroyer-escort HMCS Nipigon, combat-equipped troops of the Mobile Command are on their way to participate in a defense-of-Canada exercise being conducted along the nation's Atlantic coast.

The lesson of this experience seems clear. One should tie the defense budget to the gross national product, then work to control overhead from this more realistic base. If missions are subtracted or added, if technology indicates change, then the percent of GNP can be adjusted accordingly. With a system tied to productivity, inflation can hardly dictate defense policy by forcing cuts in personnel.

Backlash

Belatedly, the present Minister now is seeking just this sort of a deal with the government. If he has his way, it will make his problems somewhat easier in the future. But it won't give the services back the 25,000 (twenty percent of the services at the time) trained men who were lost because of his predecessor's great expectations. And, in the long run, this may be more difficult to live with than any of the organizational novelties of unification per se. (As it was put rather wryly: "There's no getting around it. Canadian defense these days isn't exactly what you'd call a growth industry!")

As of now, you don't encounter much unification in Canada for its own sake, or because it is "something new and a great challenge"—as one enthusiast frankly explained his early support. There is instead a very evident trend for those in charge to "play it like it is."

For instance, many people now admit that, unification notwithstanding, there is little chance of developing a breed of fighting men who will be so impartial in their judgments of military necessities that they won't clamor for the supremacy of their own basic trade. A logical corollary of this is that effective management in the future will involve catering to three professional unions that will look, and act, very much like an air force, army, and navy.

Right now practically all combat army units are concentrated under the baton of a three-star general. There has been no change in army ranks. Only a few of the old Corps names have disappeared and most regimental ones are still in current use. The colorful variety of army dress uniforms still is authorized and the new green outfit hardly will be strange since a summer uniform more green than khaki has long been in use.

Naval combat units similarly are concentrated under the authority of a vice admiral. They work and play on the East and West Coasts, just as always. Though listed by army ranks for administrative purposes, sailors nevertheless continue to use navy titles in day-to-day contacts among themselves and with the outer world. It seems likely that a "jolly green jumper" (as they call it) will be added to the navy wardrobe, but it is hard to believe that navy blues will disappear. Long before the moment of truth, the great proponents of "uniformity" will have disappeared in favor of others who are sure to recognize that common ranks and uniforms, or lack of them, will neither make nor break unification.

Paradoxically, the air force is perhaps the most unified of all the former services, and this mainly by being split into six-penny packets throughout the coun-

(Continued on following page)

try. But, in addition, "Royal Canadian Air Force" is now a dirty word; airmen use army ranks and they will no doubt be put into the green uniform; and above all they have no *de facto* father confessor as have the army and navy. In short, they see that their sister services still have most of those things which were highly valued, whereas airmen lost the *only* thing that was dear to them—their unity.

Paradoxically, too, it was a group of airmen (some say with stars in their eyes) who provided Hellyer's main support during the difficult days of unification. But now that the smoke and flames have somewhat abated, they're having second thoughts. So it won't be surprising to see airmen pressing to regain some of the lost ground.

The seed of such a movement already has started to sprout in MobCom. Air force elements that in the beginning were carefully kept separate and controlled by the integrated staff now have been brought together in a Tactical Group with its own commander. From there, and in the interests of greater efficiency, it seems only a short step for this Group to amalgamate with one or more of the other nearby elements of airpower, and with which it has a lot in common. This in turn will provide a broader base of authority for the senior airman who will be consulted by Ottawa (discussed earlier in the article). And when all this comes to pass, the country will benefit from a more economic and effective use of its airpower resources.

This is not to leave the impression that airmen are alone in thinking they've been had by unification. Far from it. Talk to a soldier or a sailor and either one will sound off for hours about the gouging *his* service has taken.

This indicates that anyone who thought competition among the services for defense dollars might die out with unification had better think again. The major commanders, of course, take a broad, unified look on day-to-day administrative problems, but when the infighting starts on future plans, their basic positions are clearly visible. And this instinctive loyalty is evident all down the line.

This competition is all to the good. There's a danger in too much conformity. It could lead to vastly more bureaucracy in an organization that is bureaucratic to begin with. The evils of conflict in defense have been grossly exaggerated. The legal profession bears witness that conflict is one of the best ways of arriving at the facts and thus making sound decisions—which no doubt accounts for the popularity of adversary-oriented management in business today.

Scratch Three, Add One

A most interesting bit of backlash that has followed the dissolution of Canada's three environment-oriented services has been the emergence of what amounts to a new, language-oriented one (a fallout from Canada's current constitutional crisis). Included in the group of units where French will be the official language is an army headquarters with several field units under command, plus an air base, all located in Quebec. One French-speaking ship already has been so designated, and another may be in the future. These units are in-

tegrated into the existing command structure but will nevertheless tend to be a group with separate identity.

This concession to the large French-speaking element of Canada (thirty percent) is a form of integration, *not* unification. It naturally adds extra overhead and additional costs. And for this reason it is being roundly criticized. But until time and intermarriage make the two main language elements of Canada indistinguishable from each other, better fighting units are expected because of the catering to this urge for cultural identity, rather than by holding to the letter of unification as originally charted.

Prognosis

When questioned recently for an appraisal on the unification experiment, its most ardent military disciple chose his words very carefully in reply: "Well," he said, "we're making real progress. But we won't see the full benefits of it for perhaps a decade."

This seems a fair measure of the speed of unification. But this should be qualified by saying that in ten years the father of unification will scarcely recognize the offspring that caused both him and many people in Canada such acute labor pains in 1965 through '67. Even now there is scant resemblance between the vision and the reality. A crash expansion in defense would make the contrast even more striking because of the added specialization it would entail.

How will Canada's military establishment look at the end of a decade in reference to original aims? Better management certainly will be evident. However, the battle with overhead still will be raging, even if Mr. Cadieux can get the defense budget tied to GNP (three percent is the figure he's shooting for). And the wisdom of Hellyer-type unification will not likely be validated by its imitation in other countries (as was freely prophesied), or by Canada's own experiences in the meantime.

In ten years the unification measure no doubt will still be law of the land. But in between, its interpretation will be in the hands of officers who suffered from its excesses in junior rank. These officers will probably be keen to organize the kinks out of the system. And to judge by the current mood in defense, they will be free to do so.

This trend is liable to gather momentum when the pragmatic commander of the maritime forces, representing the service that suffered the most serious casualties in the unification shake-up, succeeds the present Chief of Defense—a switch that seems to be scheduled for this year.

In these circumstances, it is reasonable to suppose that at the end of the period Canada will have—in the words of one observer with a flair for accurate forecast and simple statement—"a defense with integrated management, professional combat elements, and unified support where practical." Which is just about the status every other modern defense organization should reach by the same time—hopefully without Canada's traumatic experience en route.

With this posture no military man is likely to quarrel. For it is probably the sensible goal that Canada should have set for itself in the first place.—END

Flying aboard the world's largest aircraft, the USAF's mammoth C-5 Galaxy, is not significantly different from flying aboard any modern airliner except for the C-5's superior maneuverability and takeoff and landing capabilities, which approach the STOL regime. What impressed a group of aviation writers most during a recent special press flight was the fact that the C-5 is . . .

Such a Nimble Giant

By Edgar E. Ulsamer

ASSOCIATE EDITOR, AIR FORCE/SPACE DIGEST

THE world's largest aircraft, the United States Air Force's C-5 Galaxy, on February 25 hosted a group of newsmen during two flawless flights over the Georgia countryside. Weighing in at about 510,000 pounds, the giant airlifter took off smoothly and swiftly from the Lockheed-Georgia Co.'s facility at Dobbins AFB near Atlanta after a takeoff roll of only 3,000 feet, and landed in a record 1,500 feet, less than seven times its own length. Even without the stability augmentation system in operation, the aircraft was unusually stable in all flight phases, including a number of forty-five-degree bankings.

Compared to other jet transports, commercial as well as military, the C-5's takeoffs and landings, when observed from the ground, sounded substantially less noisy than would be expected. Ground maneuverability of the giant airlifter is nothing short of astounding. Cockpit visibility, in the opinion of a number of USAF pilots who accompanied the test flight, is excellent; to this reporter, the sheer height of the cockpit above ground would take some time to get used to, however. In flight, walking through the vast interior, the swaying motion of the C-5 creates the impression of being aboard a ship rather than a plane. Because of the relatively early stage of the C-5 test-flight program at which the press flights were held, the aircraft (No. 2 of four aircraft currently under flight test) was held to just above 10,000 feet of altitude and to 310 knots airspeed.

What was perhaps more remarkable than the faultless performance of the C-5 was the fact that such a demonstration would be held involving an aircraft on which first contracts were not let until October 1965 and which incorporated more new technology and more new manufacturing techniques than any previous transport designs, including the first advanced-technology, high-bypass turbofan engines developed and produced for the Air Force by General Electric. Demonstration of this obvious technology. (Continued on following page)



The world's largest airplane, the Air Force's C-5 Galaxy, being built by the Lockheed-Georgia Co. and powered by GE advanced-technology engines, proved highly agile both in the air and on the ground during a recent press flight.

Rigorous flight-test program of the C-5 Galaxy, which will enter the Air Force inventory late in 1969, involves operation, real and simulated, under climatic extremes. Typical is a special high-altitude icing test involving a freezing trail provided by KC-135 aerial tankers. Other tests will involve operations from such diverse areas as Panama and Alaska.



cal achievement at this early time seemingly was meant by the Air Force and Lockheed to counteract the unfavorable publicity about the C-5 created in the wake of congressional criticism of its escalating costs and a six-month slippage in its production schedule.

Air Force and Lockheed-Georgia spokesmen explained in a briefing following the press flight that first delivery of the C-5 to the Air Force had been postponed until December of this year because of "accumulative delays due to increasingly longer procurement lead times" and manufacturing problems encountered earlier in the program.

The C-5 production program involves more than 2,000 subcontractors in the United States, Canada, and England, many of whom failed to meet initial delivery schedules because of Vietnam War requirements, which preempt the C-5 priority, and the upsurge of commercial aviation business. Lockheed-Georgia Co. President T. R. May stressed that the production schedule of the C-5 was formulated in 1965 when aeronautical "subcontractors operated in a buyer's market. Shortly thereafter the escalation in Vietnam changed the picture into a seller's market." He added that sixty-five major work stoppages caused by labor disputes involving C-5 contractors also contributed to the delay.

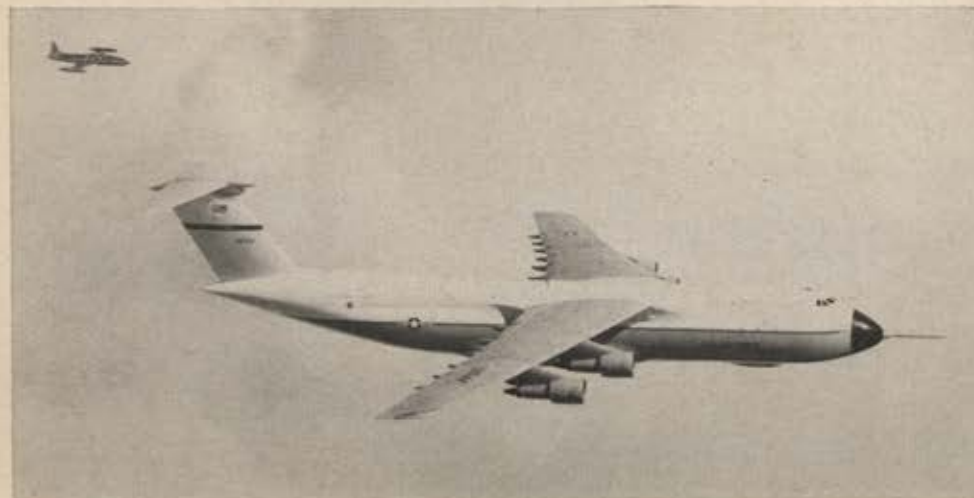
Both Mr. May and Air Force spokesmen stressed that the current schedule, which envisions first delivery at the end of this year and delivery of the sixteenth aircraft by June of 1970, is "thoroughly realistic because all fixes

[corrections of design flaws] were taken care of before we went on the [production] line."

Col. Ken Beckman, C-5 Systems Program Director, AFSC, and Col. R. E. Davis, C-5 Project Officer, Hq. USAF, announced that the price of the C-5 would be between \$23 million and \$25 million per aircraft for the 120 C-5s currently on order. Follow-on orders could, "subject to change without notice," decrease to about \$18 million, according to Mr. May. He announced that the Air Force is currently funding a Lockheed study of the C-5's potential as an aerial tanker and that the company on its own has examined over 150 corollary missions, ranging from a missile launcher employing nuclear-tipped, air-breathing, low-penetration missiles with a range of over 2,000 miles, to a testbed for a nuclear propulsion system.

As for over-all cost of the C-5 program involving a 120-aircraft buy, Air Force spokesmen pointed out that the excess over the contract, which includes a special clause for inflation, was "no more than ten percent," a value substantially below many other weapon systems which range up to 300 percent of initial cost estimates.

Initially pegged at \$3.466 billion, the contract price as stipulated by the inflation clause was increased by \$500 million, or to \$3.966 billion, the Air Force spokesman explained. The actual cost for 120 aircraft plus R&D amount to \$4.348 billion, or ten percent above the allowable cost not counting the increase provided for by the inflation clause, they said.—END



C-5 Galaxy skirts an edge of cloud during a press flight over northern Georgia, trailed by a T-33 chase plane. The Military Airlift Command will receive a total of 115 operational Galaxies, according to present orders. Lockheed officials predict, however, that the Air Force will eventually need more than 200 of the giant aircraft, which has a maximum gross takeoff weight of 764,500 pounds.



By Jackson V. Rambeau

AFA DIRECTOR OF MILITARY RELATIONS

Trouble in the ROTC Program

The ROTC programs of all the services are being lambasted in varying degrees on several of the nation's prestige college campuses. The opposition comes from groups of both students and faculty members. Activities directed against ROTC have taken several courses: (1) elimination of ROTC as a part of the school, (2) keeping it on campus but eliminating all academic credit, (3) moving it off campus and listing it as an extracurricular activity, (4) giving schools greater control over all ROTC course offerings and teaching appointments. In more violent cases ROTC facilities have been burned or bombed.

Congress has reacted angrily to the threat to downgrade ROTC. Congressman F. Edward Hébert (D-La.), who is considered the "father" of ROTC and its strongest supporter, said recently, "As a member of the House Committee on Armed Services, I intend to urge the Department of Defense to withdraw ROTC units from institutions that have stripped the ROTC program of academic credit. I am sure that I will be joined in this demand by the vast majority of the members of the Committee on Armed Services and its Chairman, the Honorable L. Mendel Rivers.

"The withdrawal of senior ROTC units from these schools will not adversely affect the production of ROTC graduates since there are literally hundreds of schools throughout the country that are eagerly awaiting the opportunity to install an ROTC unit and provide it with appropriate academic credit.

"In addition, I will urge the House Committee on

Armed Services to review other statutory avenues which the Congress can utilize to ensure that ROTC will remain a permanent military program observing its high traditional standards and providing our nation with its military leaders for the future."

Defense Secretary Melvin Laird has taken a somewhat more conciliatory approach and has offered to negotiate. Mr. Laird has written to the Ivy League schools asking them to delay any change in status of the ROTC for the time being. He indicated that Defense would work with the schools to revise courses where needed and turn the teaching of more courses over to college professors. Shortly after receiving this letter, the Princeton faculty voted, however, to eliminate academic credit for ROTC.

Dr. Nathan Pusey, President of Harvard University, appeared to react favorably to the Laird approach. Dr. Pusey recently said, "If a new arrangement can be worked out with the military services, taking into account the faculty's concern over control of the curriculum and faculty appointments, the University will continue to encourage those of its students in its various schools who wish to do so, to prepare themselves for military service by this means."

Dr. Pusey continued, "It would be shortsighted in the extreme if academic institutions were now to withdraw their cooperation from ROTC programs because of the repugnance to an unpopular war."

The Air Force is prepared to approach this threat to AFROTC with considerable flexibility, but it should be an interesting summer.

(Continued on following page)



Brig. Gen. Victor N. Cabas (center), Assistant Deputy Chief of Staff for Operations, Headquarters Pacific Air Forces, receives his new stars from Gen. Joseph J. Nazzaro (left), PACAF Commander in Chief, and Lt. Gen. James V. Edmundson, PACAF Vice Commander in Chief. General Cabas previously was in command of a reece wing in Thailand.



In a recent visit to Aerospace Defense Command Headquarters, Sen. Jack Miller (R-Iowa) discusses with Maj. Gen. James C. Jensen, ADC Vice Commander, the Airborne Warning and Control System. The AWACS is scheduled to be operated as an early warning command control center as a part of the North American Air Defense Command.



Davis



Zipp



Murray

The three Outstanding Civilian Employees of the Air Force for 1968 have been selected to receive the Air Force Association's Citation of Honor. They were chosen from twenty-seven nominees submitted by the AF Secretary, Chief of Staff, and major Air Commands. The winners from left to right: Mr. Harry Davis, Deputy Assistant Secretary of the Air Force (R&D) (Special Programs); Mr. John E. Zipp, Deputy Comptroller, Air Force Accounting and Finance Center; and Mr. Peter R. Murray, Deputy Director of Laboratories, Air Force Systems Command. The Citations will be presented on an appropriate occasion in the near future.

BX Probe in Good Hands

Rep. Philip J. Philbin (D-Mass.) has been named to head a nine-member subcommittee that will investigate two of the nation's largest department store chains—the little-publicized military services exchange systems.

Rep. L. Mendel Rivers, full Committee chairman, directed Mr. Philbin's panel to "conduct an inquiry into the policies and practices covering the operation of military exchanges and commissaries, and other pertinent or related activities within the armed services."

The Army and Air Force Exchange Service did \$2.2 billion in sales last year—just behind Sears, Roebuck and J. C. Penney. The Navy- and Marine Corps-operated exchanges do another \$1.5 billion in business.

The investigation of the exchange system will be the first congressional review in twelve years. The military customer will be fully protected, we are assured.

Fighter Pilots' Lament

Fighter pilots often ask, "Why do I have to fly bombers or transports?" USAF Military Personnel Center officials reply, "Because of the major force buildup in Southeast Asia (SEA), there has been an unprecedented rotation of pilots between aircraft systems."

"While expensive in terms of training," Personnel officials point out that "this rotation is serving two very important personnel goals."

The first is delaying involuntary second SEA tours. To do so means that bomber and transport pilots must be cross-trained into fighter aircraft and sent to SEA. The cockpit seats which they leave must be filled by pilots returning from SEA.

Since fighter pilots represent the greatest numerical need in SEA, more returnees are fighter pilots. They must be used to replace the "most eligible" pilots. SEA pilots who returned to a tactical unit three or four years ago also may find themselves going into other aircraft to release pilots for SEA duty.

"If we were to take only those pilots from the Air Training Command, Air Defense Command, and the Tactical Air Command to fill the SEA fighter pilot jobs," a USAFMPC assignment officer states, "second SEA tours for these officers would soon result. The fact is that there are more SEA-eligible pilots assigned to the Strategic Air Command and the Military Airlift Command than there are in ATC, ADC, and TAC. To delay second SEA tours, we must use this resource. Accordingly, fighter pilots are being used to fill the jobs that will release pilots from SAC and MAC for SEA duty."

The second goal is that of broadening the experience of pilots so that they are knowledgeable in the different aspects of air operations. While this has not been established as a formal program, the Chief of Staff has ex-

pressed the opinion on several occasions that cross-utilization is very healthy for the pilot force. Rotation because of SEA is adequate to assure this cross-utilization for the present, but personnel officials anticipate that a formal and deliberate rotation program will be established after SEA as a part of the career-development process.

Pilots selected for assignment to a totally different kind of aircraft are urged by Career Development officers to consider the positive aspects of the new job.

"It has been our experience that those who do well in fighters do as well or better in airlift or bombers. Similarly, some of our most-decorated fighter pilots in SEA have come from nonfighter cockpits. The Air Force is large and has a multitude of flying jobs. They are vital, all interesting, and all can lead to a satisfying career," these officials concluded.

It all sounds very logical, but fighter pilots still don't like it.

Reserve Officers Promotion Board Schedule

A selection board will convene at the Air Reserve Personnel Center, June 19-20, 1969, under the provisions of Chapter 62, AFM 35-3, and Sections 8362 and 8372, Title 10, United States Code, to select recommended non-active-duty Air Force Reserve officers for promotion to the permanent grades of captain, major, and lieutenant colonel.

Zone of consideration is as follows: promotion service date (PSD) as first lieutenant—May 31, 1967; PSD as captain—May 31, 1965; and PSD as major—May 31, 1965.

Only those officers assigned to units organized to serve as units will be recommended for promotion to the grades of major and lieutenant colonel.

Recommendations for unit vacancy promotions must be submitted to arrive at the Air Reserve Personnel Center no later than June 9, 1969.

Parting Shots

★ Major Air Commands are being asked to nominate personnel to succeed Paul W. Airey, Chief Master Sergeant of the Air Force, whose tour expires in July. As the first holder of this position, Sergeant Airey has done an outstanding job and will be a difficult act to follow.

★ The Forward Air Controller mission has been assigned the 908th Tactical Airlift Group (Reserve), Brookley AFB, Ala. The unit will be redesignated the 908th Tactical Air Support Group and moved to Maxwell AFB, Ala., in April.

★ The eleven Air Reserve Forces flying units which were to be inactivated in FY '70 have been saved again by Secretary of Defense Laird. Seven Guard units and four Reserve units are involved. Mr. Laird, while serving on the House Appropriations Committee, helped write

language into the 1969 Appropriations Bill which forced the Defense Department to retain the units. No AF Reserve or Guard units will be inactivated this year.

★ General Curtis E. LeMay, USAF (Ret.), who claims he was fired from his position as Chairman of the Board of Networks Electronic Corp. because he was George Wallace's running mate for the presidency, has gone to court seeking redress. He claims \$155,766 loss of salary and \$175,000 loss of profits that he would have realized on stock options. In addition, he is seeking \$5 million additional punitive damages.

★ In a recent speech made to the National Association of Supervisors, Rep. David N. Henderson (D-N. C.), Vice Chairman of the House Committee on Post Office and Civil Service, charged that last year's ordered cutback of civilian employees in the government can be false economy. He stated that he had found that total costs often rise rather than decline when arbitrary, unrealistically low civilian employee ceilings are imposed. We agree with the Congressman and think this matter has been poorly handled by the Congress in its meat-ax approach. Congressman Henderson is in a position to do something about it, and we hope that he will.

★ Brig. Gen. Felix L. Vidal, USAF (Ret.), has been appointed executive vice president of the Flight Safety Foundation. Foundation President is retired AF Maj. Gen. Joseph D. Caldara.

★ Sometimes it takes awhile. President Johnson signed Public Law 90-485 on August 13, 1968, in which certain changes were made to liberalize the Retired Serviceman's Family Protection Plan. All services were informed that complete details to implement the changes would be distributed as soon as possible. Recently the Air Force notified the field that instructions would be available by May 1 of this year. The length of time it has taken to get out the new regulation would appear to indicate that the plan remains extremely complex and will not be easily understood by military personnel. We still think that the entire program should be scrapped and the Civil Service survivor benefit program adopted by the military.

★ More than 1,000 Air Force Reservists and Air Reserve Technicians will be assigned to Travis AFB, Calif., on July 25 in a relocation of the 349th Military Airlift Wing from Hamilton AFB, Calif. The change is part of a new Air Force "associate reserve unit" concept designed to augment present active-duty and Reserve airlift organizations of the Military Airlift Command. As "associate" units at the base, the 349th Wing and 938th Military Airlift Group will work as extensions of the main active-duty unit, the 60th Military Airlift Wing. The 938th, which has operated propeller-driven C-124 Globemasters from its Hamilton AFB home, will fly the 60th Wing's C-141 Star-Lifter jet transports in another step toward an all-jet MAC airlift force.

★ Forty-one secondary schools in twenty-three states have been selected to add Air Force Junior ROTC's "Aerospace Education" program to their curriculum beginning this fall. These schools will bring the total number offering AF Junior ROTC to 153. By the fall of 1973, the Air Force expects to have the Junior ROTC program in 275 high schools throughout the United States. AFROTC Headquarters now is seeking highly qualified Air Force officers and NCOs who have recently retired or are about to retire to teach in these schools. Sixty officer and sixty NCO positions will be available this fall. Information on these and other openings in Air Force Junior ROTC may be obtained by writing Air Force ROTC, Maxwell AFB, Ala. 36112.

★ Maj. Raymond D. Roberts, Richards-Gebaur AFB,

Mo., became one of the youngest field-grade officers to retire from the Air Force for length of service when he retired last month at the age of thirty-seven with twenty-one years of active duty. He entered the Air Force in January 1948, served in the Berlin Airlift, and flew 250 missions in Vietnam.

★ Officer Training School (OTS) production for FY '69 has again been increased, this time by 288 to a total of 4,716.

★ At the three-quarter mark of their year's tour in Vietnam, four activated Air National Guard fighter squadrons, plus a fifth heavily manned by ANG volunteer pilots, have logged more than 20,000 combat sorties against the enemy. The 174th Tactical Fighter Squadron from Sioux City, Iowa, had logged 5,190 sorties through January 31 to lead



In ceremonies held at the Pentagon, Maj. Gen. Winston P. Wilson, Chief of the National Guard Bureau, receives the Distinguished Service Medal from Gen. J. P. McConnell, AF Chief of Staff. General Wilson received the nation's third highest award for "exceptional meritorious" service.

the pack. The 120th Tactical Fighter Squadron from Denver, Colo., crossed the 5,000 mark on January 30.

★ During the past three years significant improvements have been made in the Officer Temporary Promotion Program. The phase point for promotion has been cut back in the cases of all grades from colonel through captain. For promotion to colonel the time was reduced in 1968 from twenty-two to twenty-one years. In the case of lieutenant colonels, the time was cut in 1966 from eighteen to seventeen years. Promotion time for majors was reduced from thirteen to eleven years in 1967. Captains now may be promoted at the three-year point versus four and a half years in 1967. Promotion prospects for the future are equally promising.

★ The Defense Department, for the first time, is seeking an end to the dual-compensation law restrictions on Regular officers who retire and take government jobs. There is every indication, however, that civilian employee unions would strongly oppose any relaxation in this area. The DoD proposal now is in the Bureau of the Budget awaiting White House clearance to go to the Congress. Chances are not good for the correction of this inequity this year without the strong support of the President.

★ Dozens of bills which would bring back recomputation of retired pay have been introduced in the new Congress. President Nixon is on record as being in favor of the
(Continued on following page)

restoration of recomputation. With all of this support, you'd think recomputation should have a good chance, but this is not the case. A few key committee chairmen will decide this issue, and in the past they have been opposed to even considering it.

★ Over the past few years the Air Force has given more and more priority to personnel facilities in the military construction program. This has led to significant gains in the personnel facilities inventory. Since the FY '66 military construction program, \$245 million have been approved by Congress for projects aimed at improving bachelor

Lt. Col. Irving Neuwirth, USAF (Ret.), a veteran public information officer, died February 25 at Andrews AFB Hospital. He was 50. Colonel Neuwirth's career as PIO spanned three wars, and he was known to hundreds of newsmen covering the aerospace field. He was buried February 27 in Arlington National Cemetery.



housing and community and recreational facilities. This represents twenty percent of the total military construction program dollars and compares to approximately five percent in previous years. The 1970 program will continue to improve the lot of military personnel. Approval of this program by Congress will add 23,000 adequate dormitory spaces and 1,100 adequate officer quarters spaces, as well as numerous recreational and support facilities.

★ One of the most discussed subjects in Washington today is the Nixon campaign promise to go for an all-volunteer force when the war is over in Vietnam. Some thirty bills have been introduced in the House and Senate, which their sponsors say will carry out the campaign pledge. An all-volunteer force could easily be the most controversial military piece of legislation which Congress will consider this year. In informal discussions with a number of other military-oriented organizations, this writer has found them to be almost unanimously opposed to the

Frederick L. Anderson, a retired major general and one of the original founders of the Air Force Association, died March 2 at Houston's Diagnostic Center Hospital. He was sixty-three and lived in Woodside, Calif.

A 1928 graduate of the United States Military Academy, General Anderson advanced through the grades to become a major general in 1943, when he commanded the Army Air Forces' Eighth Bomber Command.

In civilian life, he was a director of Lear Siegler, Inc., Optics Technology, Inc., the American Bakeries Co., Federal Petroleum, Inc., Royal Industries, Inc., and the US Leasing Corp. He was a trustee of the RAND Corporation and the Menlo School and College.

General Anderson was buried in Arlington National Cemetery on March 6.



Among men on the move are (from left) Maj. Gen. D. L. Crow, named AF Comptroller; Lt. Gen. L. L. Mundell, who leaves AFLC at Wright-Patterson for the Joint Logistics Review Group in Washington; and Maj. Gen. Selmon W. Wells, who has been named to be AF Inspector General.

all-volunteer force concept. We will have more to say on this subject in future issues.

SENIOR STAFF CHANGES

Mr. Jack D. Cole, from Legislative Asst., US Senate, to Attorney Adviser, Central Control Group, The White House . . . M/G Duward L. Crow, from Dir. of Budget, Hq. USAF, to AF Comptroller, replacing L/G Theodore R. Milton, and nominated to Lt. Gen. . . . Mr. Arthur O. de la Garza, from Dep. Dir., Logistics Support Mgmt., OCAMA, AFLC, to Dep. Dir., Logistics Support Mgmt., SAAMA, AFLC . . . B/G Paul P. Douglas, from IG, 12th AF, Bergstrom AFB, Tex., to Cmdr., 836th Air Div., TAC, MacDill AFB, Fla., replacing Col. Augustus M. Hendry.

B/G James O. Frankosky, from Dep. Dir. for Strategic & Defense Forces, DCS/R&D, Hq. USAF, to Dep. Dir. of Op. Requirements & Development Plans, DCS/R&D, replacing B/G Roger K. Rhodarmer . . . Col. (B/G selectee) Augustus M. Hendry, Jr., from Cmdr., 836th Air Div., TAC, MacDill AFB, Fla., to DCS/P&O, Hq. TAC, Langley AFB, Va. . . . M/G George E. McCord, from Dep. Chief to Chief, Army-AF Exchange Service, Dallas, Tex. . . . M/G Edward A. McGough, III, from Dep. Dir. of Aerospace Programs, DCS/P, Hq. USAF, to Dir. of Personnel Planning, DCS/P, Hq. USAF . . . L/G Theodore R. Milton, from AF Comptroller, to Vice Dir., Int'l Military Staff, Military Committee, NATO.

L/G Lewis L. Mundell, from Vice Cmdr., AFLC, Wright-Patterson AFB, Ohio, to Joint Logistics Review Group, Washington, D. C. . . . B/G Roger K. Rhodarmer, from Dep. Dir. of Op. Requirements & Development Plans, DCS/R&D, Hq. USAF, to Asst. to DCS/R&D for F-15 . . . M/G Selmon W. Wells, from DCS/O, SAC, Offutt AFB, Neb., to AF Inspector General, replacing L/G Joseph H. Moore, and nominated to Lt. Gen.

PROMOTIONS:

Nominated to Lieutenant General: Duward L. Crow, Selmon W. Wells. Promoted to Brigadier General: Ray M. Cole, Woodward E. Davis, Jr., Ralph J. Hallenbeck, William A. Jack, Ernest F. John, Harold L. Price, Quintino J. Serenati, Kendall S. Young.

Air Force Reserve: Nominated to Major General: Joe M. Kilgore, Rollin B. Moore, Jr., Gwynn H. Robinson, John H. Stembler. Nominated to Brigadier General: William H. Bauer, Gerald A. Hart, Ralph G. Hoxie, Michael J. Jackson, Frank S. Perego, Duncan N. P. Pritchett, Robert W. Valimont, Alfred Verhulst.

Air National Guard: Nominated to Major General: George W. Edmonds. Nominated to Brigadier General: Ralph W. Adams, Sr., Rollin M. Batten, Jr., Norwell O. Didear, William C. Smith.

RETIREMENTS: M/G Frank E. Rouse.—END



THE NATION'S CAPITAL CHAPTER...

cited for consistent and effective programming which has focused widespread local and national attention on the Air Force Association mission.

More than 350 persons, including leaders of Congress, the Air Force, industry, and AFA attended a recent formal dinner dance sponsored by the Nation's Capital Chapter.

Held at the Bolling AFB Officers' Club, this gala function was so successful that it has been decided to make it an annual event and at that time to install the Chapter's newly elected officers and observe the Air Force Association's birthday.

With Chapter President Lou Davis serving as Master of Ceremonies, the program included an introduction of honored guests; recognition of AFA's 23d Anniversary with brief remarks from AFA President Robert W. Smart; installation, by Mr. Smart, of the newly elected President of the Chapter, V. M. Rexroad; and remarks by Sen. Howard W. Cannon (D-Nev.). Senator Cannon was introduced by Brig. Gen. F. E. Vidal, USAF (Ret.).

Guests of honor were Senators Cannon and Frank E. Moss (D-Utah); Congressmen Durward G. Hall (R-Mo.), Charles H. Wilson (D-Calif.), Donald E. Lukens (R-Ohio), and Orval Hansen (R-Idaho); Gen. John D. Ryan, Vice Chief of Staff; Lt. Gen. Seth J. McKee, Assistant Vice Chief of Staff, and from the Office of the Secretary of the Air Force, Maj. Gen. William Garland, Director, Office of Information, and Maj. Gen. John R. Murphy, Director, Office of Legislative Liaison.



Making his acceptance remarks after being installed as President of the Nation's Capital Chapter by AFA President Robert W. Smart, center, is V. M. Rexroad. Looking on is former Chapter President Lou Davis.

Among the many distinguished guests were Joseph S. Kimmitt, Secretary for the Majority, US Senate; John R. Blandford, Chief Counsel for the House Armed Services Committee; Maj. Gen. Richard Knobloch, Commander, 1001st Air Base Wing, Andrews AFB; and Brig. Gen. Henry L. Hogan, III, Deputy Director, Office of Information. AFA was represented on the national level by President Smart, Board Chairman Jess Larson, and National Directors A. Paul Fonda and George D. Hardy.

The main dining room at the MacDill AFB Officers' Club, Tampa, Fla., was filled to capacity recently for a dinner meeting of the Florida West Coast Chapter at which the Chapter's

newly elected officers were installed. John A. Lang, Jr., Administrative Assistant to the Secretary of the Air Force, was the guest speaker.

In his address on "Policy, Programs, and People," Mr. Lang summarized current Air Force posture and new weapon systems in development, and then launched into a criticism of those who oppose US efforts in Vietnam.

"There is room for rhetoric and discussion," in arriving at our national policies, he said, "but there is also need for patriotism and steadfastness of purpose. It is unreasonable and terribly unfair to ask the latter only of the youth who bear arms."

He referred to attacks on the Reserve Officer Training Corps as "not
(Continued on following page)



Attending a recent meeting of AFA's Florida West Coast Chapter are, from left, Marty Harris, AFA Southeast Regional Vice President; J. A. Lang, Jr., Administrative Assistant to AF Secretary; Lt. Gen. B. O. Davis, Jr.; Joe Martin, Col., USAF (Ret.), West Coast Chapter President; and Frank Collins, Brig. Gen., USAF (Ret.), AFA VP for Florida State.



Earl O. Wilson, left center, President of AFA's Missouri State Organization, presents AFA Charter to Neal Grubaugh, right center, who is President of newly organized Ozark Chapter, Springfield, Mo. Looking on are Bruce Hertzog, on the left, and Dean Anholt, at the right, the Chapter's Secretary-Treasurer and Vice President, respectively.

only an immediate threat to national well-being, but also foolish and self-defeating on the part of those who mount them. . . . You can't get something for nothing. You can have freedom only if you're willing to defend it, and you can only defend a nation successfully if you have skilled leadership."

Following his address, Mr. Lang was awarded an AFA Citation for his "sustained interest in AFA matters and in particular his strong support of the Florida State AFA and the Florida West Coast Chapter."

Special guests included Lt. Gen. Benjamin O. Davis, Jr., USAF, Deputy Commander in Chief, US Strike Command, and Brig. Gen. Paul P. Douglas, Jr., Commander, 836th Air Division (TAC), both headquartered at MacDill AFB; Robert Ensslin, Chairman of the Military Affairs Committee, Tampa Chamber of Commerce; John F. Loosbrock, Editor, AIR FORCE/SPACE DIGEST; Martin H. Harris, Southeast Regional Vice President of AFA; and Brig. Gen. Frank Collins, USAF (Ret.), Florida State AFA Vice President.

Incumbent Chapter President Joe Martin, who served as Master of Ceremonies, headed the slate of officers installed for the coming year by General Collins. Also installed were Miss Marion Chadwick and Dennis E. McClendon, Vice Presidents; Mrs. Sharon Knight, Secretary; and Jim Weaver, Treasurer.

Representatives of local school districts, California State College at Long Beach, and the California Civil Air Patrol (CAP) were guests at a re-



The problems of improving aerospace education programs in secondary and high schools was the subject of a discussion at a program recently sponsored by AFA's Long Beach, Calif., Chapter. The principal participants were, from left, Chapter President B. F. Bauer, Dr. Norman Wampler, Dr. C. Thomas Dean, Floyd Daman, Col. Raymond Gaver, and Dr. Howard Hubbard (see accompanying story).

cent banquet sponsored by AFA's Long Beach Chapter.

Following the banquet, Floyd Daman, the Chapter's Program Chairman, moderated a discussion on the problems of providing improved aerospace education programs to secondary and high school students, and how local school administrators, CAP, and AFA's Aerospace Education Foundation could work together to resolve these problems.

Participants included Dr. C. Thomas Dean, Dean of the School of Applied Arts and Sciences, California State College at Long Beach; Dr. Norman Wampler, Superintendent of Bellflower Unified School District; Dr. Howard Hubbard, Consultant for Science and Mathematics, Long Beach Unified School District; and Col. Raymond Gaver, Commander, California Wing, CAP.

More than 300 persons, including

military and civilian personnel from Norton AFB, Calif., San Bernardino Inland Action members, visitors from the San Bernardino area, and AFA leaders attended a social hour sponsored by AFA's San Bernardino Area Chapter.

Held in the ballroom of the NCO Open Mess at Norton AFB, the program was arranged to acquaint those attending with the AFA program and with the benefits to be gained through AFA membership.

After welcoming remarks by Jim Siville, the Chapter's membership chairman, Brig. Gen. Louis G. Griffin, Commander, 63d Military Airlift Wing, expressed his gratitude for the large turnout and urged everyone to become a member of AFA. AFA National Director William R. Berkeley briefly outlined AFA policies on the national level, and Chapter President Ed Stearn spoke on the importance of having a meaningful, strong Air Force

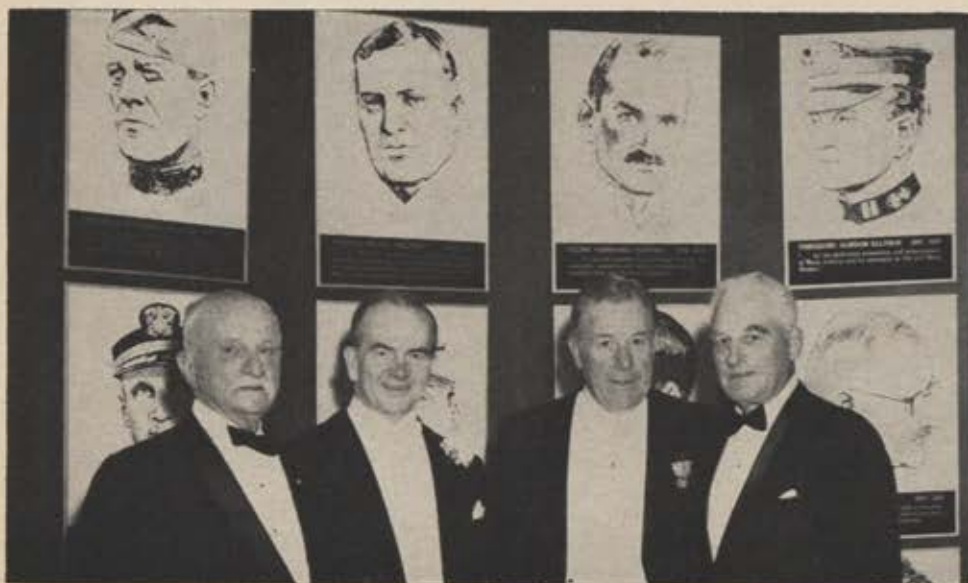


At a recent function of AFA's Gen. Thomas P. Gerrity Chapter (formerly the Oklahoma City Chapter), Oklahoma AFA President L. E. Leffer, right, presents silver bowl to Mrs. Betty Maxey, 1968 Volunteer Worker of the Year of Tinker AFB Family Services. Observing is Brig. Gen. William Snively, Vice Commander of the Oklahoma City AMA.



Ben Martin, right center, AF Academy football coach, is welcomed to Albuquerque, N. M., by, from left, Ray Hubbard, Albuquerque Chamber of Commerce; G. Schold and W. A. Gardner, President and Vice President, respectively, of AFA's Albuquerque Chapter. Coach Martin was guest speaker at the Chapter's dinner meeting at Sandia Base.

Shown at the Sixth National Air Force Salute at the Americana are, from left, Iron Gate Chapter President J. Raymond Bell; USAF's most recent Medal of Honor recipient, Lt. Col. Joe M. Jackson, C-123 pilot who risked his life to rescue three airmen; Air Force Chief of Staff Gen. John P. McConnell; and AFA President Robert W. Smart. Colonel Jackson won the door-prize jackpot, a round-the-world trip for himself and his wife.



At the Iron Gate Chapter's Sixth National Air Force Salute, Gen. Carl A. Spaatz, left, and Gen. Nathan F. Twining, right, former Chiefs of Staff of the Air Force, and both now retired, are shown with Milton Caniff, left center, creator of the Steve Canyon comic strip, and Ben Wright. In the background are some of Mr. Caniff's sketches of members of the Aviation Hall of Fame (see story for details).

Robert W. Smart; Board Chairman Jess Larson; National Directors Milton Caniff, Vito Castellano, Maxwell A. Kriendler, and Laurence S. Kuter; Northeast Regional Vice President James W. Wright; and New York State President William C. Rapp.

The flags of the fifty states plus those of Canada, the Latin American and South American republics, as well as those of the United States Air Force Commands, added much color to the decorations in the Americana's Ballroom, setting for the Salute. On the stage of the ballroom was a replica of the original Wright Flyer, built in 1909 by Orville and Wilbur Wright. The reception area was decorated with cartoonist Milton Caniff's sketches of members of the Aviation Hall of Fame, and a World War I single-seat training airplane, the Thomas Morse Scout, all of which were made available through the courtesy of the Air Force Museum at Wright-Patterson AFB, Ohio.

Over the past five years, the Salute has raised more than \$350,000 for Air Force-oriented organizations. This year, organizations that will benefit from the net proceeds are the Air Force Aid Society, the Air Force Village Foundation, the Falcon Foundation, the Air Force Historical Foundation, the Air Force Enlisted Men's Foundation, and AFA's Aerospace Education Foundation.—END



Chapter President Bell presents Mrs. Donald A. Quarles, widow of the late AF Secretary, a plaque citing Mr. Quarles' "notable contributions to the best interest of this [Iron Gate] Chapter, AFA, and the Air Force of the United States."

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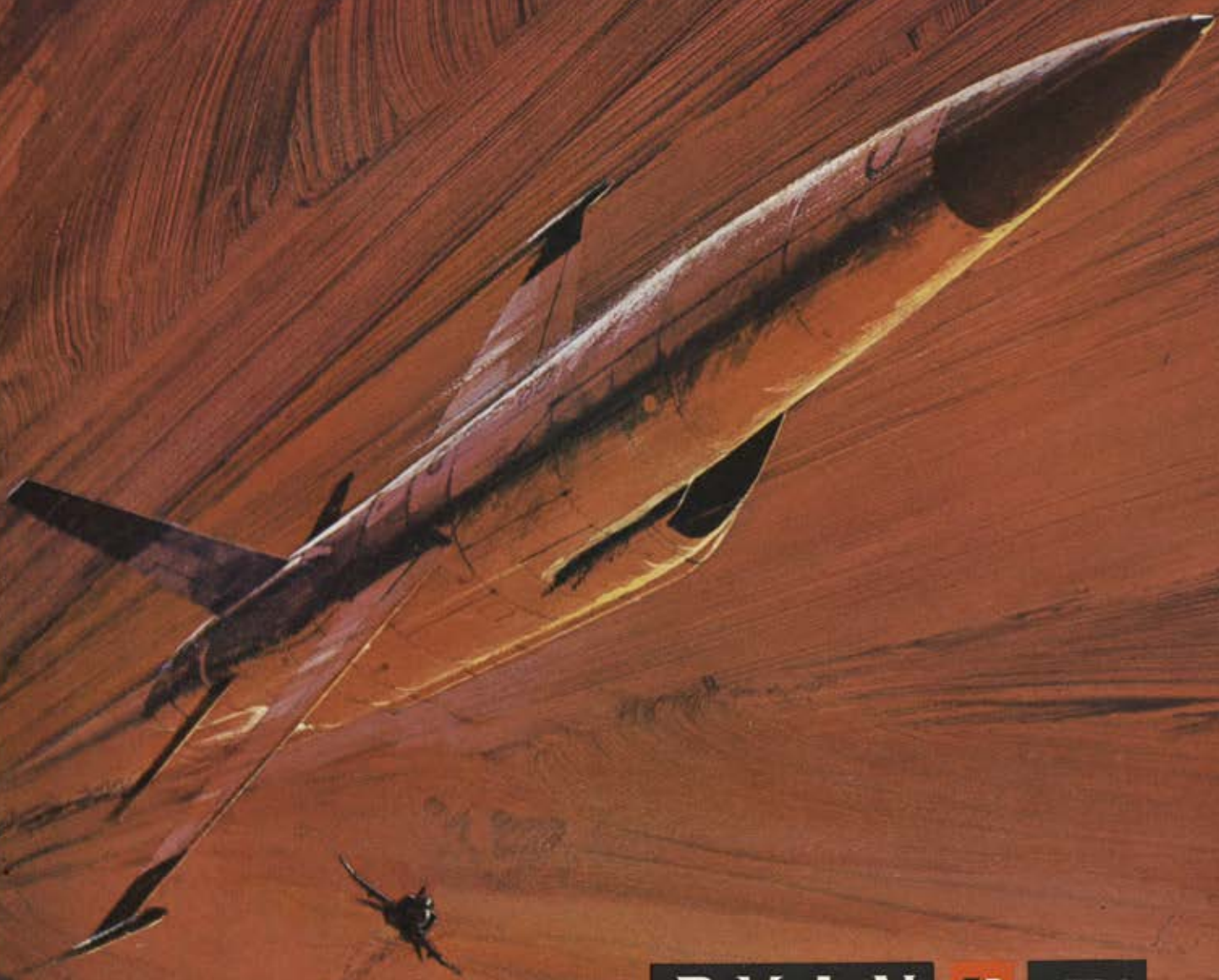
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