

AIR FORCE

and **SPACE DIGEST**

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

Gen. John P. McConnell

USAF's New
Chief of Staff

- A Sense of Humor
- A Talent for Harmony
- But a Heavy Hand for Shoddy Performers

—SEE PAGE 32

Photo by Guy Dyke





small
talk

the real word on solid-state communications for MTDS

The Marine Tactical Data System needed UHF communication centrals that were light, high-powered, ultra-reliable, capable of handling heavy voice/data traffic and very, very small and compact. Electronic Communications, Inc., designed and built them.

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Just F-5's.

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AIR FORCE

— and SPACE DIGEST —



The Magazine of Aerospace Power
Published by the Air Force Association



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SPACE DIGEST

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Speaking of Space / BY WILLIAM LEAVITT 54
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MISSILES, MOBILITY...POWER ON THE GROUND

Air and space are not the only exciting challenges in the science of defense. The Army is finding new ways of covering old terra firma in meeting its objective: The best equipped tactical force for limited or full-scale action anywhere on the globe.

A good part of the answer lies in battlefield missiles and mobility. LTV Michigan Division is supplying the Army on both counts. The Army/LTV LANCE, the newest battlefield missile, is undergoing development tests and the first firing is scheduled for early 1965. Being developed to replace the Honest John and LaCrosse missile systems, LANCE utilizes a new simplified guidance and control concept, is the first Army missile to use pre-packaged storable liquid propellants. The highly mobile LANCE system will extend the division commander's nuclear and non-nuclear firepower.

LTV Michigan is also prime contractor for the XM-561, a unique double-bodied, articulated six-wheeled vehicle which can go almost anywhere the Army fights. It will be used for test and evaluation by the military in widely varied terrain from arctic wastelands to tropic jungles. The design is based on the Gama Goat truck, which LTV privately developed. Another highly mobile vehicle being developed by LTV Michigan is the PATA (plenum air tread amphibian). A series of air cells mounted on a belt provides a continuous track on which the vehicle rides.

Highly mobile missile systems and ground vehicles are another example of the versatile store of science and technology at LTV, leader in electronics, aircraft, missiles, space, mobile ground vehicles, ground and airborne communications, and range services. Ling-Temco-Vought, Inc., Dallas, Texas.

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LTV
LING-TEMCO-VOUGHT, INC.

Unique articulation system gives six-wheeled XM-561 its maneuverability.

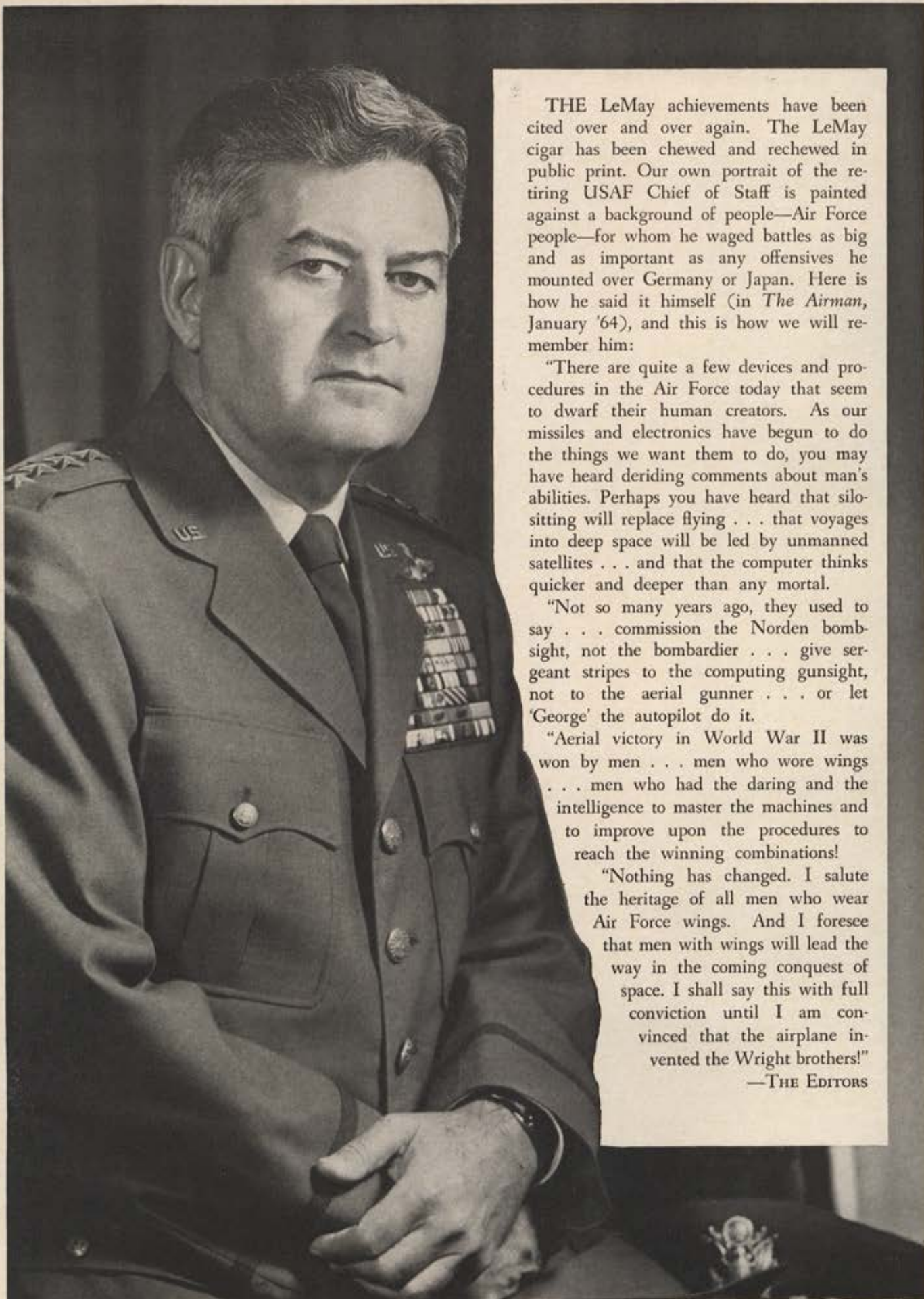


PATA crosses hard and soft terrain on continuous track of air-filled cells.



Army crews at Fort Sill, Okla., train to operate LANCE. First firing is scheduled for early 1965.





THE LeMay achievements have been cited over and over again. The LeMay cigar has been chewed and rechewed in public print. Our own portrait of the retiring USAF Chief of Staff is painted against a background of people—Air Force people—for whom he waged battles as big and as important as any offensives he mounted over Germany or Japan. Here is how he said it himself (in *The Airman*, January '64), and this is how we will remember him:

"There are quite a few devices and procedures in the Air Force today that seem to dwarf their human creators. As our missiles and electronics have begun to do the things we want them to do, you may have heard deriding comments about man's abilities. Perhaps you have heard that silo-sitting will replace flying . . . that voyages into deep space will be led by unmanned satellites . . . and that the computer thinks quicker and deeper than any mortal.

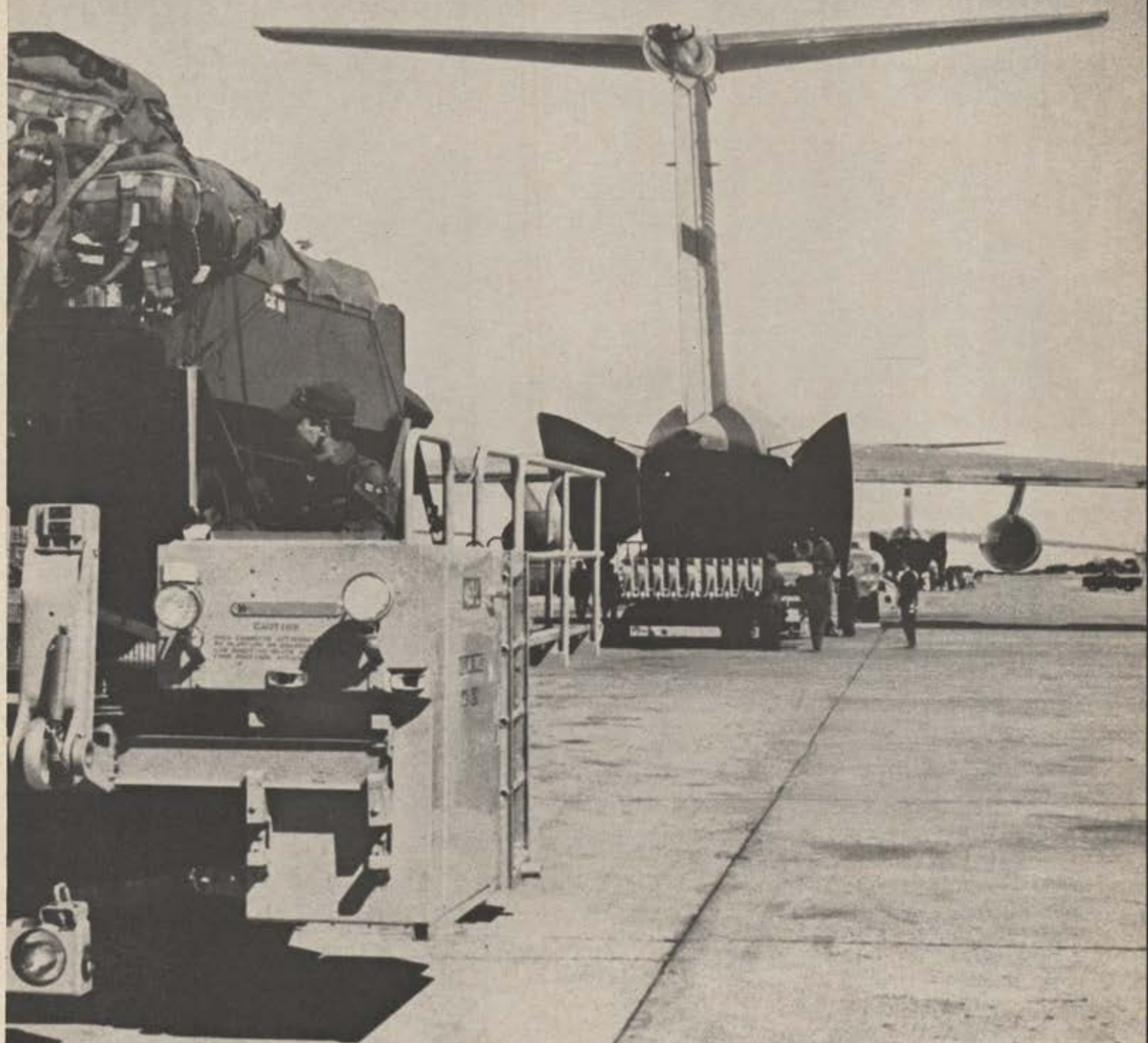
"Not so many years ago, they used to say . . . commission the Norden bomb-sight, not the bombardier . . . give sergeant stripes to the computing gunsight, not to the aerial gunner . . . or let 'George' the autopilot do it.

"Aerial victory in World War II was won by men . . . men who wore wings . . . men who had the daring and the intelligence to master the machines and to improve upon the procedures to reach the winning combinations!

"Nothing has changed. I salute the heritage of all men who wear Air Force wings. And I foresee that men with wings will lead the way in the coming conquest of space. I shall say this with full conviction until I am convinced that the airplane invented the Wright brothers!"

—THE EDITORS

**THE
AIRLIFTERS**
FROM LOCKHEED-GEORGIA



How MATS unloads its new airlifter in six minutes

Last October nineteenth, when the first of Lockheed's big C-141 StarLifters was delivered to the 1707th Air Transport Wing, at Tinker AFB, an efficient Military Air Transport Service ground crew discharged a full load from the giant fan-jet freighter—and rolled the cargo into two waiting C-130s. Using their new 463L mechanized freight shifters, total elapsed time was 14 minutes: six minutes to unload the StarLifter, eight minutes to

reload the two Hercules.

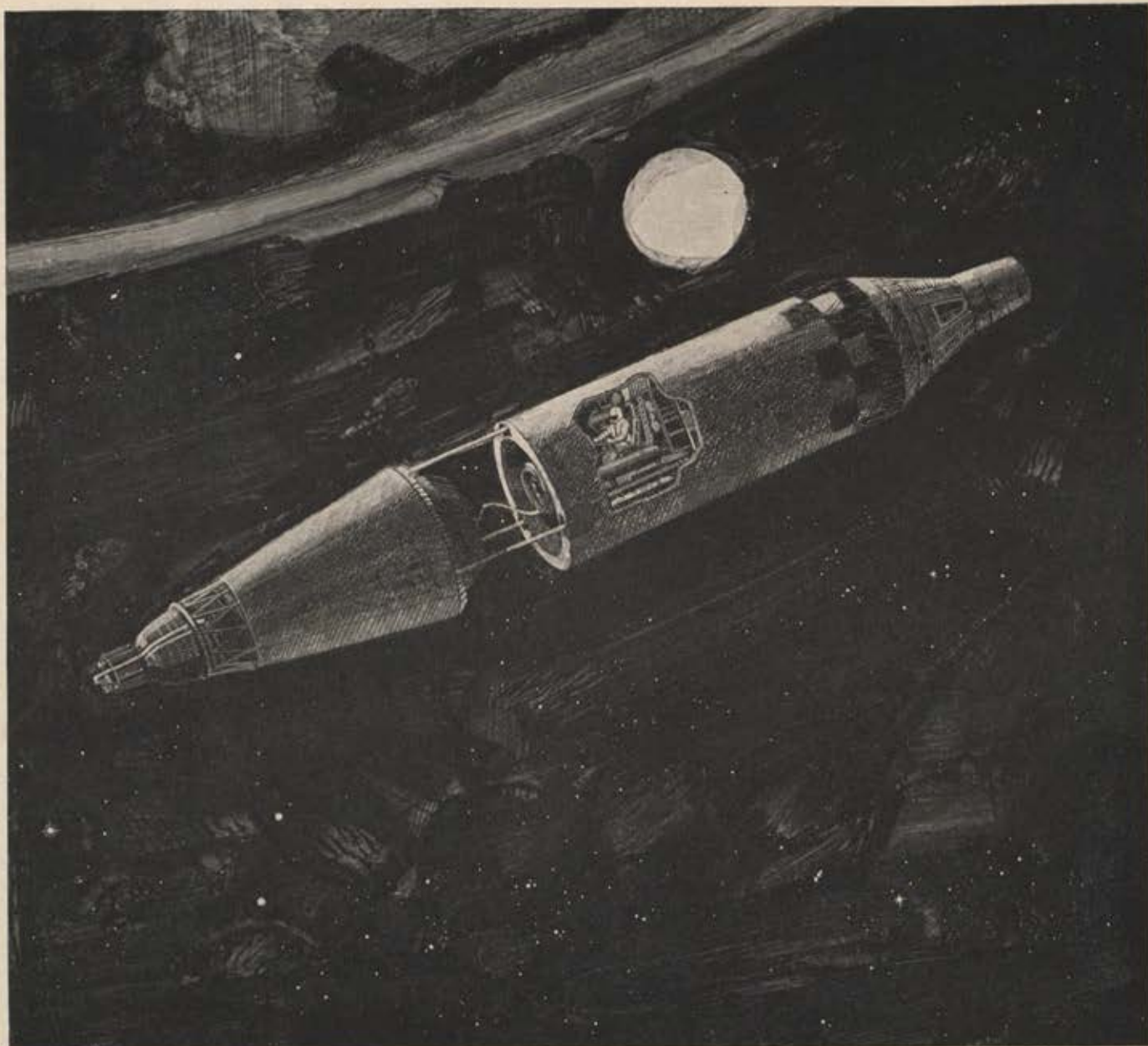
The 15 StarLifters already delivered have been flown hundreds of test hours by Air Force, FAA, and company pilots on anti-icing, all-weather, crew-training, and systems-checkout missions.

Ahead of schedule, more StarLifters are rolling off the production lines toward the objective of doubling the nation's military airlift. Now the Air Force has a truly compatible airfreight system—the

C-141s for long-haul at jet speeds, the C-130s for medium-range, short field operations. AND the 463L mechanized equipment which speeds loading operations through the big rear doors of both Lockheed aircraft.

Lockheed-Georgia Company, Marietta, Georgia: A Division of Lockheed Aircraft Corporation.

LOCKHEED



SURVIVAL UNIT

It is a SNAP reactor system—source of long-lived electric power for life support and environment control. It will supply astronauts with heat against the cold. Purify the air they breathe. Give them light amidst blackness.

North American Aviation / Atomics International Division is developing SNAP reactors for reliable, long-lived power in space vehicles, manned space stations, satellites, and manned

bases on the moon. In pioneering SNAP reactor systems for the Atomic Energy Commission, A.I. has reduced equipment as large as a house to the size of a five-gallon can.

Atomics International is one of seven divisions at North American Aviation—a corporation dedicated to advancing the frontiers of science in nuclear energy, electronics, rocketry, aviation, life sciences, and space flight.

North American Aviation



Atomics International, Autonetics, Columbus, Los Angeles, Rocketdyne, Science Center, Space & Information Systems

Economical Weapon System

Gentlemen: Your excellent article on lightweight fighter aircraft, "F-5—Little Plane With a Big Future," by J. S. Butz, Jr., December '64 issue, summarizes very well several of the operational and logistic advantages of this concept.

Of almost equal economic importance is the relatively low basic cost of this type weapon system and the financial advantage of long production runs. With a unit flyaway price of less than fifty percent of other current Century series, over twice the aircraft and support equipment can be procured for a fixed budget. Thus, more free-world allies can be equipped with a truly maintainable, logistically supportable weapon system with outstanding flying characteristics adaptable to a wide variety of air-to-air and air-to-ground roles.

The allied country national morale factor of being equipped with a first-line aircraft, one maintainable with available manpower, skills, and materiel resources and the sortie capability inherent in reliable, simplified aircraft, is strong incentive to participate in defense of free-world objectives.

The right percentage of properly configured lightweight aircraft in the armed forces of the free world, complementing an electronic-capable fighter-force structure, would provide the versatility to deal with any kind of international crisis using the optimum, most economical weapon system for the specific mission.

COL. WM. F. BARNES

Wright-Patterson AFB, Ohio

Number Please

Gentlemen: Since September we have received so many long-distance telephone calls we are thinking of putting on a special operator here in the Public Information Division. Unfortunately, a large proportion of the calls are wrong numbers—the parties calling want the hospital, base operations, family services, or any number of places on Scott Air Force Base.

These calls attest to the wide readership and use made of your September 1964 "Air Force Almanac," since, on page 198, the number of Scott Air

Force Base is listed as AL 6-5309 or AL 6-5310—the number of this office. The trouble to us is not as great as I indicated above. We average three or four calls a day, sometimes running as high as a dozen a day. The real trouble is at the other end. The people calling must redial the base operator, whose number is ADams 4-4000, since our direct dial system won't let us transfer the calls.

I don't know what can be done about this minor error at this point, but we can live with it, and will continue to boost your much-read magazine.

LT. COL. STOCKTON B. SHAW

Chief, Public Information Division
MATS

Scott AFB, Ill.

• *Thanks for being so patient. We'll make the change in the next "Almanac."*—THE EDITORS

The Sophist Known as Communism

Gentlemen: In noting the failure of the West to recognize the nature of communism, Dr. Kurt L. London ["Communism at the Crossroads," December '64 issue] opens the door to one further comment: Communism, with its tremendous powers of resilience and recuperation, cannot be grasped in its full scope except in a religious context, i.e., the role of the satanic power in the affairs of men—not as a horned hobgoblin, but as the brilliant and attractive sophist of Gounod's opera "Faust."

Indeed, the words Dr. London uses bear a striking similarity to those used by the teaching sisters in every parochial school today to describe the ability of the fallen angel to inspire and to direct the thoughts and actions of those who, by an act of their own free will, have sought his alliance, and made themselves his instruments.

Call such a belief what you will, but this fact remains: The teaching sisters had identified communism for what it is thirty years ago, and instituted the only thorough and comprehensive program of anti-Communist education that has ever been established in this country, or anywhere else.

There was nothing coincidental about this process. We ought to keep

that in mind when we consider how far the community can go in eliminating effective religious instruction from public education.

MAJ. WILLIAM V. KENNEDY
Camp Hill, Pa.

Base Shutdowns

Gentlemen: It is known by all Americans of the Defense Department's plan to close some ninety-five military bases and installations throughout this nation in an attempt to save nearly \$500 million annually and relieve the government of some 63,000 jobs.

Because I live only seventy miles from Plattsburgh AFB, N. Y., this shutdown of bases may or may not affect my area. I do not write to you on behalf of my area, but on behalf of the 63,000 people who may find themselves jobless.

Many American people are dependent on our military bases for their economic survival. To take this away for the sake of saving money that would be spent elsewhere is wrong in many ways. I should like to take the liberty of explaining this to you in more detail.

John F. Kennedy told Americans that our nation is commissioned by history to be either an observer of freedom's failure or the cause of its success. The removing of these bases will make it impossible for many Americans to take part in this nation's freedom.

It is great for the military to try to save the American people many millions of dollars that would be spent each year on the fighting of crime, poverty, and other domestic problems. But the money that we pump overseas to maintain friendship could be very well spent on such purposes.

President Johnson stresses war on poverty here in America, but we'll spend many billions of dollars on our foreign aid program, Alliance for Progress, and the Peace Corps. Yet, our poverty rate is still staggering. Can you answer these questions about these facts?

I am very interested in Air Force activities, and have conducted a successful study of air weapons that has lasted nearly five years. In this time,

(Continued on following page)

I have learned that the Air Force, under government contract, is building several aircraft overseas. . . . It must cost us plenty to build them overseas. Yet, most Americans here can never hope to see these planes in operation, and many of them cannot as yet obtain a decent meal or a decent home.

Many of these Americans who will become jobless as a result of the military savings program will not be able to secure another job, merely because they are too old. Nobody will hire them. Some of these men are the best electricians or masons or carpenters in their field, and have worked for the government for nearly twenty years. Is it democratic to take their jobs away to save money, which raises still another question: What will the additional \$500 million be spent for?

Although I have no choice as to what and where our funds are spent, and have little to say about our policies, I retain the right to be heard concerning such matters.

THOMAS P. QUINN
Schroon Lake, N. Y.

Way Back to the C-27?

Gentlemen: Relative to Crosby Maynard's letter in the November issue, perhaps I can help clarify or muddle the situation on the origin of the nickname "Gooney Bird."

First of all, I do not claim to be the originator, but certainly whoever was had to be a member of one of the old Transport Squadrons originally located at (old Patterson Field) now Wright-Patterson AFB; (old Duncan Field) San Antonio Air Depot, now Kelly AFB; Middletown Air Depot; or Sacramento Air Depot. I was at that time (1938-1942) a member of the 1st Transport Squadron, later commanded it, and still later commanded the parent 10th Transport Group, which consisted of the four transport squadrons located at the bases mentioned above.

Our squadrons were at that time equipped with C-27s and C-33s—commercial designation DC-2. Our primary function was to haul freight, spare parts, serviceable engines, etc., from the air depots to tactical bases in their respective geographical areas to expedite repair and maintain a high "in-commission rate."

In those days there were no scientific methods of loading to ensure a proper weight and balance—at least not in the prewar Air Corps. Also, weighing of freight was haphazard to say the least. This resulted

in poor loading and overloads, which frequently could not be fully corrected in flight by trimming the aircraft. Also, in those days, there were no concrete runways. Operating off sod fields, sometimes soft due to rain or poor drainage, further complicated takeoff.

At any rate, all these factors combined frequently made our hair stand on end and resulted in the nickname "Gooney Bird." Who originated it will probably never be resolved, but it had to be one of these old pioneers because it was a common term prior to World War II. Verne Poupitch, who used to be a test pilot for Douglas, was one of these early pilots.

In my opinion the C-47 did not deserve the nickname. Douglas marked the interior of the fuselage with loading guidelines, and we knew the recommended payload. But haphazard weighing of freight, lack of suitable weight-and-balance criteria resulting in a tail-heavy condition, soft fields, etc., did cause unusually long takeoff runs, poor flight trim, and did cause some gray hair.

During 1942, I served for about six months at Gura Air Depot in Eritrea. This was a Douglas contract operation. We hauled machinery off Dahlac Island in the Red Sea—no scales, no weight and balance. We looked at the tail wheel and if the tire was not flat we figured it would fly and did—although we damn near ran into the Red Sea a few times before we became airborne.

COL. T. Q. GRAFF, USAF (Ret.)
Capitola, Calif.

UNIT REUNIONS

332d Air Service Group

Personnel of the former 332d Air Service Group, 12th AF Service Command, are planning a reunion in Jacksonville, Fla., in July or August 1965. Contact

Charles G. Schrader
Convention Chairman
2819 North Pearl St.
Jacksonville, Fla.

362d Fighter Group, 9th Air Force

A reunion of the WW II members is planned for Fall 1965. Former 378th Fighter Squadron members are urged to contact the chairman

Lt. Col. W. H. Stewart
Box 36, Air War College
Maxwell AFB, Ala.

393d Bomb Sqdn. (VH) Association

The Association is planning a twentieth anniversary reunion in New York City August 6-8, 1965. Those who have not already contacted the Association should get in touch with

Jacob Beser, Chairman
1313 St. Albans Rd.
Pikesville, Md. 21208



Mission control center for simulated flight

Joint GE/USAF test adds data on value of simulation; man's utility for MOL

Two US Air Force Aerospace Research Pilot School faculty members "flying" a carefully-programmed 15-day simulated orbital mission at General Electric's Valley Forge Space Technology Center have demonstrated ability beyond expectations in handling potential MOL tasks.

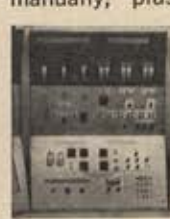
Their space cabin, especially designed to MOL requirements, was based on results of G-E's previous four-man-30-day "Terranaut" test. Atmosphere again was 50/50 nitrogen-oxygen at 7 psi. The crew's mission-task profile and system limitations subordinated all personal considerations to a demanding eight-on, four-off work-sleep schedule.



Space cabin simulator

Realistic orbital tasks were programmed: station keeping; equipment maintenance; rendezvous using G-E simulators; navigation experiments using man-controlled Orbiting Astronomical Observatory hardware, where men did the job with less fuel; a complete re-entry program performed manually; plus other experiments

pertinent to future orbital missions. Tasks scheduled for daylight had to be completed in that period of "orbit". Communications with ground stations



Control panel segment

terminated as they theoretically passed out of range.

The test proved the value of system-level simulation for performance evaluation and pilot training, and that mission-goal orientation in trained, motivated pilots can overcome the most demanding conditions of orbit. For more information, write: Mgr., Manned Orbital Laboratory Project, Valley Forge Space Technology Center, General Electric Co., Philadelphia, Pa. 19101.

162-05

GENERAL  ELECTRIC

New MOL data
USAF astronauts
surpass expectations
in complex
15-day
G-E
"space flight"



MISSILE AND SPACE DIVISION

GENERAL  ELECTRIC

AIRPOWER in the news

By Claude Witze

SENIOR EDITOR, AIR FORCE/SPACE DIGEST

On the State of the Nation

WASHINGTON, D. C., JANUARY 13

There was something disquieting about the fact that President Johnson dismissed military matters so curtly in his State of the Union message on January 4. Four years earlier, in January of 1961, the then newly-elected John F. Kennedy pointed out that on the presidential coat of arms the American eagle carries both an olive branch and a bundle of arrows. "We intend," Mr. Kennedy told Congress, "to give equal attention to both."

Most of the Americans who saw Mr. Johnson deliver his address at a joint session of Congress probably had forgotten what his predecessor had said in the same situation.



—Wide World Photos

President Johnson delivers his State of the Union message to a joint session of Congress in the House Chamber. Left in the photo and behind the President are Speaker John McCormack of the House and Senator Carl Hayden, President pro tem of Senate. Another photo on page 15.

Mr. Kennedy pointed to the perils and said, "Each day we draw nearer the hour of maximum danger." He added that "time has not been our friend." Well, it still is not on our side. And President Johnson was fortunate that he was able to say in 1965—in his lone reference to the military—that "we have built a military power strong enough to meet any threat and destroy any adversary." He claimed this had been done in the past four years. He got a sharp rejoinder from Arthur Krock of the *New York Times*, who wrote: "It was considerably more than four years ago that the retaliatory power of the United States military establishment attained this destructive force."

Of course, Mr. Krock could have been meaner. He could have pointed out that these weapon systems date back, for the most part, to the start of USAF's ballistic missile program in 1954. And that the program was launched in the face of tremendous unknowns, the solution of which

put an immense strain on our technological capability. Failure would have been so easy that the present Administration probably would have studied and restudied the ICBM right out of existence. Documentation for this is complete in Hanson Baldwin's article, "Slowdown in the Pentagon," beginning on page 61 of this magazine.

The mention Mr. Johnson was able to make of the festering spots in Southeast Asia, Latin America, Europe, and Africa did not differ substantially from those of Mr. Kennedy four years earlier. If there is a difference, it is that the martyred President spoke of what was going on in those remote theaters as if they were part of a war, which they are. Mr. Johnson, on the other hand, tried to be less pessimistic and alarming. The entire speech was designed to make nobody angry or scared.

Like Mr. Kennedy, the President said the Communists are aggressive in Vietnam and that our aim there is peace. He said nothing to placate those who are troubled about the policy in this venture and the machinery to carry it out. (Senator Richard B. Russell, who is chairman of both the Armed Services Committee and Defense Appropriations Subcommittee, says that "up to now we have been losing ground instead of gaining it," in South Vietnam.) The State of the Union address said nothing about the state of our effort in Vietnam or the fact that Americans are being killed in action there.

On Latin America, Mr. Johnson reported a tie of "interest and affection" with those republics and said he plans a visit to them this year. Four years ago Mr. Kennedy said Communists are seeking to exploit Latin America and that their domination in this hemisphere can never be negotiated.

As for Africa, Mr. Johnson said the unfolding of new nations is turbulent and that America will try to strengthen their freedom. In 1961 President Kennedy also recognized this civil strife, but added that we will support the United Nations in its efforts to restore order.

Free Europeans, Mr. Johnson said, must shape the course of Europe. He spoke of the task of reunifying Germany. He also hopes to visit that continent. Mr. Kennedy, four years earlier, saw our alliances in disarray, some peril to NATO, and requirement for a "common outlook."

Then there is Russia itself. Today's President seeks "peaceful understandings." He wants us to know the Russians better and suggested that they put on a television show, granting us equal time. He will act to increase trade with the Soviet Union. In contrast, Mr. Kennedy in 1961 said we must never be lulled into believing that Russia or China "has yielded its ambitions for world domination." He went from this into a discussion of how he planned to strengthen the US arsenal.

The State of the Union address, with no glimmer of grimness, substantiates the opinion—now becoming more prevalent—that Mr. Johnson wants no public discussion in areas where he has to make big important decisions. The effort to manage the news out of Vietnam, the nearly catastrophic fumbling of the humanitarian news we made with the most recent Congo airlift, the cold water thrown

on discussion of the multilateral nuclear fleet proposal, and other examples abound. It is hard to believe that a man with Mr. Johnson's political background can imagine the public has given him a mandate to make these critical decisions without open debate of the issues. Congress is empowered and duty bound to make sure the issues are aired.

Time for Decision . . .

Americans can look with great interest, but no sense of complacency, on the current agonies of Great Britain as it tries to shape its airpower arsenal for the years ahead. We cannot be smug about it, because this country has its own struggle, and our decisions help shape those made by our most competent ally. Here in early 1965 there is talk that the British TSR-2, a supersonic low-level strike and reconnaissance aircraft, may be canceled. If it is, there will be parallels between its history and that of our own B-70.

Like the B-70, the TSR-2 is a major achievement of the aircraft industry, described by authorities in England as promising "one of the most potent and flexible instruments of military power yet devised." The British industry, at this writing, is reported fighting desperately to keep the project from being killed and replaced by the F-111 (or TFX) aircraft, designed in this country by General Dynamics Corp. The F-111 made its first flight last December 21. The TSR-2 was off the ground about three months earlier.

TSR stands for Tactical Strike/Reconnaissance. Like the F-111, the TSR-2 is a multirole airplane, although the British usually call it their "treetop bomber." This refers to its automatic equipment that will permit the plane to operate below radar curtains at a speed of about Mach 1. This is a punishing environment of dense and turbulent air, as USAF has discovered in trying to adapt the B-52 to low-level missions. The TSR-2 is designed to do this in any weather, day or night, and over any type of terrain. Its crew of two men in most cases acts only to monitor what is being done by the black boxes. At higher altitudes it can fly at speeds exceeding 1,300 miles an hour.

No range figure has been released for the TSR-2 but it can be refueled in flight and can be ferried anywhere in the world in a day. In addition, it is capable of short-takeoff (STOL) performance from unprepared forward strips. This is accomplished by applying variable geometry to the intakes and nozzles of the two Bristol Siddeley Olympus 22R turbojet engines. Their thrust is reported to be close to 35,000 pounds. For high performance on landing and takeoff, air from the engine compressors is blown over the flaps.

The British are proud of the TSR-2's structural and electronic complexity. The latter, they say, is without precedent in Europe and comparable with anything attempted in the United States. They estimate that 1,000 companies contributed to the weapon system.

Much of this structural and electronic complexity is common to both the TSR-2 and the North American B-70. The British had to develop some new materials and many new ways of working these materials. Special alloy, titanium, and steel are involved. There is a computer in the TSR-2 which can carry out orders fed by a magnetic tape and take the aircraft on a variety of missions. The computer gets information from both forward and side-looking radar as well as advanced navigation systems. The crew will know what is going on because the computer tells the men by displaying moving color maps and displaying information on a screen.

It is interesting to Americans that, in the current talk about abandoning this project, the British center their attention on the high cost. They are looking for a cheaper



—Wide World Photos

Members of the House and Senate hear Mr. Johnson deliver his State of the Union message. Also present are diplomats, members of the Supreme Court, Cabinet members, and high military officers. Invited spectators crowd the gallery. Address was televised for coast-to-coast audience.

way to perform the mission. There has been no suggestion, as was the case in the B-70 debate in this country, that the technological problems cannot be solved.

Writing in *The Times* of London, Marshal of the Royal Air Force Sir John Slessor speaks up for the Bomber Command as a requirement for balanced airpower. He says that the V-bombers "will remain an effective force for much longer than is popularly supposed, in Europe as well as in peripheral operations far overseas." Then, he adds:

"Meanwhile, we are entering on the era of the TSR-2, the most sophisticated strike aircraft in the world today—a supremely versatile instrument, capable of operating in a wide variety of roles all over the world, with conventional or nuclear weapons.

"It will be costly, but considerably less so than the single-shot submarine missile, which is quite useless except for one utterly improbable purpose. And it could well be supplemented, though not replaced, in our strike forces at home and abroad by a modern version of the light bomber, land based as well as carrier borne, which has always been a component of British airpower."

Now both the Air Marshal and the industry are faced with possible disappointment. It is reported that, on a cost basis alone, the British can substitute the F-111 for the TSR-2 and save substantially. The TSR-2 carries a price tag of \$7 million each, and it was planned to provide a stable of 140 airplanes. The F-111, according to press stories from London, could be built for \$5.8 million each. These same accounts say that the published performance data for the TSR-2 indicates it is superior to the F-111. At the same time the Royal Navy has rejected the aircraft, and only the RAF has placed its order. Thus the 140 aircraft now planned compares with about 1,500 of the American design that will be used by USAF and the US Navy. It also has been pointed out that the TSR-2's future was clouded last year when it was turned down in favor of the F-111 by the Royal Australian Air Force. Nothing has been said about the British disappointment the last time they expected to arm themselves with an American system. It was the Skybolt air-launched ballistic missile, which we canceled just at the time its success seemed near.

The most distress in Britain is in the industry, which fears both the economic and competitive effect if the TSR-2 is killed. The Defense Minister, Denis Healey, is quoted as saying it is not the government's function to

(Continued on page 19)

We've been doing our homework on heavy logistics systems



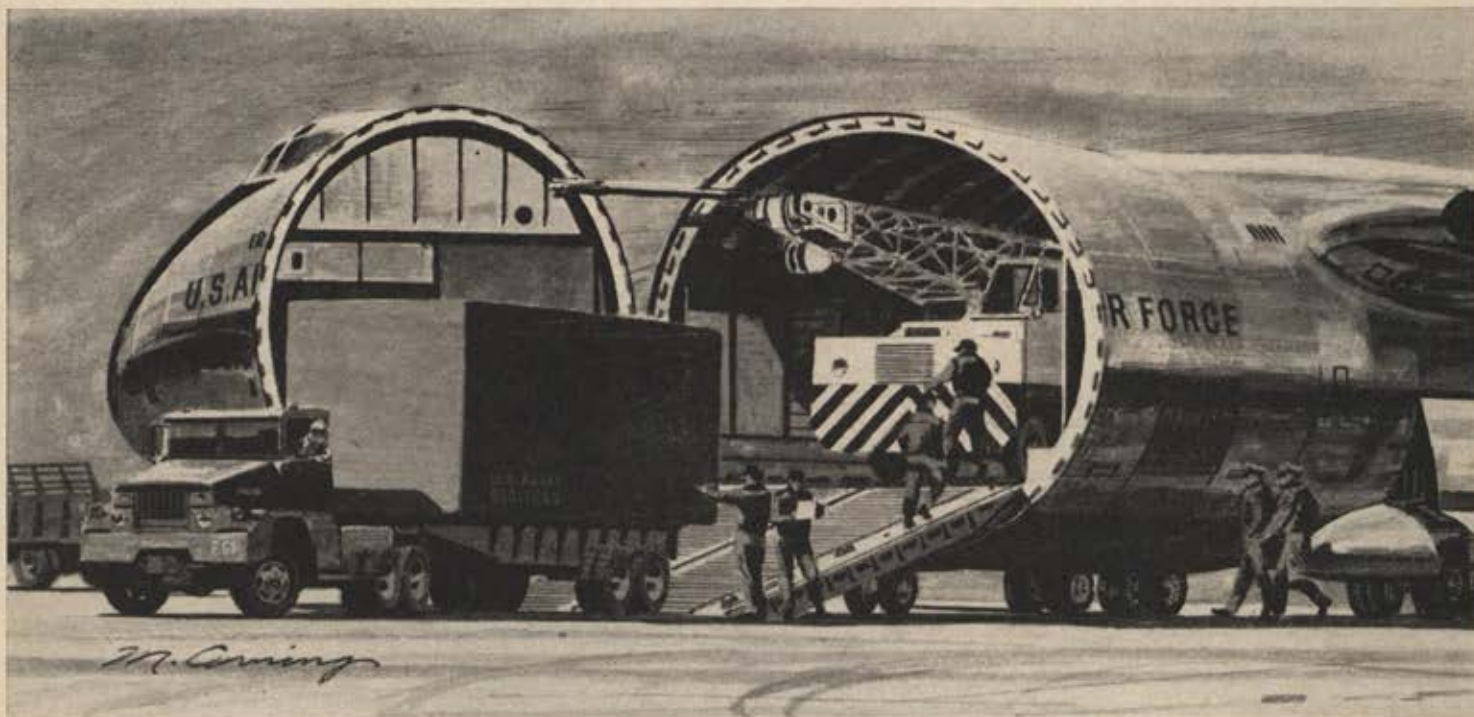
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"wet-nurse overgrown and mentally retarded children in the domestic economy." For an industry long critical to the defense of its country and one that has set quality standards for the entire world, this is rough criticism. Prime Minister Wilson has entered the controversy and he may effect a compromise.

There always will remain, of course, the complications of international politics. Certainly the British Conservatives, now out of power, will protest for the industry. But it also can be expected that there will be alarms expressed over further or continued dependence on the skills and productive capability of the United States. Great Britain will not ask for the advice of General Charles de Gaulle. He is busy building the Mirage IV.

A Report on V/STOL

Each year at this season there is a spate of reports from Capitol Hill committees. They are leftovers from the last session, delayed by late hearings or the requirement for more staff study or something really critical—like the necessity for being reelected. Of the reports that came out early this year the only one that's worthy of particular mention is called "Vertical and Short Takeoff and Landing (V/STOL) Aircraft." It is one of the first products of a new Subcommittee on Research and Development of the House Committee on Armed Services. The Chairman is Rep. Melvin Price, Illinois Democrat.

The report basically is a review of domestic and European V/STOL projects that appears to be technically accurate, if brief. It results from a series of hearings held last year, from May through August, at which some outstanding military and industrial witnesses were questioned. The subcommittee comes up with three fundamental recommendations:

1. It recommends that the Defense Department proceed to develop and buy enough V/STOL aircraft to determine how well they can perform military missions.
2. It recommends that the Defense Department recognize that propulsion is the pacing factor in V/STOL development.
3. It recommends that the military services take it easy on their commitment to helicopters. They warn, in effect, that better helicopters and V/STOL aircraft are on the way.

There is no better time for a congressional study to pronounce such truths, even if they are obvious ones to reasonably sophisticated readers. The idea of determining operational suitability with real hardware is not new to the armed forces, but it is difficult for them to carry out such a program while V/STOL projects remain in the study and development stages. The idea that propulsion is a pacing factor is as old as aviation; it paced the Wright brothers and every major advance since 1903. The idea that the Army may find a better way than that provided by present-day helicopters for the forward supply mission is one that has been entertained for some time. The Army has not worked hard to promote the possibility.

The subcommittee report points out that we have invested about \$50 million in the British P.1127 and its engine, commenting that this has been of "great assistance to the British in gaining the leadership." They now are two years ahead of the rest of the world in the development and production of lift and lift/cruise engines. The implication is clear that the money could have been invested in efforts by American industry.

It goes on to say that the Defense Department has spent more than \$300 million in the past fourteen years on

V/STOL programs. It has failed to get a sufficient number of prototypes to conduct operational suitability tests. There are men in uniform and in industry who have been chafing at the bit for most of those fourteen years.

The report says the Defense Department has had two *ad hoc* studies in the past eight years that recommended aggressive action on the V/STOL program. They said the state of the art was good and the aircraft can be developed. At present only the XC-142, the triservice aircraft being built by Vought-Hiller-Ryan, is programmed to permit a test of operations. Five planes will be built.

"The technical feasibility of V/STOL fighter- and transport-type aircraft has been clearly demonstrated," the report says. "A technological breakthrough in propulsion or aerodynamics is not required for the development of V/STOL aircraft with useful payload and range capabilities."

"An analysis of the data presented indicates that there are valid military requirements for V/STOL transport and tactical fighter aircraft."

The report is not critical of the industry or the individual armed forces.

Let's Make a Movie

At the moment, the Associated Press reports from Saigon that the US Information Service is making a fancy color movie of the war in Vietnam. Peter Arnett, an AP correspondent, ran into this the other day while he was out hunting for a battle.

He found a battle, all right, one that was being staged with a company of Vietnamese troops and spotter planes. Other troops, he wrote, were on guard to keep the Communist Viet Cong from getting into the act. Arnett is worth quoting:

"The US officer at the roadside watched the Vietnamese troops taking the 'enemy village.'

"It's a pity they never get around to doing it as professionally as that in real life," he said.

"The attack scene is to be used in a thirty-minute film for worldwide distribution to show how the Vietnamese war is going. . . .

"What we are looking for is realism," a USIS officer said."

Arnett wrote that the film unit has been on the job three weeks but has avoided the real war.

"We don't want to show cruel things like bodies," a USIS man told him. "This is a people-to-people film to win support from the free world. We want more flags here. We can sell Vietnam by minimizing the brutality and emphasizing the personal aspects of the war."

As reported in this space last August and September, this kind of an effort to tell something other than the truth about the war in Vietnam is nothing new. Only the Hollywood touch has been added. Secretary of State Dean Rusk got presidential approval early last summer of his proposal that one man be placed in charge of handling the output from Vietnam. This was to achieve what the Secretary called a "vigorous program to assure that the true story of our efforts is reported in the US and elsewhere."

For this job, USIS activity in South Vietnam was placed under the command of a man named Barry Zorthian, who was named over-all "counselor" for the total information effort, including that of the military forces. It was his job to "refute and counteract erroneous and misleading reports now emanating from Vietnam." It would be interesting to hear Mr. Zorthian testify on Capitol Hill about his effort and how he is making out as a movie producer.—END

AEROSPACE WORLD

By Allan R. Scholin

ASSOCIATE EDITOR, AIR FORCE/SPACE DIGEST

WASHINGTON, D. C., JANUARY 14

The Defense Department's announcement that fifty flying units of the Air Force Reserve—forty-five troop carrier groups and five air-rescue units—are to be transferred to the Air National Guard was imminent as this was written.

With no more Air Force Reserve flying units to administer, the Continental Air Command (CONAC) will be eliminated. Its remaining functions, such as the individual Reservist program and Civil Air Patrol, will be transferred to other commands.

The initial transfer order was expected to contain no indication of subsequent reductions in Air Reserve Forces strength, but cuts will soon be made in both old and new Guard units.

These are among the changes likely to occur:

- Of 142 flying units—ninety-two in the "old" Guard plus fifty from the Reserve—some forty are expected to be lopped off in coming months.

- Vulnerable units are those with obsolete aircraft—F-84Fs and F-86Hs, and C-97 and C-121 transports. The latter will be replaced by C-124s and, before long, C-130s, though on less than a one-for-one basis.

- Where two or more groups are located on the same base, they will be consolidated. This will make available the transfer of equipment to some groups with obsolete aircraft so that every state will keep at least one Air Guard unit.

- Many of the present wing headquarters will be eliminated, perhaps to be replaced by divisional headquarters, each with operational control over six or more groups. This measure will greatly reduce the number of senior officers in the Guard and the number of regular Air Force officers assigned as advisers.

- Strong pressure will be applied

to encourage Guard officers with more than twenty years' service to vacate drill-pay spaces, to make room for those who might not otherwise qualify for retirement.

• • •

The French government has announced plans to set up a missile test base in French Guiana on the Caribbean coast of South America. The

needs the French Guiana site because it opens onto broad ocean expanses for test shots. But in developing his force of Mirage IV bombers equipped with nuclear weapons, de Gaulle has emphasized his conviction that even a small independent nuclear power can exercise a deterrent role in Europe. With a nuclear missile base located in French Guiana he could extend his



Gen. Curtis E. LeMay, USAF Chief of Staff who was to retire January 31, talks with AFA President Jess Larson, left, and Deputy Defense Secretary Cyrus Vance at AFA reception in General LeMay's honor January 5.

present test site for France's growing missile program is at Hammaguir in the Sahara, but, under terms of its treaty with the new Algerian government, France must get out of the Sahara in 1967.

Most ambitious of France's missiles is the Diamant, a three-stage vehicle capable of orbiting a 175-pound payload. Its first full-scale firing is scheduled this year. France also has under development a submarine-launched missile to be deployed aboard five nuclear-powered submarines by the end of this decade.

The French Guiana launch site is expected to be operational by 1968. By that time, France may well have nuclear-tipped missiles capable of ranges beyond any point in South America or the US.

De Gaulle explains that France

"deterrent" to the western hemisphere as well.

• • •

What the US intends to do about its commitment to South Vietnam has a direct relationship to the conflict developing between Malaysia and Indonesia across the China Sea.

There is a small but growing sentiment in Congress that we cannot hope to win in South Vietnam without risking another Korea, and that the funds we are pouring into that struggle could better be used to support President Johnson's domestic programs.

But even if it wanted to, the US could not disengage itself from South Vietnam—at least until the Malaysia-Indonesia crisis is resolved—without leaving the British holding the bag.

Malaysia was formed in September



—Wide World Photos

Battlefield missiles supplied to Cuba by USSR are shown in Havana's New Year's parade celebrating anniversary of Castro takeover. Unlike missiles which precipitated October 1962 crisis, these have a range of only ten miles, comparable to US Army's Little John. Background poster seeks sugar field volunteers.

1963 when the former British colonies of Sarawak and Sabah on Borneo joined with the Malayan states and Singapore in an independent federation within the British Commonwealth. Indonesia, which shares a 900-mile-long border with Sarawak and Sabah on Borneo, has vowed to overthrow the Malaysian republic, a goal which is now openly supported by Communist China.

According to the British Institute for Strategic Studies, Indonesia's armed forces total 412,000 men, including an army of 350,000 and an air force equipped with about a hundred MIG fighters; more than seventy bombers, including TU-16 Badgers, IL-28 Beagles, and some B-25s; and sixty transport planes. Malaysia's armed forces total only 27,000 men. Its small air force is made up entirely of light tactical transports.

So far Indonesia has confined its military actions against Malaysia to small guerrilla raids, with very little success. But it has massed large forces on the Sarawak border in Borneo. To help defend Malaysia, Britain has assembled a major portion of its fleet in the South China sea, including its newest aircraft carrier, the *Eagle*, and the older *Victorious*, and has moved some of its V-bombers into the area.

The US has shown little inclination

to get mixed up in the Malaysian problem. A deal arranged by the Malaysian prime minister on a visit to the US last year to acquire some Cessna T-37D fighter planes collapsed because Malaysia objected to the five percent interest rate on funds to buy the planes. Though Malaysia recently renewed its request for military aid, the US is reported less willing now to provide assistance which would get

USAF's F-111A fighter flies over Fort Worth, Tex., with wings in fully sweptback position during second test flight January 6. Pilots successfully tested all wing positions.



us further involved, preferring to let Britain, with its closer ties to Malaysia, handle that role.

British determination to support Malaysia is bolstered by the realization that the loss of Malaysia would pose a serious threat to Australia.

The opinion of many observers in both East and West is that if the US were to back out of South Vietnam, Malaysia could not long hold out against the Red China-Indonesia axis,

and all of Southeast Asia would soon come under Communist domination. Conversely, if Malaysia were to be overrun by Indonesia, the US would be faced either with abandoning South Vietnam or greatly stepping up its military commitment throughout Southeast Asia.

In the first major launch of 1965, scheduled for January 19 at Cape Kennedy, Fla., NASA was to conduct the second and—if successful—the final unmanned test of the Gemini capsule. The test had been set back from December when a hydraulic failure occurred in the Titan II booster.

A successful test means that USAF Maj. Virgil Grissom and USN Lt. Cmdr. John W. Young will be ready to undertake the first orbital manned Gemini mission in late April or early May. A failure, however, could set the Gemini program back six months or more—perhaps even cancel the Gemini contributions to the Apollo moon program.

In 1964, NASA compiled an .850 mission batting average with twenty-eight successes in thirty-three launches. The year began with a disappointment, when Ranger VI, launched January 30, impacted the moon on target

but failed to transmit photos. Six months later Ranger VII proved an unqualified success, clicking off 4,316 TV photos of the moon a thousand times clearer than those produced by earth-based telescopes.

In interplanetary spacecraft, NASA also logged a failure and an apparent success. Mariner III, launched on a voyage to Mars on November 5, failed to jettison its spacecraft covering, but Mariner IV, sent on its way November 28, is on course to intercept and photograph the Red Planet on July 14.

Six of the eight satellites launched in the Explorer series were successful, with Explorer XXVI closing out NASA's year in a successful launch from Cape Kennedy on December 21.

Other major successes included the Relay II and Syncom III communications satellites in January and August respectively, the first Gemini test in April, the sixth and seventh Saturn I tests in May and September, two Centaur flights in June and December, (Continued on following page)



Triservice XC-142A V/STOL transport shown in first vertical-takeoff-and-hover test at Ling-Temco-Vought plant in Dallas, December 29. Biggest V/STOL plane yet built, XC-142 is also first in US designed for operational use.



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AEROSPACE WORLD

CONTINUED

Nimbus I weather satellite in August, the Orbiting Geophysical Observatory (OGO-1) in September, and San Marco I in December, the first satellite to be launched in the US by foreign nationals (Italians) in an international cooperative program.

Five Tactical Air Command all-weather fighter units will match their skills in a new radar navigation and bombing competition to be staged at Nellis AFB, Nev., in February.

The competition, named Blue Ghost I, will test combat-ready McDonnell F-4C Phantom II and Republic F-105 Thunderchief aircrews in low-level radar navigation and all-weather bombing techniques, including escape maneuvers and instrument recovery.

Each team's score will be determined from the results of four missions, with no crew member flying more than one mission.

Wings scheduled to participate in Blue Ghost I are the 4th Tactical Fighter Wing, Seymour Johnson AFB, N. C.; 12th and 15th TFWs, MacDill AFB, Fla.; and 23d and 355th TFWs, McConnell AFB, Kan.

The Air Force has announced plans to test launch a Minuteman ICBM in March from a typical Strategic Air Command operational silo at the 44th Strategic Missile Wing, Ellsworth AFB, S. D.

The specially prepared test Minuteman will be unarmed. The first-stage engine will contain only enough propellant to sustain several seconds of powered flight. The second and third stages will contain no propellants although they will conform to the same weight and balance as any operational Minuteman ICBM.

The test missile is expected to rise less than one mile and impact less than two miles from its launching point without overflying any residential areas.

The need for this type launching from operational sites has long been recognized by the Department of Defense and USAF to exercise all launch systems in their operational environment.

Pictorial functions of the Air Photographic and Charting Service will be consolidated in a new Aerospace Audio Visual Service (AAVS) to be located at Norton AFB, Calif. The Military Air Transport Service has announced that the consolidation will be completed by July 1967.

The new unit will consist initially of 1,500 military and civilian person-

nel, including photographic, administrative, and supply experts. Photographic capabilities will exceed those of the largest Hollywood studio.



LeRoy Whitman, who retired recently after thirty-five years as editor of *Journal of Armed Forces*, has accepted post with *AIR FORCE/SPACE DIGEST* as consultant on editorial development.

In addition to covering Air Force missions, MATS photo units are regularly tapped for photo work by the other military services, the State Department, and the National Aeronautics and Space Administration.

USAF's first operational unit to fly the SR-71, the Mach 3, high-altitude jet reconnaissance aircraft, was activated at Beale AFB, Calif., in January.

The unit is the 4200th Strategic Reconnaissance Wing. It is assigned to SAC's 14th Strategic Aerospace Division at Beale AFB, which also operates B-52 jet bombers and KC-135 jet tankers.

In its first flight at Palmdale, Calif., on December 23, the SR-71 exceeded 45,000 feet altitude and 1,000 mph speed. Deployment of production units to SAC will begin this year.

DoD began assuming operational control over Syncom II and III communications satellites from NASA in January, with the changeover scheduled to be completed by March 31. NASA reported it has completed its experimental research-and-development program with the synchronous satellites. DoD will operate them for the remainder of their useful lives.

Syncom II was launched from Cape Kennedy July 26, 1963, and Syncom III on August 19, 1964. Both are in relatively stationary orbits at altitudes of about 22,300 miles.—END

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Like modern football, fighter aircraft operations are complicated and the margin for victory is usually narrow. Theories today are so divergent that some *must* be wrong—but, unlike football, an incorrect theory applied to war can mean tragedy. One thing is sure, the confusion that exists over modern fighter tactics suggests that more basic research and testing are urgently needed . . .

AIR FORCE
FEBRUARY, 1965



As exemplified in this WW II attack by a US P-47 pilot on a German flak tower, successful fighter operations call for courage, as well as skill and first-rate aircraft.

THE TEST OF FIGHTER AIRCRAFT

They Must Give
BETTER
Than They Get . . .

By J. S. Butz, Jr.

TECHNICAL EDITOR, AIR FORCE/SPACE DIGEST

FIGHTER aircraft operations always have had much in common with football. This may be trite but it is also true. Today, as the role of tactical aviation is reexamined, the football analogy is more pertinent than ever to understanding the problems and potential of the fighter airplane.

Both modern football and fighter warfare are complicated. The first requirement is for first-class "material," equal to or better than that of the opponent. In fighter forces, the material is primarily the pilots, the aircraft, and the armament. In both cases, it takes hard work, training, and experience to turn first-class material into a superior force. Firm leadership, imaginative tactics, swift decisions, and practice must combine with skill, courage, and perseverance to achieve success, whether on the gridiron or in the fighter cockpit.

The second great parallel is that the margin between victory and defeat of evenly matched opponents is usually narrow. The line between a champ and a chump is a fine one. Championships are often decided by only a handful of plays out of many hundreds run.

Fighter commanders are as troubled as football coaches by these narrow margins of superiority. Any

combat between two modern, well-led, aggressive fighter forces of approximately equal numbers is a touch-and-go situation and can end in upsets and unpredictable defeats.

This is not clearly understood by most laymen and even many military men in the United States, largely because the overwhelming US edge in fighter victories at the close of World War II and in Korea have led many observers to assume that the US will automatically enjoy air supremacy in any type of future war. Air commanders generally are not so sanguine. For example, Gen. O. P. Weyland, USAF (Ret.), who commanded allied air forces in Korea, reported to the Congress that he could find no reason for complacency or comfort in the fact that the F-86 bested the MIG-15 in air-to-air combat on a ratio of nearly fifteen to one. He commented, "They [the Russian aircraft] were good. . . . I felt . . . ours were better. But it was my experience not to belittle them too much, or not to belittle them—period." General Weyland believed our tactics were superior because "we retained the initiative and stayed on the offensive primarily." In the area of relative pilot skill, he placed considerable emphasis on the fact that the Russians, during the periods

they took over MIG operations from the Chinese and Koreans, were rotated every three or four months compared to an average rotation period for US pilots of nine months to a year.

A third similarity between football and fighter operations is the multitude of emotional spectators involved, as compared to the few participants and handful of real experts. Winston Churchill's tribute to the Royal Air Force fighter pilots after the Battle of Britain—"Never has so much been owed by so many to so few"—eloquently expresses the spectator-participant relationship.

If anything, the Germans were more emphatic than the British and Americans in their assessment of the role of the fighter in World War II. For example, Afrika Korps Field Marshal Erwin Rommel, an expert champion of armor, believed that the fighter airplane, not the tank, was the decisive instrument in most major World War II land battles, especially in the war's latter phases. Shortly before his death in 1944, Rommel predicted the outcome of any future war in which the Western Allies might be heavily outnumbered by the Communist bloc. He said, "... the Americans have got control of the air and they'll keep it. That is a sentence of death for any land army, however large, that has to fight without adequate air cover."

Rommel, and the big majority of his contemporaries in the Wehrmacht's general officer corps, believed that no army, regardless of its quality, could operate successfully against an enemy whose fighter aircraft had won air superiority over the battle zone and who exploited this superiority through mass attacks on armored formations, troop concentrations, artillery emplacements, supply columns, etc. Rommel's belief in the ability of a few thousand aviators to immobilize and doom an army sounds almost as if it had been taken from US Air Force doctrine.

Of course, the military environment has changed considerably since World War II. Many new weapons have been developed, and the ground rules for all types of operations have changed considerably. Rommel, for instance, never heard of the atomic bomb and never saw an accurate missile. If he had lived, it is possible that he would have altered his views on tactical airpower, as have many military leaders.

One of the great military problems of the present is the necessity of bringing some order into this nation's thinking on tactical airpower. There will never be agreement on a rigid doctrine, even for a short period. But the arguments within the services, among the services, and between the services and the Office of the Secretary of Defense are so sprinkled with contradictions—and the conflicts of opinion are so basic—that it has become virtually impossible to write a set of requirements for any new tactical air weapon.

Some say that modern anti-aircraft weapons will not be effective against fighters that attack at supersonic speeds and low altitudes. Others maintain that is wrong, that the only protection lies in going very slow in a helicopter. Still another group believes that the answer to control of the air is a large number of relatively cheap and simple ground-attack fighters.

The arguments proceed and include such key questions as the maximum speed at which ground targets can be seen effectively from low-flying aircraft, the

vulnerability of various dispersion patterns for tactical air bases, the ability of helicopters to withstand damage, the effectiveness of various types of armament for air-to-air combat, and the degree to which tactical aircraft can protect themselves through electronic countermeasures.

The current tactical air situation in the Pentagon is in the worst tradition of military squabbles. The conflicts of opinion are so fundamental that a great many people inevitably must be wrong. If the wrong kind of US airpower is ever seriously challenged in a major or limited war, the results could be disastrous.

Until someone in a position to do something about it gets unassailable answers to the fundamental vulnerability and effectiveness questions, the tactical air furore is likely to continue. Yet, considering the advanced state of technology today, it should be possible, even though probably quite expensive, to conduct field tests of sufficient realism to establish the capacity of all weapons. These tests would have to go far beyond the "canned" tests now used, in which opposing forces are rated primarily on their ability to follow a script. Considering the present concentration of authority in the Pentagon, no level under the Secretary of Defense could direct such a major improvement in the art of conducting war games and the technology of umpiring.

There is one major point of agreement. It squares with the lessons of World War II as seen by Rommel and the majority of students of war. This key point is that any army will be victorious once it has free movement above the whole battlefield, in enemy as well as friendly airspace. The basic disagreement today is whether fighter aircraft, even an overwhelmingly superior force of fighters, can control the air over a modern army.

Certainly the problem of gaining and holding air supremacy is much more difficult than ever in the past. Mobile anti-aircraft defenses for all types of ground units—armor, infantry, and guerrilla forces—are continuing to improve. This is true of sophisticated, high-speed surface-to-air missiles and the lighter types of automatically directed rapid-fire guns.

Perhaps even more important is the increased vulnerability of tactical airfields. Ballistic missiles with ranges of from 500 to 1,500 miles have ended the day of fighter operations from sizable airfields in the rear areas of an army. Such airfields will be prime targets for short-range ballistic missiles of both the offense and defense in any major conflict, whether nuclear weapons are used or not.

Fighter operations, therefore, will have to be widely dispersed. This increases maintenance and resupply problems and cuts down the number of sorties flown and the general effectiveness of the fighter force.

The steady and apparently unending improvements in battlefield anti-aircraft defenses and lightweight ballistic missiles have convinced many military officers that air superiority to the degree seen in World War II can never again be achieved. Many believe the most important aircraft for the future will be the small VTOL fighter for the close support of troops and the helicopter or small VTOL transport to give troops unprecedented mobility. This is the basic con-

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cept behind the US Army's new air-assault units, now being tested. This concept features nap-of-the-earth flying, below the level of the trees in many instances, to reduce vulnerability to enemy AA fire. When sizable attacks are mounted, fighters would be required to assist the Army's integral antiaircraft units in establishing local air superiority. If enemy fighters ever broke into helicopter or propeller-driven VTOL formations, proponents of this concept expect that losses would be very high. But one of the virtues attributed to this type of air-assault operation by its supporters is that complete air superiority is not needed over the whole battlefield.

It is difficult to sort out the arguments against air assault. Dissent comes in varying degrees from within the Army, and from the Marine Corps and Air Force. The running dialogue among the services makes it clear, however, that there is no large body of military opinion that objects to increasing the Army's mobility through use of the projected air cavalry-air assault units.

The key question in the tactical air controversy concerns air supremacy and the role of the high-performance fighter. A large body of opinion in all the services, and certainly within the Air Force, still holds that air superiority can be achieved over any modern battlefield. The logical conclusion to this argument is that obtaining control of the air should be the number-one military objective, since such control can be decisive.

The description of the future tactical air battle most commonly presented by Air Force leaders envisions three overlapping phases. First is the contest for air superiority. Complementary attacks by high-performance fighters and short-range ballistic missiles would be directed at enemy airpower on the ground and in the air. Destruction of ground installations and parked aircraft, if possible, is the preferred method of accomplishing this objective. Superior equipment, and the highest order of training, leadership, and determination are considered vital to success in this phase.

The second phase is interdiction of the battlefield, isolating enemy forces from supplies and reinforcements. A low level of interdiction sorties would begin during the initial phase, and they would build up rapidly as control of the air was won. In both of these phases it is expected that determined attacks by high-speed low-flying aircraft can overcome antiaircraft defenses as they have in the past.

In the third phase the major portion of the tactical air forces would be concentrated on close-support missions in assisting the Army in the final defeat of the isolated and immobilized enemy ground forces.

The speed and intensity of this battle would pick up rapidly as the numbers and quality of the committed forces increased. It is believed that the crucial air-superiority phase could be concluded in as little as twenty-four hours in a major attack involving a thousand or more aircraft and scores of short-range ballistic missiles on each side.

This idealized concept of the air battle must now be modified to fit a wide range of possible "contin-

gencies." According to Secretary of Defense Robert S. McNamara, the range covers everything from "counterinsurgency operations in such places as Vietnam to a large-scale conventional or tactical nuclear war in Europe."

Current US policy in meeting these contingencies still is oriented to the familiar lines of the past. Air supremacy is expected, and, if it isn't forthcoming, our military fortunes are in serious jeopardy. The situation in Europe, for example, is described by Defense Secretary McNamara in the following terms: "Air superiority in the NATO area is essential to our defensive strategy since we depend upon that superiority to disrupt enemy supply lines and prevent reinforcement of bloc ground forces in Europe."

While DoD plans to achieve air superiority, it also attributes an advantage to our antiaircraft defenses. Mr. McNamara says our forces are equipped "with substantially more surface-to-air missile launchers which would help to reduce the effectiveness of Soviet aircraft." But he does raise the possibility that Soviet capabilities will be improved sharply, saying, "In the longer run, as the Soviet Union increases both the quantity and quality of its surface-to-air missile forces, the vulnerability of manned tactical aircraft will increase, and we will probably have to turn increasingly to surface-to-surface missiles for a tactical offensive capability."

However, the longer run of which Mr. McNamara speaks apparently is predicted by DoD to cover several years. DoD currently is in the process of upgrading all tactical air forces, in the Navy, Marine Corps, and USAF. A stable of new fighters is being readied. First and most important is the General Dynamics F-111 variable-sweep, multipurpose, long-range aircraft which already is well along in development. More than 1,200 F-111s are expected to be built for the USAF and around 300 for the Navy. The Navy also is expected to buy at least 700 of the Ling-Temco-Vought A-7A ground-attack fighter, which is due to make its first flight this spring.

Still more aircraft are needed. Both USAF and DoD agree that more than the currently programmed number of F-111s must be provided if the Tactical Air Command is to be properly upgraded for the 1970s.

Many hard choices are involved in selecting these new fighters. The broad set of requirements—from counterinsurgency operations to a major war—certainly indicates a need for several types of aircraft. No one plans to chase guerrillas with multimillion-dollar, ultra-high-performance aircraft. This is reflected in the fact that DoD already has selected North American to develop a COIN (counterinsurgency) aircraft, which is due to fly next fall. And General Dynamics/Convair already has flown its own COIN aircraft, which the company is developing on speculation.

One of the major decisions due is an answer to TAC's need for a super-COIN, or some sort of light ground-attack airplane suitable for campaigns which involve major forces but are limited, as in Korea. There is an extremely wide variety of views on this



North American P-51, equipped with Rolls-Royce engine, proved Army Air Forces' most versatile fighter in World War II. With new wing design, which made possible long range and more time on target, it was highly valued for ground-attack, bomber-escort, and air-superiority roles.

question. No consistent opinion appears to exist in any single USAF organization, within the various offices at the Department of Defense level, or in the aircraft companies. Firm requirements have not yet been set down for a new fighter. Time is growing short for there is much discussion that DoD wants the first operational squadron ready by 1970.

It is possible to split current opinion on fighter selection into three basic categories. The three basic approaches are:

- **High-Performance Multimission Aircraft**—Proponents of this theory assert that the best possible maneuverability and speed and altitude performance should be built into every fighter. They believe the air-to-air portion of the air-superiority battle is so tenuous, under the best of circumstances, that the enemy should never deliberately be allowed an edge in performance. In effect, the argument is that no one ever set out to design an inferior air-superiority fighter. Yet history is littered with such aircraft. The technical differences between the best and the second best have been small and usually not properly understood until the aircraft entered combat.

The multimission aspect of this argument is that the air-superiority airplane can also function adequately for interdiction and close-support missions by carrying external bombs, rockets, and other ordnance. And, if jumped by enemy fighters, this airplane can dump its ordnance and defend itself.

The high-performance, multimission theory won greatest acceptance during World War II. The P-51 was the Air Force's leading fighter, and it met all the requirements of this theory. Its Rolls-Royce engine provided high power at all altitudes. The aircraft had a relatively low wing loading, in line with that of other fighters of the day. The Mustang was exceptionally clean and had low drag when developing high lift in turns. All these features were important in providing high maneuverability at all altitudes.

The P-51 was the first US fighter to have a laminar-flow wing with exceptionally low drag in the level-flight attitude. Thus the aircraft had an exceptionally long range and a long time over target. And, it was highly valued as a ground-attack fighter and bomber escort as well as an air-superiority aircraft.

Many other US fighters did not fare so well. Neither



P-40 flown by Flying Tigers in China was inferior to the Japanese Zero in maneuverability and rate of climb. But it could dive faster and possessed superior firepower and armor. By forcing the enemy to fight on their terms, General Chennault's pilots consistently scored victories.

the Navy nor the Army Air Forces had a fighter that could have won a major air superiority decision at the opening of World War II. Exceptional leadership and pilot skill were the only bright areas in those days.

One of the better examples was the excellent record of Gen. Claire Chennault's fighter squadrons in China against the Japanese Zero during World War II. The Zero was substantially superior to Chennault's P-40 in maneuverability, rate of climb, and most other key aspects of fighter performance. Still, by demanding strict adherence to one of the basic tenets of good fighter tactics—force the enemy to fight on your terms—Chennault was able to lead his smaller forces to victory. The P-40 could dive faster than the Zero, and the pilots normally fought only when they could make one-pass diving attacks. Superior armor and firepower also helped the P-40 cause against the light-gunned and virtually unarmored Zero.

In the Korean War, the US had only one fighter that could handle the MIG-15, presumably the Soviet's best at that time. This was the F-86, which could not fly as high as the MIG-15 and could not stay with it in turns at some altitudes. The F-86 was superior, however, in top speed, dive speed, and in armament. Tactics calling for the F-86 pilots to maintain their speed at all costs, and not to slow down to fight, were quite successful against the MIG-15.

Other high-subsonic-speed US jet fighters of that
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In Korean War, although F-86 couldn't match MIG-15 in altitude and turns, USAF pilots won out by employing tactics favoring Sabrejet's superior speed and armament.



To provide fighters with long range and supersonic speeds, designers have had to compromise between efficient subsonic and supersonic characteristics. McDonnell F-4C, a second-generation, two-design-point aircraft, efficiently combines these features to achieve multimission capability.

day were used for ground attack under the protection of the F-86s. But while the margin between the F-86 and some other US fighters was decisive, it also was narrow. For example, the results of an exhaustive flight-test competition between the F-86 and the F2H Navy Banshee are illustrative. In eight of the ten performance categories investigated the F2H was superior. However, the Navy flight-test report concluded that the Banshee was no match for the F-86 in air-to-air combat because the F-86 was faster and could fly at a higher altitude. Consequently, the F-86 would not have to engage the F2H until conditions were in its favor and the F2H could not force a fight on its terms.

Troubles with the multimission concept began when the jet engine was introduced. This powerplant consumed fuel at a great rate, especially at low altitudes, and severely limited aircraft range and time over target. Early supersonic fighters, even though their speed was considered decisive, were in even greater trouble as to range. Very thin, short-span wings, needed for efficient supersonic flight, develop relatively low lift and high drag below Mach 1, increase subsonic fuel consumption, and raise takeoff distances.

Since these airplanes cruise at subsonic speeds and usually fight supersonically, the great majority of them

are two-design-point airplanes—that is, their wing and general aerodynamic features are not optimum for either flight condition. This is a compromise between efficient subsonic and supersonic design. This technique does give maximum range/payload capability for supersonic fighters.

The McDonnell F-4C, for example, which holds the major speed records for level flight and in turns, plus most of the time-to-climb records, is a second-generation, two-design-point airplane. It handles the multimission job much more efficiently than did the early Century-series fighters such as the F-101.

The General Dynamics F-111 is the latest product of the multimission fighter concept. It has a turbofan powerplant with better fuel consumption at all altitudes than any turbojet used in current fighters. More important, it is the first fighter to have a variable-sweep wing. At takeoff, the wing is rotated forward so its sweep is sixteen degrees, and the takeoff distance is less than 3,000 feet, fully loaded, which is very low for a fighter of this size. During high-subsonic-speed cruise and high-altitude combat the wing is set at the most efficient angle, some forty degrees. And during sea-level attack against well-defended targets, the wings are drawn back to seventy-two degrees so that speeds of Mach 1.2 are possible.

The variable-sweep wing is heavier structurally but has compensations. It keeps drag relatively low at all speeds, which reduces the fuel consumption and allows the engine size to be reduced. The F-111's payload/range capacity is so great that it is being considered as a possible Strategic Air Command weapon which might outperform some bombers.

● **Lightweight Fighters**—The major disadvantage of the high-performance multimission fighter is cost. The F-4C per-copy delivery price is reported to be around \$3 million, and the F-111 apparently will top \$4 million. Maintenance costs, primarily on their complex electronic systems, also are very high.

Many influential persons in the military, industry, and DoD believe that costs have risen to the point that the future fighter force must contain a mixture of heavy high-performance, multimission aircraft such as the F-4C and the F-111, and lightweight, multimission fighters such as the Northrop F-5.

Variable-sweep wings of General Dynamics F-111 make possible efficient operation at all speeds. Its turbofan engine boasts better fuel consumption rate than any turbojet in current fighters. With its outstanding payload/range capacity, F-111 might outperform some bombers.



Apparently it would be possible to buy four or five lightweight fighters for the price of one F-111. There is a similar relationship between maintenance costs. Since numbers can be decisive in fighter warfare, this argument is strong.

Several important debates are under way about the ability of the lightweight fighters to perform the tactical air mission. One argument is over the air-superiority phase. The lightweight proponents say that air-to-air missiles have altered the old theory that speed and altitude performance are the keys to success in combat between aircraft. They believe that the aircraft and missile must be judged as a unit, and that each can compensate for the other's weakness.

However, many experienced fighter men and missile experts directly oppose this theory. Some say that all air-to-air missiles have severe limitations in combat between fighters, even though they are effective against

advantages are gained by eliminating the requirement for supersonic flight. The wing is relatively thick and efficient. The structure is relatively light, and the maximum engine thrust is reduced by a substantial amount.

As a result, the A-7 is truly remarkable in its design mission. The empty weight of the airplane will reportedly be between 14,000 and 15,000 pounds, its internal fuel load will be 10,000 pounds, and it will carry up to 20,000 pounds of ordnance. No other jet fighter aircraft can approach the A-7's payload capacity up to its combat radius which is in the 600-700-nautical-mile class. No other jet fighter can match this radius, other than the F-111, and the F-111 cannot carry as large a load.

Opponents of this type of airplane argue about the relatively low attack speed and also say it could never be effective in the air-to-air phase of the air-superiority battle.

Proponents of such aircraft dismiss the attack-speed argument as incorrect. They point to Air Force doctrine which states that a large portion of the air-superiority battle will be waged through ground attacks against airfields and parked aircraft, which is what this type of airplane is specifically intended to accomplish. The single-design-point airplane also enjoys approximately the same cost advantage as the lightweight fighter, so a given expenditure would purchase a force of A-7s three or four times larger than an F-111 force.

Most reports today indicate that the next USAF fighter purchase will occur within two years and that it will be for some sort of lightweight fighter or a subsonic single-design-point airplane. The Northrop F-5, Douglas A-4E, the L-T-V A-7, a stripped-down Grumman A-6, modified versions of some older fighters, and some completely new designs are all in competition.

However, the possibility that all available fighter funds will go for additional F-111s or F-4Cs certainly can't be dismissed.

In addition to this early fighter order, a great deal of effort is being expended in planning still another generation of high-performance fighters that would enter service sometime after 1975.

Much effort also is being made to provide VTOL capability so that the fighter forces may be dispersed to reduce ground vulnerability. Research and development also are aimed at providing solid-state electronic devices that will check themselves and have more defect-free performance hours than a jet engine, to reduce the maintenance problems which are very troublesome now.

However, the confusion and contradictions that exist today over modern fighter tactics suggest that much more basic research and testing is urgently needed. If the US waits until its tactical airpower is challenged again to find out just what type of fighter airplane, what type of missiles, and what type of tactics will dominate modern battlefields, the nation's ground forces may have to fight without air superiority for the first time since early in World War II. Such an event could lead only to defeat.—END



First generation of supersonic fighters, represented by North American F-100 Supersabre, achieved speed at expense of range, high fuel consumption at low altitudes.

bombers, which cannot maneuver so quickly. Others contend that the missile is just another type of "gun" and that the aircraft with a major speed and altitude edge, such as the F-111 would enjoy over a lightweight fighter, would win consistently. Still others are pressing for the replacement of the present-day generation of missiles with rapid-firing cannon in all fighters.

Ground-attack speed is also controversial. One theory holds that the success of an attack against heavily defended ground targets depends directly on the attack speed. The conclusion here is that the F-111 with its Mach 1.2 speed over the target will be by far the most effective ground-attack aircraft.

The other theory contends that Mach .9 is a sufficiently high attack speed and that four or five lightweight fighters will have as high a probability of success as one F-111. Therefore, it is concluded that there is a place for the lightweight fighter in relatively short-range interdiction missions, and that it is preferable in the close support phase because it costs less than the F-111.

● **Single-Design-Point Aircraft**—Another attack on the high cost of high-performance tactical fighters is being made by the Navy through development of a single-design-point airplane—the Ling-Temco-Vought A-7. The A-7's engine and airframe design are optimized for cruise at high subsonic speeds. Many

The United States Air Force has a new Chief of Staff. What sort of man is Gen. John Paul McConnell, and what sort of leadership will he bring to USAF? The General's Air Force career, after a distinguished record at college and West Point, has been one marked by accomplishment. It includes extensive experience in the Far East and Europe. To General McConnell, people still are USAF's most valuable asset. Of the new Chief, his fellow officers say he has an ability to "create harmony" and a lively sense of humor. But these men also say retribution can come quickly when a job is not done right . . .

USAF'S NEW CHIEF OF STAFF —MAN WITH A MISSION

By Claude Witze

SENIOR EDITOR, AIR FORCE/SPACE DIGEST

DR. S. P. McCONNELL of Booneville, Ark., describes his son as "a smart boy who knew what he wanted and always worked hard for it."

The son now is Chief of Staff of the US Air Force. He is Gen. John Paul McConnell, who celebrates his fifty-seventh birthday on February 7, a few days after taking over the command of USAF from Gen. Curtis E. LeMay, who has retired.

Dr. McConnell's smart boy was First Captain of the Corps of Cadets at the United States Military Academy at West Point, which means that he was tapped by the Army as the most promising military leader in the class of 1932. It is a quirk of history that he now sits as a member of the Joint Chiefs of Staff under the chairmanship of Gen. Earle G. Wheeler, of the US Army. General Wheeler also was a member of the Class of 1932 at West Point.

As a young man, General McConnell was persistent in his determination to go to the military academy. His father, who at eighty-two calls himself an "old-fashioned country doctor," recalls that John Paul got his first appointment when he was sixteen years old, but already out of high school. The Academy's minimum age was seventeen. The next year he was given an alternate appointment, but the principal appointee accepted, leaving no berth. Then there was a third appointment, and this time the young man was turned down because of a minor fault in eyesight. It was only on the fourth try that John P. McConnell was successful in donning the uniform.

The time that this consumed—four years—was not wasted. Young McConnell was born in Booneville, and there are times today when he jocularly plays the role of the "Arkansas boy." But that it is an act is easily recognized by friends who know his academic record.

In the years before he achieved West Point, he attended Henderson-Brown College in Arkadelphia, and was graduated in 1927 with a degree of Bachelor of Science, magna cum laude. After a one-year hitch at coaching high school football and working as a roustabout in the oil fields, he went to the Military Academy, which means that by common standards he has had two college educations.

His classmates at West Point still remember Cadet McConnell as the man with the most military bearing and most pride in the uniform.

USAF's new Chief of Staff still has the bearing. On top of this he has a reputation as a fair but firm boss with a remarkable memory that includes the names and accomplishments of men who did a good job for him, often many years before. Asked at a recent interview for a rundown on the major problems he expects

Lt. John Paul McConnell won his wings at Randolph Field in 1932, then went to Kelly Field for advanced training. He was first assigned to the 20th Pursuit Group at Barksdale AFB, La. That was in 1933.





At his Pentagon desk, the new Chief of Staff thinks back on more than thirty years in uniform. In his new post, one of his highest concerns will be the welfare of Air Force people.

to face as Chief of Staff, General McConnell headed the list with his concern about USAF's personnel. A revision of the promotion policies, he said, is the most essential thing on the docket.

General McConnell's military peers who have been questioned by this reporter speak first of his ability to get along with people and the facet of his personality that "creates harmony." The next thing they bring up is his sense of humor, the fact that he likes to josh his colleagues and fend off their teasing when the barbs are pointed his way.

A former USAF Chief of Staff says that one of General McConnell's great qualities is that "no man has any reason to be afraid to talk up to him." And the General himself sets the stage for this.

"I want men to argue with me when we are trying to make a decision and they have a point of view," he

says. "But after the decision is made, they are not to undercut."

The men who know General McConnell best also emphasize that when a job is not done right, retribution can come quickly. "He will fire faster than his predecessors," one of them said, "but always for good cause. There will be no room for foulups."

Of high current value here in 1965 is the General's acknowledged expertise on China and its neighboring countries in the Far East and Southeast Asia. That cauldron of trouble is familiar land for General McConnell, land where he served during much of World War II and afterward. General McConnell has had stations in India, Ceylon, and China. He was Chief of Staff of the China-Burma-India Air Force Training Command, then Deputy Commander of the Third Tactical Air Force in India. Then he was Senior Air Staff officer for the Southeast Asia Air Command in Ceylon and acting Deputy Chief of Staff for Operations of the Eastern Air Command in Chungking. After the war he was, for about a year, Senior Air Adviser to the Chinese government of Chiang Kai-shek.

And he is known, as well, in Europe. For all practical purposes, General McConnell was in charge of American forces in Europe for the two years (1962-1964) when he was Deputy Commander in Chief, US European Command. His superior was Gen. Lyman L. Lemnitzer, who wears a second hat as SHAPE Commander, where he is responsible for the military stature of the entire NATO complex.

On the more human side, any question about General McConnell's hobbies brings only the reply that he is a skilled and enthusiastic fisherman. It is a sport that he shares with Gen. Thomas D. White, the amateur but expert ichthyologist who preceded General LeMay as Chief of Staff. The Generals take frequent fishing trips together to remote rivers and lakes all over the world.

General McConnell's first flying assignment was with the 20th Pursuit Group at Barksdale AFB, La. He went there in late 1933 after going through the Randolph and Kelly Field training complexes in Texas. After Barksdale, he served in Hawaii and at Maxwell Field in Alabama, where he was stationed at the outbreak of World War II.

He advanced rapidly even before the spurt of wartime promotions. General McConnell rose from second
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A few years back you could really spot an aeroplane pilot by his attire. Here's Lieutenant McConnell, fresh out of West Point and learning to fly in Texas. The helmet and goggles went well with the primary trainer visible in the background.

General McConnell had extensive experience in operations in the Far East during World War II. Right, the then Brigadier General Senior Air Adviser in Nanking chats with the Commanding General of the Chinese Air Force, General Chow, shortly after the end of World War II.





General McConnell receives the highest decoration of the Chinese government from the first lady of Nationalist China, Madame Chiang Kai-shek, wife of the Nationalist Generalissimo.



On his last assignment as a one-star general, USAF's new leader served in the Pentagon as Deputy Special Assistant for Reserve Forces. He went next to a post in England.



At the AFA Convention in Washington last September, General McConnell (right) chats with Gen. Mark E. Bradley, the Commander of AFLC.

lieutenant to colonel in ten years and was made a brigadier general in 1944 at thirty-six. By this time he had served a short hitch at USAF Headquarters, at the Technical Training Command, and at Headquarters of the AAF Training Command before going to India. Soon after he got his first star, he went to Ceylon, where he served under Admiral Mountbatten as Senior Air Staff Officer. After the fall of Rangoon, US military headquarters were shifted to China, and General McConnell wound up as Chief of Staff of US Air Forces in China. In China he won the Distinguished Service Medal and Flying Cross, plus decorations from both the Chinese and the British.

In 1947 General McConnell became Chief of the Reserve and National Guard Division at USAF Headquarters in Washington, and rose to be Deputy Special Assistant to the Chief of Staff for Reserve Forces. During this part of his career he made his last appearance as a witness before committees on Capitol Hill before the round of inquisitions he will face this winter, spring, and summer.

In 1950 General McConnell first drew duty in Europe and was promoted to major general. He was Chief of Staff and then Deputy Commander of the 3d Air Division in Middlesex, England. When the division was elevated to the Third Air Force he soon moved to full command of both the Third Air Force and the 7th Air Division.

In 1953 General McConnell returned to the United States as Director of Plans at Hq. SAC. He stayed for more than four years before being named Commander of the Second Air Force, returning to Barksdale AFB in Louisiana, where he had his first flying assignment twenty years earlier. He later became Vice Commander of SAC. In 1962 he returned to Europe to work for General Lemnitzer and stayed there until he became Vice Chief of Staff, Hq. USAF, in August of last year.

In his more recent career, it is of interest and importance that General McConnell spent about eleven years—from 1951 to 1962—on assignments with the Strategic Air Command. Some of this was in England, but he was Director of Plans for SAC at the Offutt AFB, Neb., headquarters in 1954 when the ICBM development program was launched. His most recent stay at Offutt, in 1961 and 1962, saw him as Vice Commander in a period when the first and most difficult operational problems were being overcome. All this experience will be of value to him as Chief of Staff as our reliance on missile capability keeps growing, as indicated in future budget profiles.

General McConnell's wife is the former Sally Dean, who was a WAC lieutenant colonel in the CBI theater. She was on the staff of Lord Mountbatten and already was widely traveled and experienced in military customs. A native of St. Paul, Minn., she had been brought up in France and fled that country, through the underground, when the Nazis took most of it over. The McConnells have two sons who attend a private school in Virginia. Mrs. McConnell is attending classes at American University in Washington, where she expects to take a degree in physical chemistry.—END

MONEY AND PEOPLE

The Big Problems Ahead for the Air Force

*An exclusive interview with USAF's new Chief of Staff,
Gen. John P. McConnell, by AF/SD's Senior Editor, Claude Witze.*

PHOTOGRAPHS BY GUY DYKE

Q. Here at the start of 1965, what do you anticipate are the major problems you will face as Chief of Staff of the Air Force?

A. I anticipate that I will be faced with problems very similar to those faced by my predecessor, General LeMay—namely, money and people.

With the tremendous cost of weapon systems today we cannot afford to buy those things which do not do the job effectively and at a minimum cost. We will continue to study every system we have to determine its need. At the same time we must conduct a vigorous research-and-development program to be sure that we maintain qualitative superiority over any enemy.

People are still our most valuable asset, and we must continue to seek the best possible career opportunities for them.

Ultimately, the quality of our officers and airmen will determine how well the Air Force succeeds in its mission. Today's Air Force has an unprecedented need for perspective, imagination, and intellectual resiliency. I am convinced that continuing improvement of career incentives is a "must" in getting and keeping people with these attributes.

In addition, I think we must anticipate the possibility of a period of scattered smaller crises which will place increased demands on the mobility and tactical aspects of airpower, operating under the protection of our strategic forces. Our thinking will have to evolve new concepts taking into account a very wide range of possibilities in planning.

Q. Do you agree with recently retired Generals LeMay and Power that it is essential to maintain a flexible mixed strategic force? If you do, what must be done now to ensure that this force is maintained in future years?

"Minuteman is a sophisticated missile with steadily increasing capability. We are continuing research so that we will have the know-how to develop any missile the future may require."



A. Yes, I certainly do agree that it is essential to maintain a flexible strategic force. To this end, as you know, we requested approval last year to initiate the development of an advanced manned strategic aircraft as a replacement for our aging B-52s. We are continuing our studies on some of the systems for such an aircraft, and to develop the best airframe to accommodate the crew and the weapons that will, in our judgment, be required for the strategic mission in the 1970s.

"It is essential to maintain a flexible strategic force. . . . We requested approval last year to initiate the development of an advanced manned strategic aircraft as a replacement for our aging B-52s."



Q. Will the pendulum in the bomber/missile mix ever swing back toward the bomber? What's the future for Air Force missiles beyond Minuteman?

A. I believe that a mix of bombers and missiles will be needed for the foreseeable future. With our present technology, this mix gives us a degree of flexibility impossible to achieve with either system alone, as each has unique advantages. The missile has a faster reaction time, for instance, but the bomber can be recalled or diverted after launch. With advancing technology, it is conceivable that it would become desirable at some future time to increase the ratio of bombers to missiles, but I doubt that bombers will ever approach the ratio of the force that they once represented.

At present, Minuteman is a sophisticated missile with steadily increasing capability. We are continuing research so that we will have the know-how to develop any missile the future may require. It is impossible to predict exactly where that research may lead.

Q. It has been said that since Air Force flying jobs may become fewer, and since Army aviation
(Continued on following page)

is growing, along with the fact that the Army uses planes that are "fun to fly," a potential pilot might do better in the Army. What is the future, as you see it, for Air Force pilots?

A. Contrary to what many people think, the number of pilots and other crew members being trained for the Air Force is on the increase. This increase is due primarily to the fact that the pilots trained in great numbers during World War II are reaching or approaching retirement age.

Today's aircrews are equipped with aircraft which have far greater performance and striking power than anything we have known in the past.

Our present and foreseeable aircraft will demand the highest standards of performance. Meeting these demands will provide not only opportunities for our aircrews but also a stimulating challenge to their professional skill. The job will continue to be vitally important to the nation and to be exciting as well. The future for Air Force pilots is not only bright but will be extremely challenging and professionally rewarding.

Q. Do you anticipate a solution to the differences between USAF and the Army over tactical air operations and, if so, what do you think the solution will be?

A. The Air Force and the Army have been working together to determine the most effective utilization of airpower in support of ground forces. We are making a concentrated effort to help the Army achieve greater mobility and effectiveness. This involves a thorough and comprehensive evaluation by Strike Command of equipment, concepts, tactics, and techniques. We are confident that the evaluation will result in improved support for the Army.

"The Air Force and the Army have been working together to determine the most effective utilization of airpower in support of ground forces. We are making a concentrated effort to help the Army achieve greater mobility. . . ."



Q. USAF has in recent years worked hard to develop and improve counterinsurgency techniques. Are you satisfied with the results? How can they be improved? Are we utilizing what we have learned, particularly in South Vietnam?

A. We have achieved great improvement in counterinsurgency techniques but we are not satisfied and must make further progress. The 1st Applications Group at Eglin AFB, Fla., and the Air Force Unit in Vietnam spend much of their effort on improving tactics and techniques as well as adapting new equipment for use by the Vietnamese in their counterinsurgency effort.

A program of particular significance is our debriefing program. Selected officers and senior noncommissioned officers returning from Southeast Asia and

other areas are brought to the Pentagon where their comments and recommendations are solicited. Individuals who are exceptionally well qualified in a particular area are also identified to lecture at our military schools. In this way we take advantage of lessons learned in our counterinsurgency efforts.

The capability of the South Vietnamese Air Force has been improved by equipping it with A-1H aircraft. This is an excellent counterinsurgency aircraft for the Republic of Vietnam because of its ruggedness, load-carrying capability, and its simplicity of maintenance. Our special air warfare forces, which are helping to train Vietnamese crews, have been equipped with a two-place version of the A-1H, designated the A-1E. This provides compatibility with the VNAF A-1H aircraft and assists in accomplishing the training mission. We have encouraged the VNAF to pursue night air operations, since the guerrilla often operates at night, and we have learned numerous other lessons. We still do not have all the answers but we are making progress.



"We have encouraged the VNAF to pursue night air operations, since the guerrilla often operates at night, and we have learned numerous other lessons."

Q. How far will the new C-5A go toward solving USAF's airlift requirements?

A. I think the C-5A will be a tremendous improvement in our airlift capability. The C-5A will be designed to provide, for the first time, true air mobility for the combat forces of all services, including the capability to transport large items such as the M-60 tank, howitzers, helicopters, and construction equipment. We think it will be able to carry payloads of 100,000 pounds over 5,000 miles and more than 200,000 pounds over shorter distances. It will land on airfields of relatively short length. With large loading doors, the aircraft will be able to offload in a matter of minutes. The aircraft will probably be powered by four engines, and it will provide a significant reduction in the ton-mile cost of airlift.

Q. Do you think Nike-X should be pushed? What are your views in general on the anti-ICBM?

A. Without properly balanced defensive forces, the enemy can inflict severe damage by those systems against which we have little or no defense. These balanced forces should include defenses against both bombers and ballistic missiles. Air defense doctrine is to attack the enemy as far out as is operationally feasible and to increase pressure on him as he nears his objective. Thus the Air Force favors an area-type defense which permits defense in depth, and I have also supported the development of the Nike-X, a terminal defense system.—END

The Brezhnev-Kosygin regime seems firmly in power, although much may be happening beneath the surface. The new rulers have been as unsuccessful as Khrushchev at bringing the Chinese into the fold and, although there are internal changes, international goals remain basically the same—peaceful coexistence with the West and a loose commonwealth of Communist states rather than a tight Stalinist bloc. But the US must remain strong and watchful. Here an expert on Soviet affairs discusses these and other points in outlining . . .

Nine Keys to the New Soviet Strategy

By Anne M. Jonas

WHAT can we discern as the key factors of Soviet strategy under the Brezhnev-Kosygin regime which has been in power since October 1964?

As always, many aspects of policy formulation in the USSR remain shrouded in secrecy. But, from public pronouncements to date, we can fathom, at least in broad outline, the goals which the new Soviet leaders have set for themselves. We can see, too, the domestic and international problems with which they are confronted. These goals and problems may be isolated into several categories:

1. *The Soviet regime is forced to recognize that the USSR and Red China are no closer to a rapprochement than they were when Premier Nikita S. Khrushchev was ousted from office.*

After Khrushchev's purge, the Chinese and the Soviet parties both issued statements stressing the importance of Communist unity. Their exchange of polemics temporarily ceased. Chou En-lai made a trip to Moscow, ostensibly to represent his nation at celebrations of the forty-seventh anniversary of the Bolshevik Revolution, actually to discuss with Khrushchev's successors the future of the Sino-Soviet alliance. But these talks failed to bring the two parties any closer together. Nor did China's explosion of its first nuclear device prior to the conference succeed in impressing the Brezhnev-Kosygin team. In their eyes, Communist China had no more right than before to claim equality with Moscow. Moreover, even before the Sino-Soviet talks, the new Kremlin leaders had gone on record as continuing to

support policies such as "peaceful coexistence" with the major Western powers—adopted by the twentieth, twenty-first, and twenty-second Soviet Party Congresses and opposed by the Chinese.

Shortly after Chou returned home, *Red Flag*, the chief theoretical organ of the Chinese Communist Party, published an editorial attacking Khrushchev. It also castigated many of the policies the new Soviet regime had pledged itself to support, concluding that "Khrushchevism without Khrushchev" might prevail in Russia and implying that it was the duty of all true Communists to ensure that such a continuation of "revisionism" would be doomed to failure. Publication of the *Red Flag* editorial, on November 21, was soon followed by a reappearance of anti-Soviet literature at Red Chinese newsstands.

The USSR has made no move to alter its policies to accommodate Chinese demands. On December 12, *Pravda* announced that a preparatory commission of various Communist parties would meet on March 1, 1965, to plan for a world Communist conference. Such a conference originally was scheduled for mid-December 1964. Whether or not to hold it was a key issue between the Chinese and Soviet parties at the time of Khrushchev's ouster. Postponement—rather than cancellation—of the conference, combined with continuing indications that neither the Chinese nor the Soviet leaders have agreed to compromise on the basic issues which divide them, suggests that tangible prospects for any meaningful *rapprochement* between the two major Communist powers in the near future are dim indeed. Soviet policy seems to be predicated on this assumption.

(Continued on following page)

2. *In Eastern Europe, the Kremlin leadership change has not enhanced the possibilities of dictating or fully manipulating the behavior of bloc leaders.*

The fact that most of the Eastern European Communist leaders demanded that Moscow offer an explanation for a Soviet internal policy decision—the ouster of Khrushchev—once again demonstrated the limits of Moscow's control over these Eastern bloc parties. We can cite other examples to illustrate the tendency of the Eastern European Communist states to pursue policies independent of Moscow whenever it suits their purposes:

- The Yugoslavian party's reaffirmation of its determination to continue to seek its own path to "socialism and communism"—the path it has been following since 1948—and to resist any possible future efforts of the new Soviet regime to persuade it to pattern its internal policies on the USSR model.
- Rumania's seeking to remain aloof from the Sino-Soviet dispute, to avoid economic integration with other East European Communist nations, and to expand her ties with the West. In a recently published translation of previously suppressed material, Rumania even pointedly referred to her previous ownership of Bessarabia, now a part of the USSR.
- Albania's continued adamant opposition to USSR policies since the new regime took power in Russia. Albania has long supported the Communist Chinese.
- Less dramatically, perhaps, but nonetheless effectively, continued demonstration by the leaders of most of the other East European nations—Bulgaria is a possible exception—of the limits, in their eyes, of their ties to Moscow.

It is highly unlikely that the new Russian leaders consider it feasible to replace the "socialist commonwealth" of states which has emerged in the past few years with a revived Stalinist-type Communist bloc. Even if they did, the Eastern European leaders have made it clear that they will tolerate no such return to the past.

3. *Throughout the international Communist movement, fragmentation remains as marked as ever. Many parties moving in many directions continue to pose problems for the Kremlin.*

Partly as a consequence of the Sino-Soviet dispute, and partly for other reasons, many non-Eastern-bloc parties have for some time been split into at least two factions. If the new Kremlin leaders and Chou En-lai had succeeded in papering over some of their differences, tensions between "Russian" and "Chinese" factions within the non-Eastern-bloc parties might have lessened. Since there has been no such *rapprochement*, the earlier arguments continue between members of other international parties as to which policies are best. In addition, at least two key non-Eastern-bloc parties, those of France and Italy, have shown in recent months

a Yugoslav-like tendency to declare their independence.

For example, in a major pronouncement issued just prior to Khrushchev's ouster, the French party stressed the necessity of tailoring its strategy to internal conditions in France. It announced its intention to do so in the future, whatever Moscow might think. However, the French party's positions on most issues were very similar to those of the Soviet party.

Earlier, on September 5, 1964, the Italian Communist newspaper *Unita* published a posthumous memorandum by the Italian Communist leader, Palmiro Togliatti. His successor, Luigi Longo, asserted in an introduction that the memorandum "... sets forth with utmost clarity the position of our Party in regard to the present situation in the international Communist movement." (This Togliatti memorandum was originally drafted in reply to the initial Soviet invitation, issued prior to the ouster of Khrushchev, to attend a meeting in mid-December to prepare for an international Communist conference.) As he had in earlier pronouncements, Togliatti recognized the trend toward "polycentrism" within the international Communist movement. Like the later French Communist Party statement, Togliatti's memorandum stressed the importance of adapting tactics within a given country to the "objective situation" in that country.

In endorsing Togliatti's position, his Italian Communist successors were making known their view that Moscow's role as the "vanguard of the revolution" no longer presupposes a right to dictate the internal policies of other Communist parties.

These two examples serve to indicate the degree to which international Communism has become a multifaceted movement. The change of leadership in the Kremlin has not changed this development.

4. *Inside the USSR, both the Party and the governmental apparatus are undergoing reforms in an attempt to accelerate achievement of the long-range goals set forth in the 1961 Party program for attaining "full communism" in Russia by 1980.*

The new Soviet Party Program, adopted in 1961, was filled with glowing promises that "full communism" would be achieved in the USSR by 1980. As part of this projected paradise, the "contradictions between the city and the countryside" would entirely disappear. Great emphasis was placed on the introduction of the latest scientific techniques to improve industrial efficiency. Despite these promises, both Soviet industry and agriculture have continued to be plagued with problems. And, on November 16, 1964, the new Soviet regime announced a major reversal of a Khrushchevian decision of 1962. The ex-Premier had created in 1962 a dual party organization to deal separately with problems of industry and agriculture at the regional and local levels. The new regime abolished this procedure. In the future, it was decreed, a single regional and territorial party organization would direct *both* industry and agriculture.

Concurrently, the new Kremlin leadership announced that local Soviets, also separated in 1962 into industrial and rural elements, would again be reunited. Formerly, the local Soviets were rubber-stamp bodies endorsing decisions handed down from the central government. Now it is promised that they will play a greater role in policy formulation.

Both measures are part of an attempt to replace direction from above with planning and activity from below. Trends in the USSR to now have evidenced



—Wide World Photos

The Brezhnev-Kosygin regime has been no more successful than Khrushchev at bringing Red China into the fold. Here, Premier Chou En-lai, left, of Communist China, is greeted by Alexei Kosygin, Soviet Premier, as he arrives in Moscow for forty-seventh anniversary of the Bolshevik revolution.

vacillation between centralization and decentralization in the management of the economy. It is too early to tell how well—if at all—the new reforms may work.

5. *The new Soviet leaders are tackling anew the long-troublesome resource allocation problem. How to improve the quality and quantity of consumers' goods, to increase real wages, and to improve agricultural output have received particular attention.*

Resource allocation long has been a serious problem in the Soviet Union. Shortly before his political demise, Khrushchev reverted to the Malenkovian heresy that light industry should have priority over heavy industry. (The latter includes allocations for military requirements.) Perhaps this deviation was partly responsible for Khrushchev's downfall; the evidence is inconclusive. Whatever the case, the new Soviet leaders also have emphasized the need to improve consumers' goods, real wages, and agricultural output.

How well the new leadership will be able to cope with increasing popular pressures for better living standards should become evident within the next few months as reforms designed to achieve these goals are implemented.

Before jumping to conclusions that the USSR leaders are becoming "soft," one must recall that the reduction

in the military budget, announced at the December 1964 session of the Supreme Soviet, is not a true reflection of military research-and-development expenditures. Traditionally, such expenditures are hidden outside the purely military portions of the budget. There is no reason to believe that this tradition has been broken. The promise to narrow the gap between heavy industry and consumer-oriented production reflects, instead, the fact that the USSR has reached the point in the development of its economy—and its military strength vis-à-vis the United States—where the earlier excessive emphasis on defense needs can be moderated somewhat.

6. *Although the new Soviet "collective leadership" has evinced no overt stresses and strains to now, a succession crisis may already be in process within the USSR.*

As would be expected, the new Soviet leaders have begun gradually to replace Khrushchev's protégés with personnel of their own choice. Not surprisingly, the ousted leader's son-in-law, Alexei Adzhubei, was one of the first to go. It is difficult for outside observers to determine precisely where the loyalties of the various individuals now holding key positions within the Soviet hierarchy lie. Some say, for example, that Nikolai V. Podgorny has been placed in charge of the reforms in the party structure and should be considered "number-two man," ranking behind Leonid I. Brezhnev.

More important is the fact that up to now, "collective leadership" has been, in the history of the USSR, a short-lived phenomenon. When Lenin died, it took Stalin some time to consolidate his power. In the struggle for Stalin's mantle, Khrushchev, too, spent several years ridding himself of his opponents. Many of Khrushchev's supporters later turned against him and seem, in turn, to have helped bring about his ouster. We cannot be sure that a repetition of this pattern will not, eventually, result again in one-man leadership in the Soviet Union.

If the declared emphasis on granting a larger share in the Soviet budget to light industry should jeopardize, in the view of the military leaders, the requirements of the armed forces, the military leadership might become the fulcrum of a new power struggle. In past debates over resource allocation, there have been differences between the military and the civilian leaders. Although there are factions within the military itself, with some high-ranking spokesmen advocating more vigorously than others the importance of nuclear missiles in modern warfare, these factions might unite with other disaffected elements to attempt to overthrow a civilian leadership deemed overly solicitous of the demands of the Soviet consumer.

Struggle is an integral part of communism, and thus far leadership struggles have occurred in the USSR whenever one-man leadership was replaced by a "collective."

(Continued on following page)

7. Soviet support for "national liberation wars" once again has been upgraded.

A keystone of Khrushchev's policy was the necessity to couple "peaceful coexistence" with the major Western powers with increased Communist support for "national liberation movements" in the underdeveloped world. The new Soviet leaders have reemphasized the importance of this policy.

Part of the increased Soviet activity in assisting "national liberation movements," such as reported Russian financing of airlifted aid to the Congolese rebels, stems from the desire to curb Chinese influence in the underdeveloped world. Ironically, both the Soviets and Chinese agree on the necessity for fomenting revolution in such areas. But they have long disagreed on timing and tactics. Since the rift with the Communist Chinese has progressed as far as it has, rivalry for spheres of influence in the underdeveloped world is more likely than any amelioration of Sino-Soviet differences.

8. As a corollary to the increased emphasis on support for "national liberation movements" and on improvement of sectors of the domestic economy, "peaceful coexistence" with the major Western powers has assumed new significance.

No nation can achieve all its policy goals simultaneously, and the USSR is no exception. If the weak sectors of the Soviet society and economy are to be effectively strengthened, if attention is to be devoted to problems stemming from polycentrism in the international Communist movement, and if support for "national liberation movements" is to be rendered with a minimum of counteractive moves from the West, a temporary détente with the major Western powers—and especially with the United States—is essential. Hence, although an occasional "hard" line has been evident in the pronouncements emanating from Moscow since Khrushchev's ouster, a "soft" line vis-à-vis the United States has been far more predominant. "Peaceful coexistence" has been emphasized even at the expense of reconciliation with the Red Chinese.

If the new Soviet leaders are serious about improving the well-being of their own population, this policy could continue for some time. However, it is dangerous to confuse short-term Soviet goals with their longer-range objectives. The new Soviet regime has made clear in its pronouncements that it still adheres to Lenin's tenets. Any détente with the major enemy is merely a means of gaining time and building strength for a more direct confrontation at a later date.

9. The future success or failure of current Communist strategy will depend not on the USSR, but on the United States. Today "deterrence" must go far beyond the prevention of a thermonuclear war.

In October 1962, the Soviet Union tried to confront the United States directly by placing strategic missiles in Cuba. The failure of this effort may have been one reason for Khrushchev's ouster. When in August 1964 the US retaliated for North Vietnamese attacks on its destroyers in international waters, both the Soviet Union and Communist China reacted with little more than verbal protests. The primary reason that the current Soviet leadership has shifted the battleground from areas like Berlin is that it respects US military power and US willingness to employ it to defend vested interests.

In and out of Russia, Communism is in a state of transition. Renewed effort is being applied to strengthening the *over-all* Soviet capability to compete with the United States. The display of missiles in the 1964 Revolution Anniversary parade and the AEC announcement, of November 16, 1964, of an apparent underground nuclear test in the USSR serve as reminders that the Soviet Union remains a major nuclear power. Under the new leadership, the emphasis on applying science and technology to all the needs of the state continues. Soviet goals of ultimately achieving a communized world remain unchanged; events have necessitated a temporary alteration of the ways in which realization of these goals is sought.

The shifts in Soviet strategy complicate the task of the United States in its role as the strongest free-world power. The US still must continue to maintain the military capability to deter the Soviet Union from all kinds of direct confrontation. It also must find ways to meet a larger number of indirect challenges. Social and economic progress at home must continue to outdistance upgraded Soviet efforts to improve the USSR's status in these fields.

Ways must be found to prevent Communist successes in transforming "national liberation wars" into new "socialist" states. A more diversified bloc pursuing essentially national goals, but still composed of Communist states, must be dealt with. Communist parties outside the Eastern bloc must be countered when operating on their own—not Moscow's—terms. Only if successes can be achieved in all these areas simultaneously will Communism be effectively deterred.—END

The author, Mrs. Jonas, who has contributed previously to this magazine, is a member of the technical staff of the Weapons Systems Evaluation Division, Institute for Defense Analyses (IDA). She was formerly a member of the research staff of the Social Science Department of the RAND Corporation. Mrs. Jonas' articles and book reviews have appeared in *Orbis*, in the books *American Strategy for the Nuclear Age* and *Modern Guerrilla Warfare*, and elsewhere. The opinions expressed in this article are those of the author and do not necessarily reflect assessments of the Institute for Defense Analyses or of those branches of the United States government with which it has contracts.

THE SPACE AGE IN PERSPECTIVE



SPACE

DIGEST

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"Hello, CTA-21—Is Anyone There?"

By Isaac Asimov43

There probably are, science believes, myriads of earthlike planets in space, and some of them may bear intelligent life. How might we communicate with such distant neighbors? A noted biochemist suggests some ways earthmen could try.

The Public Image of Science

By Glenn Seaborg48

In the past scientists have been regarded sometimes as visionary quacks, sometimes as dangerous wizards. But today the works of science affect all our lives, we hear the views of scientists on public issues daily, and scientists have come to have a new image.

Speaking of Space

By William Leavitt54

The Administration is serious about keeping the budget as close to \$100 billion as possible, which fact makes 1965 the year of reconsideration and restraint in the space effort. Under LBJ, NASA now gets the "treatment."



TORTURE CHAMBER

In a huge laboratory building in Huntington Beach, California, 60 foot high rocket stages like this one are undergoing twisting strains and searing heat even more severe than what they will meet during actual missions. They are being tortured beyond endurance on earth to make sure of perfect performance in outer space.

This structures laboratory is only one of 11 buildings in the

Douglas Space Systems Center, which is very probably the most advanced company-owned space complex in the world. It incorporates the finest and most modern equipment including a space simulation chamber 39 feet in diameter capable of housing a complete manned spacecraft.

Here, Douglas is building the S-IVB, the *Saturn* stage which will power three *Apollo* astronauts from

earth orbit to moon orbit. Also being developed are manned orbiting space laboratory designs, and work is progressing on other orbiting and planetary programs relating to the advancement of U.S. space supremacy.

DOUGLAS
MISSILE & SPACE SYSTEMS DIVISION

It is conceivable, according to current scientific thought, that there may be myriads of earthlike planets in space and that some of them may bear intelligent life. Could we communicate with such beings, separated as they would be from us by millions of miles and hundreds (or more) of light-years? A noted biochemist who is also a famed writer of science fiction suggests some ways for earthmen to say . . .

“Hello, CTA-21— Is Anyone There?”

BY ISAAC ASIMOV

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FROM some invisible spots in the heavens come radio waves not quite like those in others. Two such spots were first observed in 1960 and later included in a listing of heavenly radio sources drawn up by the California Institute of Technology. From their numbers on that list, the sources in question are called CTA-21 and CTA-102. What they are we do not know, nor do we know how far away they are. In 1963, a team of Anglo-American astronomers pointed out these sources as worthy of special study.

In October 1964, a leading Soviet astronomer, Nikolai S. Kardashev, went further. He came to the conclusion that the natural phenomena of the inanimate universe might not be responsible for the broadcasts from CTA-21 and CTA-102. Instead, he suggested, we might be observing radio beacons sent out by intelligent beings of high technological proficiency.

Should this be dismissed at once as fantasy? Not at all. Since World War II, astronomers have grown more and more convinced that somewhere out in the infinite depths of space are, indeed, other intelligences. This has come about chiefly

because of changing theories concerning the origin of the solar system, and of life.

There are two general kinds of theories about the origin of the solar system: catastrophic and evolutionary. According to the first, as two stars pass close to each other, huge tides of matter are pulled out of each star and these condense to form planets. According to the second, a star is formed out of a huge cloud of swirling dust and gas, and, out of the material at the edges of this cloud, planets are automatically formed.

During the first half of the twentieth century, the catastrophic theory was generally accepted. As the nature of the interior of stars came to be better understood, however, astronomers threw it out. Material pulled from the sun by an approaching star could not condense to form planets. The extruded material would be too hot.

In 1944, a German astronomer, Carl F. von Weizsäcker, put forth a new version of the evolutionary theory which met with wide approval. Astronomers may argue over just how to modify it to meet various difficulties but virtually all agree, now, that some version of the evolutionary theory represents the truth of the matter.

This has an important bearing on the question of whether other intelligent creatures exist. If planets originate in catastrophes, then there can be very few of them in the universe, for stars virtually never come close to each other.

If, however, planets originate as part of the natural evolutionary changes undergone in the formation of a star, then they must be exceedingly common. Practically every star ought to have a train of planets—and this is what astronomers now believe.

How many of these planets are sufficiently like the earth, however, to qualify as possible abodes of life as we know it? Dr. Stephen H. Dole of the RAND Corporation has recently tried to answer that question on the basis of present knowledge.

Taking all reasonable considerations into account, Dr. Dole concludes that there are some 640 million earthlike planets scattered here and there in our own galaxy. (And there are many billions of other galaxies in the universe, too. One of the closest, M-31 in Andromeda, is about two million light-years away and speeding further away all the time. The possibility of communicating with it is unlikely, for, by the time messages reached M-31 and returned—more than four million years from now—the earth might not even be here any more.)

If these earthlike planets are distributed evenly throughout our galaxy, then the nearest would be twenty-seven light-years away (a distance equal to 150 million million miles). Within 100 light-years of earth, in all directions, there might be as many as fifty earthlike planets.

Could these planets bear life? Right now the conclusion is: Yes, almost certainly. There was a time, not too long ago, when biologists suspected that life might be the result of a most unlikely chemical accident that took place in the primeval oceans.

Not any longer, however. Chemists have experimented with very simple chemical compounds of types strongly suspected to have existed in earth's primeval ocean and atmosphere. They have subjected them to the type of environment thought to have existed on the early earth, and out of the simple chemicals have arisen considerably more complicated ones of types essential to life.

It would seem from this that life must arise out of a natural and, indeed, inevitable combination of reactions. Any earthlike planet with an environment similar to that of our own planet billions of years ago would be bound to develop life.

But how many of these planets would bear *intelligent* life?

Ah, there science is still stumped completely. There is no way of telling. Life on earth existed for some two billion years before an intelligent species developed. And might this not have been but a rare and lucky accident? Might it not be far more likely that life would continue ten or twenty billion years without ever developing intelligence?

We don't know the answer to that (and Dr. Dole ventures no guesses), but even if intelligence rose only on one out of a million life-bearing planets, there might still be nearly a thousand intelligent species scattered throughout the galaxy. And if this is so, then the activities of some of them may give them away, if we listen carefully enough and subtly enough. It is not likely that we will hear anything, but it is not impossible either.

If we wanted to send a message to some life-form on a planet circling another star, or to receive a message from it, some signal that could reach across vast gulfs of space is necessary. We ourselves receive three types of such signals from outer space. They are (1) gravitational effects, (2) streams of subatomic particles, and (3) electromagnetic radiation.

Of these three, gravitational force reaches us most strongly from the sun and the moon. Our path about the sun is in response to its giant pull, and the ocean tides rise in response to the moon's. The weaker pulls of Venus and Mars can be detected in small variations in the moon's motion.

However, gravitational force is the weakest force in nature and it reaches us from other stars with an intensity so weak that there is no practical way of detecting it. Nor could we send out a useful gravitational beam even if it were a stronger force than it is, since we know of no practical way of turning gravity on and off in order to send out a gravitational dot-dash code, for instance.

Streams of subatomic particles (objects far smaller even than atoms) reach us in the form of protons and electrons from the sun and in the form of cosmic rays (very-high-energy protons) from further out in space. We can produce streams of such particles easily enough and turn them on and off, too, but only in small quantities.

Even if we could produce them in mighty streams with a force that would reach from star to star, we couldn't send them outward in a smoothly aimed line. Their paths would curve whenever they passed through magnetic fields.

Probably every star has a magnetic field associ-

ated with it, and so has the galaxy as a whole. Streams of subatomic particles would quickly be bent and scattered by these fields made useless for communication.

That leaves electromagnetic radiation, of which two types penetrate our atmosphere. One is ordinary light and the other high-frequency radio waves of a type usually termed "microwaves." Both are easy to produce, easy to detect, and are not affected by magnetic fields.

Of the two, light might seem to be the first choice. You can easily imagine a huge searchlight sending out flashes in Morse code toward the stars. There are some basic difficulties to this, however. First, light does not penetrate thicknesses of dust—and our neighborhood of the galaxy is pretty dusty. A light beam would be dimmed and scattered to uselessness too quickly.

Second, there are so many light sources in the galaxy, considering its billions of stars, that one dim signal would be lost among them. In particular, if the light originated on some far-off planet, it would be bound to be blotted out by the superior light of the planet's own sun.

That leaves microwaves. These penetrate dust clouds nicely. We can detect microwaves coming from the central nucleus of the galaxy, for instance, though we can't detect the light of that nucleus because clouds of dust bar the way.

The sources of microwaves in the sky (invisible "radio stars") are far fewer than are sources of light. That makes an oddly behaving radio source far easier to spot. Furthermore, a strong radio source on a planet is not likely to be blotted out by the sun of that planet, for few stars are strong microwave emitters.

It is easy to measure the length of the individual waves of the microwave beam arriving from outer space. From most radio stars, this "wave length" is a matter of feet and yards. However, for purposes of communication, it would be better to use shorter microwaves. It is suggested, for instance, that wave lengths of three to six inches would be ideal. Such waves would be least likely to undergo distortion or interference on long voyages, or to be drowned out by natural sources of microwaves.

That is why the emissions of CTA-21 and CTA-102 rouse such interest. The microwaves received from these sources are chiefly in the four- to twenty-inch range, with a peak at about twelve inches or so. This isn't quite ideal, but it is fairly close, much closer than is true for other sources. Furthermore, as best astronomers can tell, those microwaves arise from a tiny "point-source" in the

heavens, as though they were originating from planets, rather than from large expanses of gas, as is true in the case of many radio stars.

If, indeed, the microwave emissions of CTA-21 and CTA-102 are the product of intelligent life, then they must represent civilizations far more advanced than our own.

Right now, mankind on earth is producing power at the rate of four billion kilowatts. Even if all of this were poured into a microwave beacon and sent out into space, it would not suffice. The beacon would spread out and grow dilute, and by the time even the nearest intelligent beings had been reached, it would have grown too feeble to detect. To produce beacons strong enough to detect would require a civilization capable of wielding far more energy than we do.

Mankind's energy output is growing at the rate of three to four percent a year. If nothing happens to interfere with this, then in a matter of 3,200 years we will be producing energy at the rate of the sun, and we could then announce our own existence with beams that will stretch through the length and breadth of our galaxy. And if we can detect the beams of other life-forms, then those life-forms must be at least several thousand years ahead of us.

What is there to say in announcements being sent out or received? We can't really use Morse code or expect any foreign intelligence to speak English. We must find something universally understandable. We could assume, for instance, that the people of any supercivilization would understand mathematics and that whatever mathematical statements are true here are also true there.

For instance, suppose we sent out two pulses of microwaves, followed by two more and then by four. Then, after a longer pause, we send out first three, then three, then nine, then go back to the first group, and so on. We would have the following messages: 2, 2, 4 . . . 3, 3, 9 . . . 2, 2, 4 . . . 3, 3, 9 . . .

If then, from somewhere out in space, we got the message, 4, 4, 16, even once, we would have successfully established communication.

Or we might try the universal language of chemistry. There are a fixed number of types of stable atoms that should be the same all over the universe. Each different type is made up of a definite combination of two kinds of particles: protons and neutrons.

The simplest, hydrogen-1, is composed of a single proton, while the next, hydrogen-2, has a proton plus a neutron. We can therefore send out



numbers representing the structure of the different atoms in order of increasing complexity. We could start with hydrogen-1 (1) and hydrogen-2 (1-1). We could then go on to helium-3 (2-1), helium-4 (2-2), lithium-6 (3-3), and lithium-7 (3-4).

Suppose, then, we repeat the number combinations, 1 . . . 1-1 . . . 2-1 . . . 2-2 . . . 3-3 . . . 3-4, over and over again. Some alien intelligence receiving this series of number combinations might recognize it as representing the structure of the first few simple atoms and return signals for the next atoms in line: beryllium-9 (4-5) and boron-10 (5-5). If they did so, we would have established communication.

Or we might try the geometric approach. We might send out a string of rapid pulses among which there was, periodically, a pulse of a special kind. There would follow a pause, then another string; another pause, another string; and so on. Each string would have a somewhat different pattern of special pulses.

If the strings are recorded one under the other, the special pulses might combine to form a circle or some other pattern. In this way, simple geometric theorems could be transmitted; a right triangle with squares built on each side would indicate that the square of the hypotenuse is equal to the sum of the squares of the legs.

Even simple cartoons might be sent in this way, cartoons which might indicate that human beings had four limbs and stood on two of them; that they existed as two sexes, and so on. If the answer came in similar cartoons we would *really* be in communication.

Such communication would be exceedingly slow, of course, since a planet capable of answering could be anywhere in our galaxy, from twenty-seven to thousands of light-years away. Suppose that the intelligence we detect is 500 light-years away, a supposition which, if anything, errs on the side of optimism.

In that case, radio waves, or any other conceivable form of information-carrying signal, must

Here's where we live, the Milky Way, tenants of one planet—with a rather pleasant and comfortable set of temperature and other environmental factors—which orbits a second-rate (in the eyes of astronomers) star: our sun. Once science thought that life was an accident, but no more. If we developed, why not others?

take fully 500 years to travel from here to there. Another 500 years will pass before the answer will travel from there to here. Indeed, the messages reaching us from CTA-21 and CTA-102, if they are indeed being sent out by intelligences, are not being sent out today—or yesterday either. They were sent out hundreds of years ago, or thousands—depending on how far away the sources are.

Of what use is a dialogue in which remarks take place at intervals of a thousand years?

In the first place, the mere fact that the dialogue exists at all would be of tremendous importance. Mankind will know itself *not* to be the only intelligence, or even (very likely) the greatest intelligence, in the universe, and this is bound to have a profound effect on religion and philosophy, on our very approach to the world about us.

In the second place, neither we nor they need wait for an answer to continue talking. We can well vary our messages at will once we have established our communication. They will do the

same and the end result will be a complex conversation consisting of comments, for answer in the future, and answers for comments in the past.

In 500 years we can send out a great many signals and, if the intelligence we reach is superior to our own, there should be no trouble in breaking the code. Given a certain vocabulary to begin with, they may even require no further pictures but can deduce the meaning of words they don't understand from words they do.

When the 500 years are up and they start responding, we may well find that they have caught on quite quickly, and after only a single century, perhaps, they will have switched to straight English. (Or straight Russian, perhaps?)

It is possible that even the simple forms of communication with which intelligences must start may yet serve as cross-fertilization in the realm of ideas. If we list the proton-neutron combinations of the atoms, "they" may respond, eventually, with a somewhat different listing of the atoms, and in puzzling out the new listing we might, conceivably, see a regularity that now escapes us.

It is not even necessary to suppose direct and specific information. The mere fact of interstellar communication may help advance our technology. The effort to send out stronger and stronger beams with greater efficiency, or to detect weaker and weaker ones, will encourage advances that may have application in fields far removed from that of interstellar communication.

Then too, the effort to concentrate as much information into as few symbols as possible will encourage us to concentrate even more intensely on information theory. In attempting to reach the alien minds of intelligent beings many light-years away, we may better fit ourselves for communicating with dolphins here on earth. More important still, man may even learn how to communicate more effectively with his fellow man. That consequence alone would justify almost any conceivable effort put into an attempt to contact aliens. —END



Dr. Isaac Asimov is a biochemist and member of the faculty of Boston University. He has written a number of books on science, including The Intelligent Man's Guide to the Physical Sciences, and The Intelligent Man's Guide to the Biological Sciences, and several science-fiction novels, a field in which he is considered one of the country's leading practitioners. Above is condensed from the N. Y. Times Magazine, November 29, 1964. © 1964, the N. Y. Times Company. Reprinted by permission.

In different periods, scientists have been regarded as visionary quacks, as dangerous wizards, always as men apart from the common concerns of humanity. Now this is all changed because today science is intimately connected with all levels of our life. The public and political activity of scientists reflects this impact of science on modern society and has led to a change in . . .

The Public Image of Science

BY GLENN SEABORG



OLD legends die hard, but none has been more persistent than the belief that the scientist is something more, or perhaps something less, than a human being. The image of the scientist as a misguided or visionary eccentric is almost as old as Western culture. . . . But the image of the scientist as a more or less wicked wizard is perhaps even more ancient. . . .

To say the least, people have always felt some uneasiness upon being confronted with new knowledge and have been inclined to distrust the purveyors of such knowledge. The quasi-legendary figure of Dr. Faustus represents one reaction—that of awe-struck fear; the dwellers in [Aristophanes'] *Cloud-Cuckooland* and their successors in the writings of Jonathan Swift are the products of another, more positive reaction—ridicule.

The two images vacillate in time with the successes and failures of science, with some component of each usually present in our culture. I believe most [scientists] who have had the experience of presenting testimony to a congressional committee will agree that the picture of a scientist blissfully floating along on cloud nine has not entirely disappeared, even with the great prestige that science now enjoys. And perhaps it is a sign of good mental health on the part of the average citizen that he is still able to have some fun at [scientists'] expense. . . .

While, as I have admitted, the image of the scientist as an otherworldly bungler is still with us, in recent years, and especially since the earth-shaking advent of nuclear energy, the Faustian

figure has again been renewed with some potency. It is very difficult for the majority of mankind to regard those who have had a hand in the release of such an awesome power of destruction as not having some infernal motivation. The process of demonstrating to the world that the beneficial aspects of nuclear energy can, in the long run, outweigh its potential evil will require the devoted and patient efforts of many men over many years. We have only begun to rebuild our confidence.

Nor is nuclear energy the only cause for apprehension concerning the products of applied science. Unfortunate results from the use of some modern drugs and the deleterious effects of pesticides when improperly used have caused widespread concern. The knowledge that chemical and biological agents have been developed to refined stages of destructiveness has had a disquieting effect on many people. Even those technological applications, such as computers and automation, which without question will prove to be immensely liberating for man everywhere, have raised specters of painful economic and social dislocation. The scientist as the moving force behind a vast new array of technology must expect that he will to some extent become the focus of these anxieties, even while his status and prestige increase due to the benefits his work has achieved. . . .

The point can now be made most forcibly that never again will the scientist appear to be a distant figure isolated from the common concerns of everyday human beings. Never again will science

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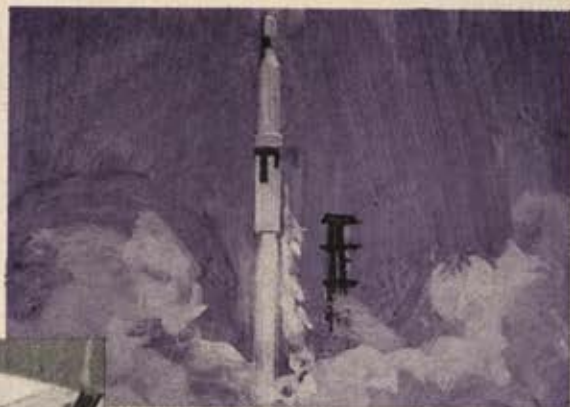


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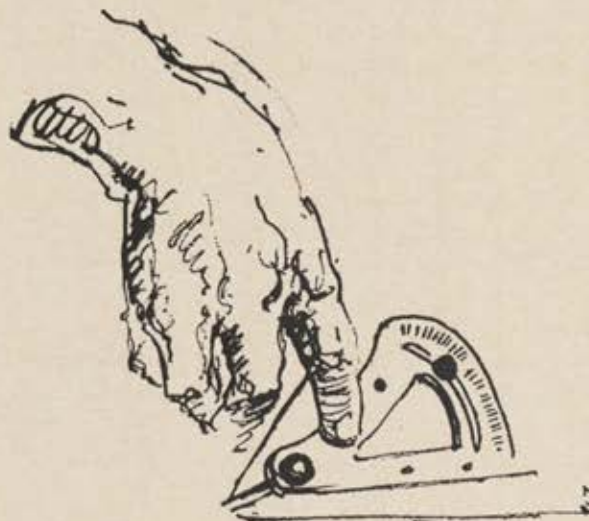
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appear to be an esoteric philosophy pursued merely for the disinterested intellectual pleasure of a few individuals. Science is so intimately connected with all levels of our life today, from the most utilitarian technology to the highest reaches of our intellectual endeavors, that there can be no question of escaping its pervasive influence. However, it is interesting to note in this connection that Einstein's work set off a far-reaching train of reactions among philosophers even before it demonstrated its concrete potentialities in helping to provide us with a new form of energy.

Thus, while we may occasionally be able to point to seemingly ridiculous aberrations, the layman is likely to feel uncertain that even the wildest [speculations] may not turn up something important. Science has demonstrated its potency over and over again, and as a result we have to put ourselves in a special frame of mind to find the experiments conducted at the Grand Academy of Lagado [in Jonathan Swift's *Gulliver's Travels*] anything like as humorous as they seemed to Swift's contemporaries.

These then are the traditional stereotypes, and though they are waning we must admit that, since scientists include very nearly the whole range of traits found in the human species, there are elements of truth in both of our stock-character versions of the scientist. The scientist as the visionary bungler stubbing his toe over the most obvious facts of life certainly has his counterpart in everyday experience. Indeed the very fact of asking a lot of questions is sure to produce a lot of wrong answers. But it is the virtue of science over the



long run to put these wrong answers to the test of reality and relegate them to the junk heap of human experience.

Ordinarily it is only among the unenlightened that the more extreme errors continue their precarious day-to-day existence. Naturally there are exceptions to this rule. Even well into this century I have been told there was a professional man—the profession to remain anonymous—who explained malaria as an illness that arises from eating cornbread. Among scientists, of course, there will continue to be those worthy of the highest honors accorded them and the exceptional few who help to perpetuate the image of the theoretical bungler. I have heard one story of an investigator, one of our contemporaries, who was studying the growth rate effects of planting Irish potatoes during different phases of the moon. Perhaps by now he has succeeded in establishing a correlation.

And the scientist is human in other respects, as many a government and university administrator has discovered when trying to economize at the expense of a scientist's favorite project. His attachment to the things that are peculiarly his own is just as strong as the painter's identification with his canvas or the novelist's feelings for the characters coming to life under his pen. He is human and selfish, at least to that extent.

Those familiar with the history of science are aware also that the scientist can be very human on questions concerning the priority of discoveries. . . . Today perhaps, with our emphasis on group research in large organizations, we are



more inclined to recognize the likelihood of simultaneous advances and be more lenient with claims and counterclaims. Nevertheless there is still a healthy spirit of competition.

The image of the scientist as a visionary eccentric has faded away and the wicked wizard picture has been revived only now and then by the spectacular potency of modern science. For the most part, the scientist tends to look more and more like the rest of the population. His numbers are increasing as science prospers and its benefits spread to the far corners of the earth.

Most of us would be hurt and disappointed, I think, if we could easily be distinguished from the lawyer, the business executive, a professor of the humanities, or a successful football coach. The



image of the scientist has in fact begun to assume human proportions. To the extent that this image looms at all larger than life, it is due to the increasing involvement of the scientific community in the affairs of state and industry. Along with this involvement and a correspondingly rapid growth in the number of people choosing science as a career, there has been a major escalation of the scientist in the public's esteem.

The University of Chicago's National Opinion Research Center issued recently a draft report entitled "Occupational Prestige in the United States: 1925-1962." This report lists the first nine occupations ranked according to prestige as follows: Supreme Court Justice, physician, nuclear physicist, scientist, government scientist, state governor, cabinet member in the federal government, college professor, and US representative in Congress.

A similar study was made in 1947, and the major difference between these two studies was a rise in the prestige of scientists. The most remarkable change was in the status accorded to nuclear physicists, apparently a somewhat delayed reaction to events during World War II. While the studies in each case showed that only a

very small proportion, from two to three percent, of the respondents could describe the duties of a nuclear scientist, there was undoubtedly a realization that this scientist was the man responsible for nuclear weapons. It may be also that the nuclear scientist has become the most articulate representative of the scientific community.

At any rate, the post-World War II years have seen not only a change in the public image of the scientist, but an equally profound change in the scientist's attitude toward himself and his work. The soul-searching among scientists of the Manhattan Project, as that endeavor reached its culmination, is too well evidenced in subsequent events to need retelling. There is hardly a one of the major contributors to the project who has not felt the need to participate in developing public policy with regard to the control of nuclear energy in its military and peaceful uses. There has been a marked willingness of scientists in recent years to enter the public service, sometimes even at a considerable personal sacrifice.

What is now emerging, I believe, is an era in which the scientist will achieve increasing stature as a human being because he is willing to look beyond the immediate results of his scientific endeavors to their social consequences. He recognizes that, even though he cannot presume to advise mankind with finality on the values that are most acceptable for our world, at least he may be able to help point out the probable consequences of pursuing alternative courses according to one or another set of values. And he realizes that he, in common with men generally, will be deeply affected by the course that is chosen.

I believe further that nonscientists are coming to accept the scientist and his science on these terms. They do so realizing that only by cooperative efforts involving scientist and layman, deeply committed to the need for resolving the extremely complex problems we face in this age, will we be able to achieve the higher levels of human behavior toward which we are all striving.—END



Dr. Glenn Seaborg became Chairman of the Atomic Energy Commission in 1961. A noted chemist credited with important nuclear discoveries, he won the Nobel Prize in chemistry in 1951 with Prof. E. M. McMillan of the University of California. He also is a winner of the Enrico Fermi Award for his outstanding work in the field of nuclear chemistry and for leadership in scientific and educational affairs. Above is condensed from a speech to the American Chemical Society, December 5, 1964, in Washington, D. C.

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Speaking of SPACE

BY WILLIAM LEAVITT
Associate Editor, AIR FORCE/SPACE DIGEST

Not Quite Full Speed Ahead

WASHINGTON, D. C., JANUARY 12

It appears that 1965 is the year of reconsideration for the national space effort. President Johnson is quite serious in his announced intentions to keep the fiscal 1966 budget as near to \$100 billion as possible. This dollar-and-cents fact has significant implications for the National Aeronautics and Space Administration, which spends the major share of space money.

Later this month, the President is expected to send to Capitol Hill a request on space spending which will ask for a little more than \$5.25 billion for fiscal 1966. This sum is approximately the same as last year's request of \$5.3 billion which was slightly trimmed by Congress in its appropriation activity during last year's session.

The President's decision to keep NASA budget requests at pretty much the same level as last year represents his determination to do two things at the same time: First, to support the already-made commitment to land US astronauts on the moon by the end of the current decade, and second, to restrain, at least for another year, the space agency from launching into additional expensive programs such as its paper proposal to start an exten-

sive program, generally titled Apollo-X, to develop large-scale space-station capability using Apollo and Saturn module and booster components.

There are a number of reasons for what amounts to a hold-down on NASA activities by the Administration. For one thing, despite the general progress and achievements of the NASA effort since Project Mercury, there is no question that costs have sharply exceeded original estimates—this was of course true in the case of Mercury itself and is proving true with the two-man Gemini orbital program as well. Also, despite the over-all prosperity of the country, there are basic financial constraints in terms of how many expensive programs can be run at the same time. The war on poverty, especially the overcoming of national educational shortages, which is so close to the President's heart, is inevitably going to be costly.

Another factor is the increasing pressure on the Administration from Capitol Hill, and from other critics and observers of the space effort, to put into practice all along the line the sort of close examination of projects and hardware and costs that has been a hallmark of the Defense Department under Secretary McNamara.

One other influence that is not as often mentioned but is significant is the chorus of scientists' criticism, some of it justified and much of it merely a new brand of conservatism that ill befits the group from which it emanates. Many scientists are complaining loudly about so-called "big science" as an ill-considered drain on talent and funds that could be, according to these critics, devoted to more basic research efforts and/or to social purposes here on earth.

These and many other influences have combined to create what amounts to a leveling off, for at least the short term, of the space effort.

Naturally, the space agency is not overly pleased with the plateau on which it is being placed. NASA

Scientists are fallible too, Dr. Edward C. Welsh, Executive Secretary of the National Aeronautics and Space Council, pointed out (see text) forcefully this week, adding that aerospace policy could not be based purely on the views of science.



has grown enormously since its post-Sputnik inception, and like most vigorous enterprises, sees further exponential growth as its ordained future.

One of the most interesting aspects of the flattening out of the NASA spending curve has been the internecine battle within NASA over funds and priorities—the principal skirmishes being between the Office of Manned Space Flight and the Office of Space Science and Applications. The latter has smarted publicly and privately over what it considers the short-changing of its scientific efforts to pay for the sizable costs of the manned spaceflight activities. Indeed, a few months ago Dr. Homer A. Newell, the head of Space Science and Applications, and Dr. George E. Mueller, head of the Office of Manned Space Flight, traded verbal blows in speeches in which each argued vigorously for priority for activities of his respective operation.

Dr. Newell hinted at then-unreleased preferences of the National Academy of Sciences' Space Science Board for unmanned exploration of Mars—to search for extraterrestrial life—as the next priority goal for the national space effort after NASA's moon landing. And Dr. Mueller answered in speeches defending manned spaceflight priorities. He claimed that existing manned spaceflight experience proved pretty conclusively that man made unique and necessary contributions to space exploration [see SPACE DIGEST, December 1964]. Dr. Newell's remarks on the National Academy of Sciences' strong preference for Mars as the next priority space effort resulted in release of the NAS text on the subject, in the form of a report to NASA Administrator James E. Webb, which



For a piece of real estate millions of miles from earth, our planetary neighbor Mars has stirred up rather a lot of controversy. Academy of Sciences wants NASA to make it a top-priority search-for-life objective. Prof. Commoner disagrees with the Academy.

made the Mars suggestion very strongly indeed.

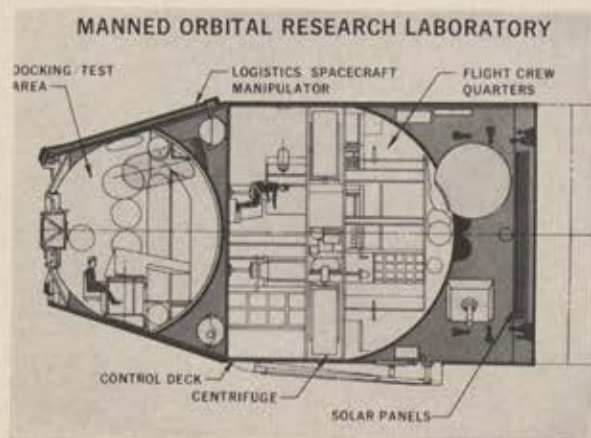
That suggestion, so far as can be determined now, has been filed in the future pile at NASA. As have been other plans such as the Apollo-X proposal.

Although on some grounds the Johnson Administration's cutting down on the throttle may be regrettable, there are some advantageous aspects to such a policy.

For one thing, an opportunity is presented to examine more closely the desired course, both in terms of hardware and management, of such future programs as space stations. There is already under way such an examination, at fairly cosmic levels in the Administration, of the Air Force's Manned Orbiting Laboratory Project which has been so long delayed. It is reported that Mr. McNamara is really serious about MOL, not out of any desire to mollify the Air Force, but because (1) he really does want to determine the utility of manned strategic reconnaissance from space and (2) because he does not want to have to depend on NASA for manned military space capability.

If the latter is true, it represents a distinct shift from Defense Department views of a few years back when the sales pitch was that NASA and its heavy funding could help pay the freight for space developments on the military side and that it would be a lot cheaper to do it that way. All this is easier said than proved.

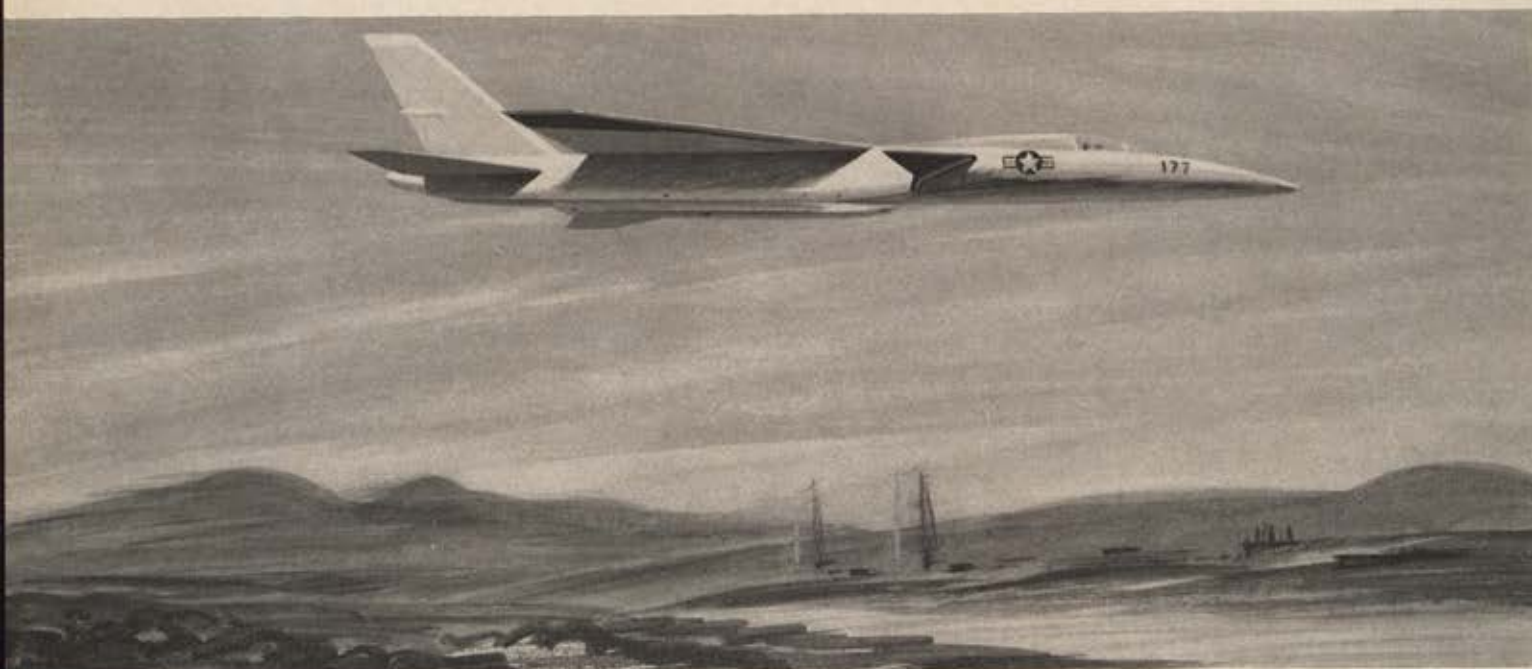
The amazing, usually infuriating, but always fascinating thing about Washington is how rapidly policies go in and out of style.



This is a schematic drawing of Douglas Missile and Space Co.'s proposed Manned Orbital Research Laboratory (MORL) under study for NASA's Langley Research Center. MORL could carry up to ten men.



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NASA's Lunar Excursion Module ascent engine gets shakes at Textron's Bell Aerosystems, Buffalo, N. Y., facility on a new vibrator, produced by MB Electronics, New Haven, Conn. The vibrator produces 28,000-pound force, frequencies up to 2,000 cycles per second.

Some Sharp Words to the Scientists

The always candid Dr. Edward C. Welsh, Executive Secretary and Acting Chairman (until the assumption on January 20 of the post by Vice President-elect Hubert Humphrey) of the National Aeronautics and Space Council, made some acerbic comments this week on the scientists' role in the formulation of aerospace policy. They are worth quoting.

Dr. Welsh was speaking at a meeting of the New York Academy of Sciences in New York City devoted to aerospace affairs. His remarks were especially significant in the face of the chorus of complaints by scientists of late that the so-called purity of science has been corrupted by the upsurge of federal support of scientific research and development since World War II, climaxed by the post-Sputnik US space effort.

One of the sharpest recent attacks in this category came from Prof. Barry Commoner, of Washington University in St. Louis, who suggested at the year-end meeting of the American Association for the Advancement of Science at Montreal that the views of scientists opposed to the priority of search for life on Mars had been shunted aside by NASA and its chief scientific advisory group, the Space Science Board of the National Academy of Sciences. Professor Commoner, in his widely reported speech, also had many important and valid things to say against excessive secrecy and for efforts by scientists to explain to the public the consequences of scientific advance. But, at the same time, he expressed strong reservations about science's current involvement in large-scale tech-

nological undertakings by the federal government.

"The scientific community," Professor Commoner said in part, "should require that any public assertion, whether made by a scientist, by a government agency, or by a political figure, which makes use of scientific considerations, include, if only by reference, verifiable sources for the latter. . . . If a public official declares that a particular public policy, such as exploration of the moon, is required for the advancement of science, he should be expected to indicate where the supporting scientific considerations may be found. . . ."

To this, Dr. Welsh, in effect, answered:

"It contributes to clear thinking . . . to recognize that the vision of the scientist does not and should not be expected to encompass the whole spectrum of the competences necessary to fruitful uses of aerospace. The point is made primarily to emphasize the wide range of skills and background required rather than to minimize the role of the scientist who, in individual cases, does have capabilities in addition to those obtained through exposure to the physical and life sciences.

"It would seem to be obvious," he said, "but

Wing-like canards at top of Apollo spacecraft launch escape tower are checked by North American engineers at Downey, Calif. Canards are designed to extend automatically, turn command module blunt end forward during abort prior to deployment of landing chutes.



nevertheless it is sometimes overlooked, that science is only one element among the considerations which should shape policy goals in the field of aerospace, just as it has been true in past improvements in the evolution of transportation and in the exploration of new lands. Among the other considerations are national defense as well as national prestige, economic growth, advances in technology, and the vigor of the general intellectual climate of the times."

Dr. Welsh went on to say that "scientists should be consulted of course," since scientists' views on space policy are "particularly important in

better understanding what is possible and what is not, and what the hazards are in specific missions in space.

"An intelligent selection of missions," Dr. Welsh said, "should include those which would obtain scientific knowledge not to be gained in any other way and perhaps of a value which cannot be measured in ordinary dollar terms.

"But it should be noted," Dr. Welsh added, "that organized science has not always been outstanding in its courage, its vision, or its optimism regarding goals for human efforts. Elements of conservatism, parochialism, and even reactionary thinking do appear among scientists just as they do among many other groups in our society. Many important projects, later proved to be entirely feasible, have been reviewed earlier by distinguished panels of scientists and found wanting. Numerous examples in the airplane, the rocket, the ICBM, and manned spaceflight come to mind. This is not to say that it is axiomatic that advice from scientists will be wrong, but it does suggest that such men may be as fallible as the rest of us."

These were hard words from an Administration official who in person is the courtliest and most gentle of men, and they got harder as his speech proceeded:

"Alarms," added Dr. Welsh, "have been sounded regarding the risks which purportedly stem from the federal government's sponsorship of research and development. In fact, some of these alarms stem even from government sponsorship of training people so that more and better research and development can be conducted. Such alarmists, although stridently critical, generally fail to stipulate just what the risks are. . . .

"I do not share this worry for a moment. However, if I did think that some element of our society were in jeopardy because of the stimulation of research and development in the public interest, I would chance it. We can always improve the mode of such federal assistance without destroying its beneficial substance. Even though our type of society is undoubtedly the best in existence, it surely is not unpatriotic to believe that it is not perfect. There is always room for improvement, and research and development is a productive source of new insight. It will yield positive benefits in the long run in spite of any short-run inconvenience it might cause."

We do not quote Dr. Welsh at such great length to make light of Professor Commoner's views. As we remarked above, the professor's



Boeing's zero-gravity researchers have reported progress in their studies using a submerged, water-filled facility in which weightlessness is simulated. In zero-g-like environment, researchers are able to study personal locomotion and equipment handling.

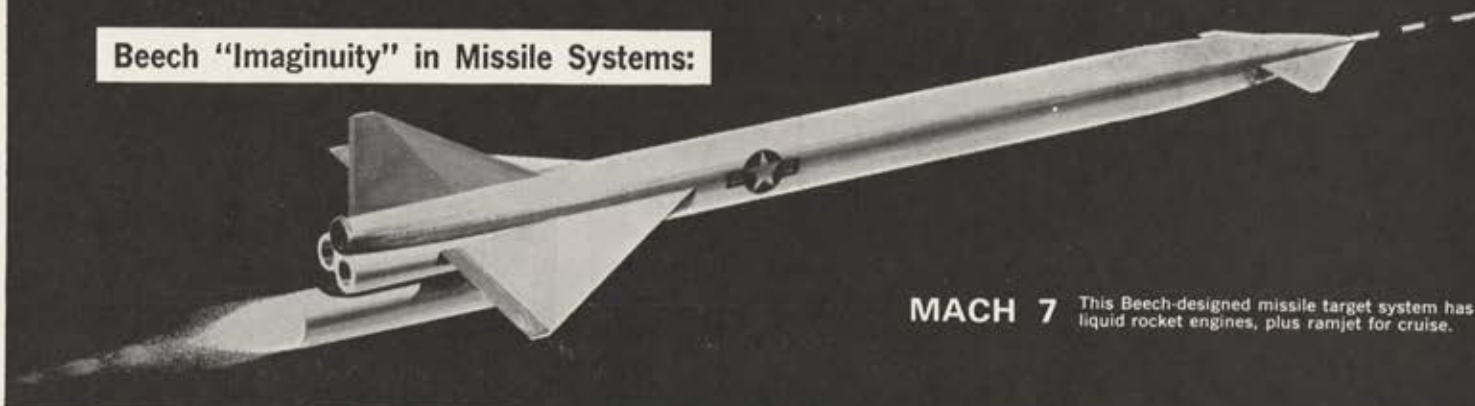
speech in its entirety, which may be obtained from his office at Washington University in St. Louis, had many important and sensible things to say. One of his most striking points was the condemnation of early downgradings by government-organized scientific committees of nuclear fallout dangers, for example. It is also doubtless true that in at least some cases scientific committees have been bulldozed into rubber-stamping preconceived government policies. At the same time, it is also true that distinguished scientists have publicly disagreed with not only the government but also with their colleagues. Like other citizens, scientists have the right, in a democracy, to balk.

The reason for such controversies is that scientists are human above all else, human before they are scientists. Dr. Einstein wrote his famous letter to President Roosevelt about the possibility of a nuclear bomb because he was human and because he saw nuclear energy as a possible bar to Nazi victory in World War II. A Nazi victory would have been inhuman.

In essence this is what Dr. Welsh is saying, and forcefully—that beyond a certain point no one, not even the most prescient scientist, can predict fully the consequences or prove or disprove the potential benefits of research and development, that a forward-looking society must gamble, at least a little.

The real argument is whether scientists can have their cake and eat it too, *i.e.* retain their nostalgic cloistered community while at the same time taking part in the large undertakings of society. The answer seems to be: No.—END

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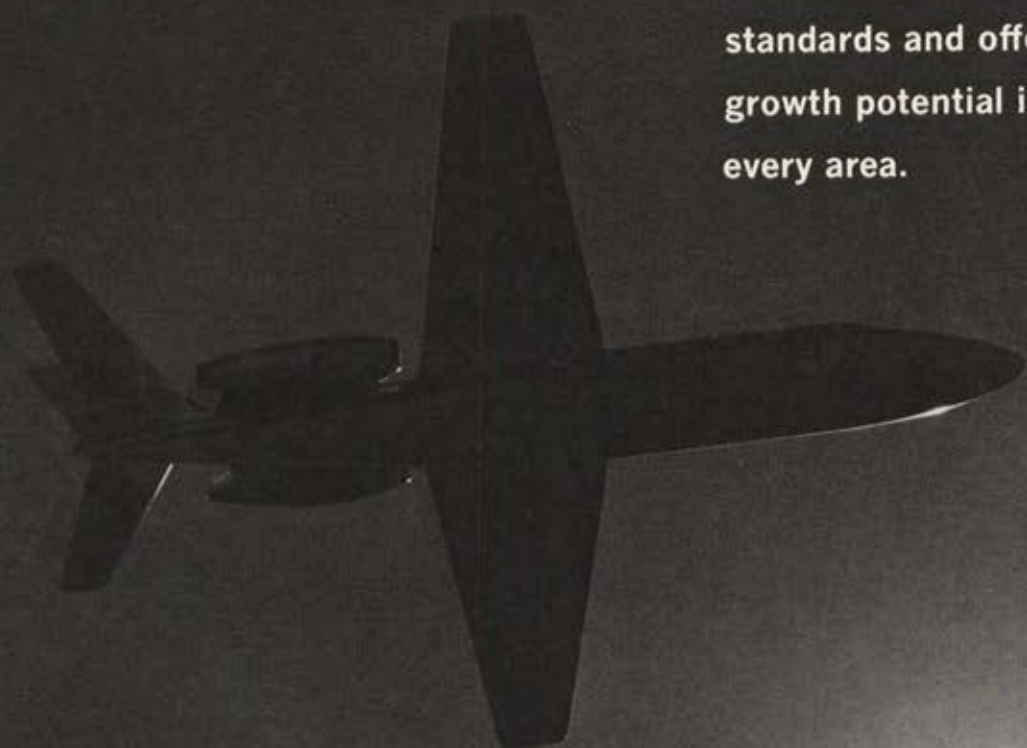
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The population explosion in the Defense Department, coupled with tighter DoD control using economy-first management techniques, is causing dangerous rigidity, over-management, and a negative attitude, says this author, who is often called the "dean of American military writers." He suggests abandoning forced "commonality" and encouraging constructive service competition in weapons research to reverse the . . .

AIR FORCE
FEBRUARY, 1965



Robert S. McNamara

SLOWDOWN IN THE PENTAGON

By Hanson W. Baldwin

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IN 1947, the "Bible" of the nation's military contractors—*Armed Services Procurement Regulations*—was a slim volume about 100 to 125 pages long. Today, the ASPR, which governs in minute detail all those who do business with the Pentagon, has expanded to four huge volumes totaling 1,200 pages, with new ones added daily.

Five to seven years ago, according to a careful statistical average compiled by one major defense contractor, it required four to five months to execute a contract from the time an acceptable price quotation was received in the Pentagon to the time the contractor received the final document. Today, the same contractor estimates that an average of nine to twelve months is needed for the same process; a very few may be completed in thirty days; some may require twenty-three months.

Parkinson's law of bureaucracy—the less there is to do the more people it takes to do it, and the simpler the problem the longer the time required for the solution—appears to be operating in Washington, particularly in defense contracting. There are many reasons for this state of affairs.

Secretary of Defense Robert S. McNamara, the apostle of "cost/effectiveness" these past four years, must share the blame for many of them as well as the credit for some improved management procedures. But the lengthening delays in the development and production of new weapons started long before he took office, and no one man, no one cause, is responsible.

A rough rule of thumb used to hold that it required about seven years (in the United States) from the gleam in the eye of the designer to the finished operational product. This time span, which has been compared unfavorably with the lead time required for the development and production of new weapons in Russia, has been steadily lengthening, and there is no sign at the moment that the process is being checked.

Even more important, there appears to have been in the first half of the 1960s a definite reduction, as compared to the 1950-1960 period, in the evolution and production of new weapons. The Republicans protest too much when they allege that the Pentagon, under Mr. McNamara, has

not produced a single new weapon system. But it is at least true that virtually all the major—and most of the minor—weapon systems in operation or in development today (Polaris, Minuteman; B-70, TFX or F-111; AR-15 rifle, etc.) were already in production, development, or in preliminary design and specification form back in the 1950s. The Pentagon in recent years has certainly instituted some much-needed management reforms, effected some economies, and added considerably to our ready strategic strength and our conventional war and general support forces. But it has probably canceled more development contracts (the nuclear-powered aircraft, Dyna-Soar, the mobile medium-range ballistic missile, Skybolt, etc.) than it has initiated new ones.

Two principal and telling criticisms have been leveled at the Pentagon's present policies, trends, and procedures by scientists who can be in no way accused of political parochialism.

Dr. James R. Killian, Jr., Chairman of the Corporation of the Massachusetts Institute of Technology, cautioned recently against an attitude that is too prevalent in and outside of the Pentagon—a belief that the technological revolution is over. No one in the Pentagon has ever explicitly stated such a belief, but the attitude of skeptical "show-me-ism" widely held there acts as a very definite brake upon the excited enthusiasm which should energize new research projects. Mr. McNamara's "whiz kids," complete with slide rules and computers, brushed aside the factor of professional judgment or scientific hunch when they took office, and their emphasis upon "perfection on paper" and the cost part of the cost/effectiveness formula has definitely slowed the pace of military development.

Behind this attitude in the Pentagon is an even broader trend. Part of it is a belief expressed by many scientists—notably by Dr. Jerome B. Wiesner and Dr. Herbert F. York in a recent issue of *Scientific American*—that disarmament, or arms limitation, is the only way to political salvation, and that therefore continued technological military development worsens the situation. This somewhat sim-

(Continued on following page)

plistic viewpoint has had an increasing public and political appeal and indeed has its adherents in the Defense Department. And even so hardheaded a man as Representative Melvin Price, chairman of the research and development subcommittees of the House Armed Services Committee and the Joint Congressional Atomic Energy Committee, recently warned that "we are entering a leveling-off period, a plateau, in the total dimensions" of the government's research program. This feeling of disillusionment on the part of scientists, and of fear of economic limitations on future "breakthroughs" in weapons research, comes at a time when the military technological revolution is far from finished.

Despite our present great strength, Dr. Killian has said, we cannot "rest on our oars," thinking the race is won. "We may be only at the beginning of unexampled scientific and engineering achievement," he notes, and the "high confidence" and sheer size of the present research-and-development effort may "obscure weaknesses still present in our program and lead us once again into complacency."

The second major criticism leveled at present weapons development policies comes from James T. Ramey, Commissioner of the Atomic Energy Commission, and Dr. Edward C. Welsh, acting chairman of the National Aeronautics and Space Council. Mr. Ramey, in a recent speech, urged the government to rid itself of what he called the "requirements merry-go-round." He pointed out that every new project had to be justified on the basis of "military requirements," and that many promising developments—particularly in space—could never be pushed, or even demonstrated, if development had to wait for the establishment of requirements. Invention has never followed this path; the machine gun and the tank would still remain blueprint dreams if their development had awaited the specifications of clear-cut military requirements. One cannot state a requirement for an inventor's hopes. As Dr. Welsh has pointed out, "If we had required a clear-cut prior mission, we would probably have developed no airplanes, no spacecraft, or, in fact, no wheel."

Other causes for the delays in development and production of new weapons have their roots in the past, well prior to the present Administration, and the responsibility extends far beyond the Pentagon. A \$50 billion annual defense budget attracts the eager interests of many government agencies.

The sprawling bureaucracy of Big Government; the control of major military or paramilitary projects by agencies over which the Defense Department has no direct authority, including the Atomic Energy Commission, the National Aeronautics and Space Administration, the Central Intelligence Agency, the Bureau of the Budget; congressional legislation and executive regulation—social, political, and economic; the tremendous size and complexity of the armed forces; overcentralization and overregulation in the Pentagon; too much service rivalry and not enough service competition—all these and other factors have become built-in roadblocks in defense development and contracting.

Big Government itself is undeniably one of the roadblocks to speedy performance. Everybody must get in on the act, particularly if a new development project involves sizable sums of money or promises numerous jobs, or involves systems or components which must be provided by foreign governments or by other agencies of government.

Development of nuclear weapons and nuclear engines is the responsibility of the AEC, yet the only users are the military, and they develop the devices which carry warheads and the vehicles which use the propulsion systems.

Over the years, an effective system of liaison by interchange of officers, by committees and other means has made the AEC quickly responsive to military needs, but the mere process of two-headed control slows and complicates the system.

LASV (Low Altitude Supersonic Vehicle) provides an enlightening case history of how many heads produce many purposes, and no final results. LASV was once hailed as a highly promising project. The AEC was to develop a nuclear-powered ramjet engine and the Pentagon would use the engine to power a pilotless atmospheric missile, capable of indefinite flight (perhaps ten times around the world) at three times the speed of sound. The weapon was envisaged as a possible future successor to, or supplement for, ballistic missiles in case the Russians should develop—as they now appear to be doing—an antiballistic missile. In this instance the AEC, after overcoming many technical difficulties in its part of the job, was on the verge of outstanding success and was ready to flight-test the engine, when Mr. McNamara, reversing prior judgments—and as Dr. Edward Teller put it, for "the sake of an economy that amounts to less than one percent of the Air Force budget"—canceled the project after a prior investment of nearly \$200 million. Dr. Teller was caustic: "I believe this is the biggest mistake we have made since the years following World War II when we failed to develop the ICBM."

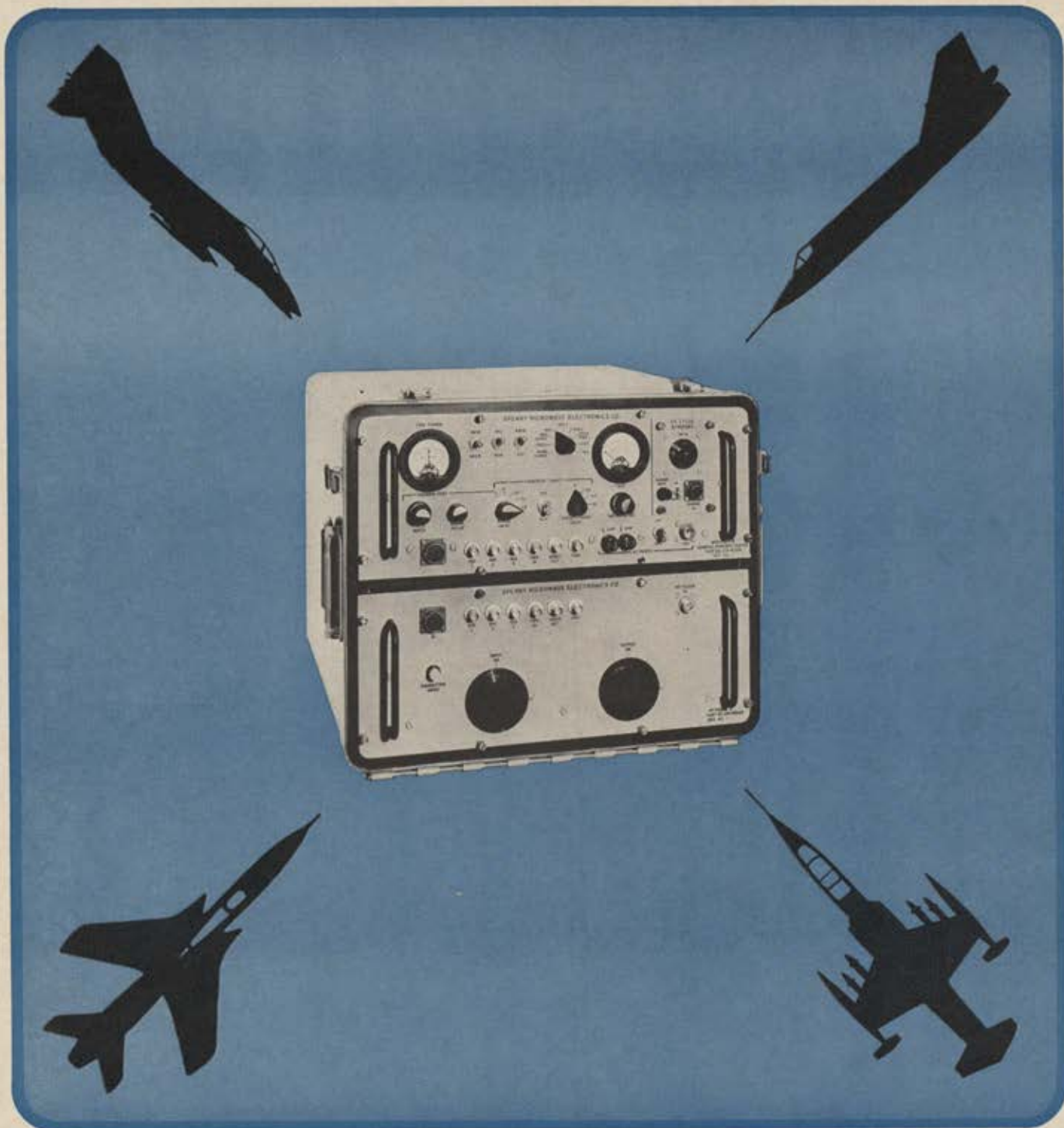
Whether Dr. Teller is correct or not in his assessment of the importance of such a weapon, the fate of LASV is illustrative both of prevalent negativistic Pentagon philosophy about new weapon systems and of the difficulties of developing new systems under hydra-headed controls.

The creation of the National Aeronautics and Space Administration has provided another type of problem. NASA stemmed from the same kind of political philosophy that nurtured the AEC. Atom bombs were too powerful to allow the generals to play with them; *ergo*, a civilian agency must control nuclear power—and it must be channeled away from nasty military purposes. The same scientific-political pressure groups that advocated this concept helped (with President Eisenhower's approval) to establish NASA, again on the theory that space efforts must be controlled by civilians and that space must not be used for military purposes. The pragmatic absurdities of this point of view are now self-evident; nuclear power so far has been far more important in the military weapons and military propulsion field than in any other way, and the most important applications of space technology have been military—reconnaissance satellites, weather satellites, missile-warning and navigational satellites.

But in the case of NASA, the problem has been compounded. For while the AEC is essentially a research and production agency, NASA is an operating agency as well. From a small, highly efficient aeronautical research agency, it has now expanded into a gargantuan multibillion-dollar empire, with tentacles all over the country, managing the biggest program on which the United States has ever embarked—to place a man on the moon.

In its early years, NASA was sluggishly if at all responsive to military needs, and the Pentagon itself was inhibited from any effective space developments (though, curiously, the only effective space boosters available were military ballistic missiles). Gradually the liaison, due to Dr. Welsh and others, has been greatly improved. Numerous military officers, active and retired, now hold some of the most important positions in NASA, and in addition the armed forces have furnished most of the astronauts and by far the most important part of the facilities and

(Continued on page 64)



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services used by the agency. The two-headed control still offers difficulties, but today the main stumbling blocks to the rapid development of military space projects are Secretary McNamara and his Director of Defense Research and Engineering, Dr. Harold Brown, who in his new political role in the Pentagon has become a remarkably unadventurous scientist.

Often the President's Scientific Adviser, whose contacts with Pentagon and other government scientists cut squarely across organizational lines, has also acted as a roadblock to new developments. He exercises tremendous power without either specific responsibility or specific authority; therefore, his intervention often not only delays but confuses. The adviser's great power stems largely from his White House status; unfortunately, around him has grown up a small but important office manned by men more impressive as bureaucrats than as scientists, who represent, in effect, another echelon of delay. The old bogey of "no military requirements" has been invoked again and again by the Defense Department, with tacit support of scientists outside the Department, to stifle projects aborning, particularly in the military space field.

The Central Intelligence Agency is another organization which has gradually usurped some of what were once primarily military functions. Two factors—the creation of the Agency and its tremendous increase in power, and the creation by Mr. McNamara of a Defense Intelligence Agency outside and above the service chain of command, and directly responsive to him—have greatly reduced the importance of the now emasculated service intelligence agencies—G-2, A-2, and the Office of Naval Intelligence. The service chiefs no longer sit as members of the US Intelligence Board, the governing policy-making organ of the defense community. In operations as well as in procurement the result is still another proliferation of agencies and committees. The fiasco of the Bay of Pigs—a military operation run principally by the CIA instead of by the Pentagon—is one example of the kind of problems this expansion of the executive department can produce. And until recently the CIA—not the Army—was operating the Army's own Special Forces counterinsurgency troops in South Vietnam.

The new centralized organization of intelligence can also affect weapons procurement, for military requirements must be measured in part against Soviet capabilities; if the centralized control of intelligence reduces those capabilities, obviously force levels and weapons requirements are altered. This is not an imaginary problem. For instance, the strength and speed of mobilization of the Soviet Army has been sharply reduced, in the Pentagon's intelligence estimates, during the McNamara administration.

The Bureau of the Budget with its pervasive influence over the source of all power—the dollar—has now developed military "experts" who literally can doom a weapon system or foster its growth. Even Congress' watchdog—the Comptroller General—has become his own "expert" on tactics and military supply.

Thus the "advice"—and the actual control—exercised on military projects by executive agencies outside the Pentagon is sweeping but almost completely negative. They delay and they criticize and they inhibit; they do not expedite.

Congressional legislation and executive regulations complicate, restrict, and delay research and procurement contracts. The contractor must comply with hundreds of laws or executive orders. Accounting procedures, minimum wages, civil rights, veterans' preferences, subcontracting,

profit limitations, and so on and so forth, all are roadblocks to speed. The Armed Services Procurement Regulations reflects in its bulk, size, and complexity how social, political, and economic considerations, as well as those that are military and technical, influence the awards of contracts.¹

Economic considerations—the need, for instance, to funnel defense contracts into depressed areas—and political pressure—the need to win an election or placate a pressure group—play their part in consideration and delay in contracts. Normally, as the TFX investigation brought out, no major defense contract is awarded without presidential approval, and the Democratic (or as the case may be, the Republican) National Committee representatives always have their opportunity to urge contractual rewards to the party faithful. The F-111 (TFX) contract went to the General Dynamics Fort Worth plant, although the services in three separate evaluations preferred the Boeing proposal. Many in Washington believe this was the result of political pressure.

All of these practices—all of this red tape—"jest growed" as part of Big Government and a big defense budget.

But the major causes of recent delays are to be found in the Pentagon itself, and they stem from the overcentralized organization established by Mr. McNamara and the attempts made to achieve "perfection on paper" before any steel is bent.

Centralization—"unification," the public calls it—has been steadily increasing, particularly since the passage of the 1958 modifications to the National Security Act. But Mr. McNamara has used the power every Secretary of Defense has always had to a far greater extent than any predecessor. There is no doubt that he has run the show. Any major contract must be approved by him; even relatively minor modifications must pass the gauntlet of his numerous assistants.

The checkreins Secretary McNamara has used were, without doubt, needed to halt the proliferation of unneeded weapon systems and the expenditure of billions on projects that turned out to be "duds" or duplications of others.

It is an axiom of sound military-research practices that in the early stages two or more parallel lines of development should be followed leading to the same end—a weapon system of given characteristics. In case an unexpected engineering problem of insuperable difficulty is encountered in one developmental effort, the second may offer an alternative. But to avoid unnecessary duplication and expense once the teething troubles are over, one of the two lines should be abandoned and full efforts concentrated on the more hopeful one. In the pre-McNamara era this decision was often left until too late. This was the case, for instance, when the Air Force developed the Thor intermediate-range ballistic missile and the Army developed Jupiter. Because of service rivalries and pressures, both missiles were developed to final "hardware" stage and both were produced in small but expensive quantities, although one virtually duplicated the other and either could have done the job of both. Mr. McNamara, therefore, had some justification for his "show-me" attitude and for the elaborate

(Continued on page 69)

¹ASPR regulations require the proposals of the contractor to be reviewed before submission by engineering, pricing, auditing, data, legal, civil rights, subcontracting, and many other experts, and in turn various Pentagon and government agencies must review the proposals for compliance. Even so, ASPR regulations are sometimes vaguely worded. A congressional investigating subcommittee recently requested the Department of Defense to alter those regulations dealing with employee health and recreation expenses. The wording of some of the regulations permitted the charge-off of losses for operating factory cafeterias, and contractors could also charge cocktail parties to the taxpayers if they were billed as "employee welfare."

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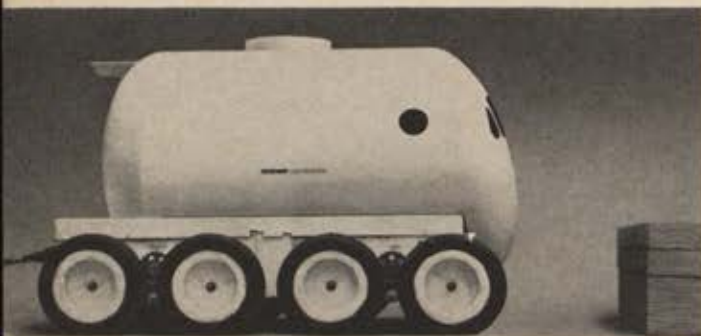
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Where do you test a lunar surface vehicle? On a lunar proving ground. Where else?

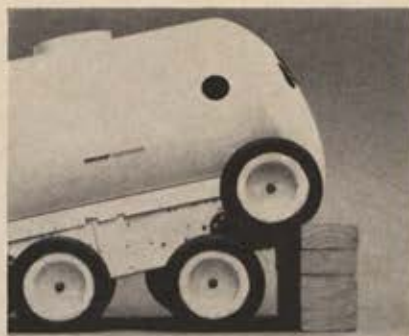
You're developing a mobile laboratory that can be transported to the moon aboard a LEM truck, get itself down off the truck, park in a convenient spot, wait as long as six months for a couple of astronauts to arrive, trundle itself over to meet the astronauts, then take them on a two-week exploration trip of 300 to 400 miles in comfort and safety.

You have a new suspension and drive system which is simpler and more reliable than any of the multitude of other systems you've studied, and which looks as if it could cope with any lunar surface it might encounter.

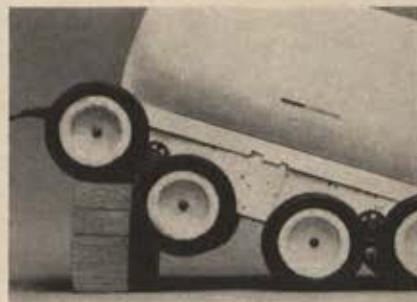
So how do you test it to be sure?



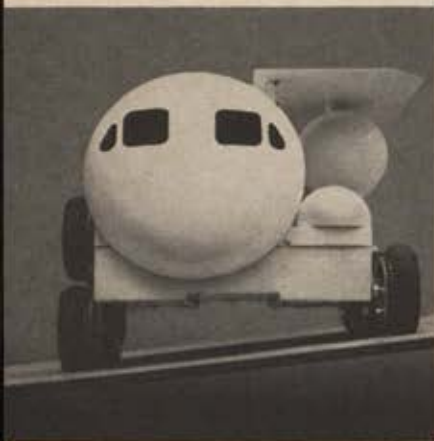
First you build a powered scale model of your vehicle. Then you build a proving ground with obstacles that exaggerate lunar surface problems. And you run your vehicle over the proving ground. Thus...



High obstacle with slippery surface. When the vehicle reaches it the driver rotates two of the powered walking beams to raise the front wheels to the top. The front wheels pull, the rear wheels push (all wheels are individually powered).



As the vehicle descends the other side, the beams are freed.



or one side.



Slippery slope. Weight on four corner wheels gives lateral stability.



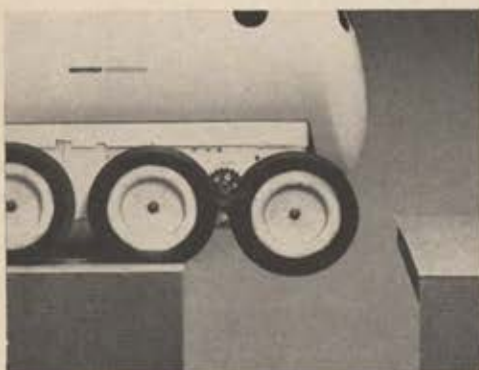
Narrow obstacle. Vehicle rises to straddle it.



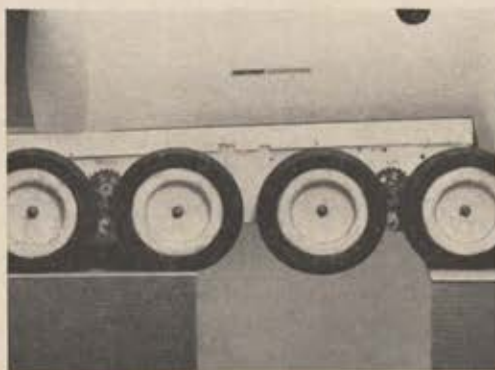
Bumpy ground. Free walking beams let wheels follow contours, reducing pitch and roll, smoothing ride.



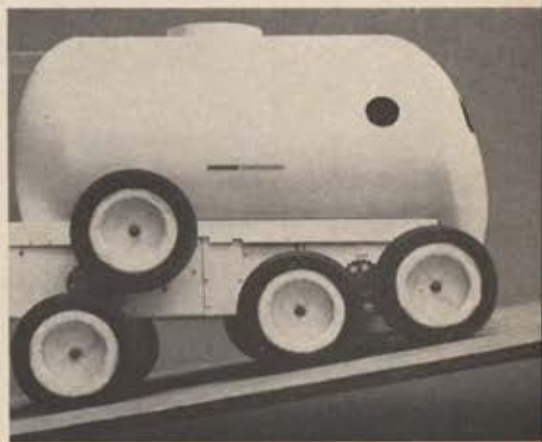
Sharp turns. With scuff steering, vehicle can spin on its own centerline. Eight-wheel drive gives high flotation in soft sand.



Crevice. Vehicle locks its walking beams...



and bridges it. It can bridge crevices as wide as half its wheelbase.



Slopes. Vehicle levels itself by rotating beams at one end...



Vehicle can shorten wheelbase for tight maneuvering. If necessary, it can lock wheels and rotate beams to literally "walk" through soft ground.



Can the driver see what lies in the shadows? To find out, create a lunar landscape inside a black chamber with collimated light sources to simulate sun and earth light. Put a TV system in the model and turn it loose to roam the moonscape. You learn immediately that the light is harsh and the shadows very dark. The vehicle will need sun filters on the windows, strong lights to probe the shadows.

In this vehicle the cylindrical lab module is mounted on one side of the chassis, with the fuel cells and tanks next to it. The driver sits on the centerline. Optical and TV systems permit him to view all the wheels.

The pressurized cylinder contains two compartments — the spacious main lab and a two-man airlock and flare shelter. A small airlock on the side permits samples to be passed inside or worked on in lunar vacuum. The command module docking adapter on top provides an emergency escape hatch.

The vehicle can be remotely controlled from the lunar surface, from the orbiting command module, or from earth.

The market for two-man moon campers is still quite small, but we expect it to grow. We intend to be ready with practical and proven designs to meet the demand when it comes.

NORTHROP

ANOTHER MAJOR TRIUMPH FROM RYAN'S

SPECTRUM

OF CAPABILITIES



RYAN FIREBEE...THE WORLD'S MOST "SHOT AT" JET TARGET MISSILE

Ryan Firebees, in over 6,000 flights, have tested more U.S. Army, Navy and Air Force surface-to-air and air-to-air weaponry than any other jet target missile. These sophisticated drones have no counterpart for providing the realistic combat environment so vital to training and accurate evaluation of weapon systems.

Firebees fly at any altitude from 50 to 60,000 feet. They are capable of 600 mph speeds, and plans for supersonic performance are well advanced. At one base, Ryan flew 46 Firebee missions without an operational loss and 55 consecutive flights in which all mission objectives were attained.

The Firebee, moreover, is a highly stable aerial platform — adaptable to battlefield surveillance, cargo and weapons delivery, electronic counter-measure and other missions. It is also used to tow the Towbee, an inexpensive, Ryan-developed target system.

But Ryan's spectrum of capabilities goes far beyond the Firebee. From it are coming new V/STOL aircraft concepts; landing radar for LEM; altimeters and Doppler sensors for Saturn, Surveyor; solar panel structures for Mariner-Mars.

RYAN AERONAUTICAL COMPANY • SAN DIEGO • CALIFORNIA

RYAN

system he has established of evaluating and analyzing all new projects. But he or "the system" has overcompensated. The "cost" part of the "cost/effectiveness" formula has been emphasized and underscored at the expense of speedy development and new ideas. Never in the history of competition have so many been able to say no, so few to say yes.²

In the past, technological development and research and procurement contracting were largely decentralized; the individual services were responsible to a major degree for their own weapons development. Service competition, in the happiest sense, produced the air-cooled aircraft engine (sponsored by the Navy) and the liquid-cooled engine (sponsored by the then Army Air Corps) with which the United States fought and won World War II in the air. One without the other would have been incomplete; service competition produced both.

When a new aircraft was required, the service needing it determined the characteristics wanted to perform the specialized missions contemplated. Competitive contracts were then let for a small number of planes, and actual flight competitions between competing companies were held, with the big payoff production contract going to the contractor who built the best plane, as actually determined in the air.

The services formerly had, within over-all policy and budget limitations, a considerable degree of autonomy, and weapons development and procurement were largely decentralized. What can be done when red tape is cut, authority and responsibility are coupled, and organization is decentralized to the working levels is shown by the production of the Polaris missile and the A-11 aircraft. The highly successful and extremely complex Polaris was pushed to completion as an operational weapon in about three and a half years, well ahead of schedule. One man, Vice Adm. W. F. Raborn, was given authority and responsibility to cut across organizational lines, and he was fully backed by the Navy and the Department of Defense. There was then no such centralization in the Pentagon as exists now. The A-11, successor to the famed U-2 high-flying reconnaissance plane, was a secret project, amply funded by the CIA and by the Air Force. With ample funds, full authority and responsibility and a high degree of autonomy, Lockheed Aircraft was twice able to produce—in the U-2 and its successor—world-beating aircraft in an abbreviated timespan. Similarly, Vice Adm. Hyman Rickover, who wore two hats—one Navy, one AEC—and whose authority, therefore, spanned the bifurcated organizational structure, was able to produce [in the nuclear-powered submarine] what was essentially a new weapon system with minimum delay. The key to these and other successful development and production efforts is the coupling of authority and responsibility at working levels.

Today the entire picture has changed violently. Under the law, separate service departments must be maintained and the services cannot be directly merged; Mr. McNamara has merged them "indirectly," as John C. Ries points out in his new book.³ A fourth service—the Office of the Secretary of Defense—has been built up as an all-powerful apex. It is far more than a policy-making and coordinating

agency, as it was originally intended to be under the National Security Act of 1947; it administers, operates, contracts, develops, procures, and commands. Superagencies, superimposed over the service departments, are answerable only to the Secretary of Defense and the Joint Chiefs of Staff.

Former service functions have been assumed by the Defense Supply Agency, which procures items common to the services; by the Defense Intelligence Agency, the National Security Agency (communications, intelligence, and security; codes and ciphers, etc.), the Defense Communications Agency (common and long-lines communications), and the Defense Atomic Support Agency. These have added new superechelons to the Pentagon bureaucracy.

Mr. McNamara came into office intending—he let it be known—to streamline top echelon Defense Department management. There were some fifteen presidential appointees of the rank of Assistant Secretary of Defense or higher in January 1961 when he took office; there are sixteen today. There were eleven Deputy Assistant Secretaries of Defense two years ago; there are about thirty today.

The Joint Staff of the Joint Chiefs of Staff was originally limited by law by Congress to 100 officers, then increased to 400, a specific limit intended to prevent the development of a super-General Staff; it now numbers the full 400, plus another 1,170 military and civilian personnel. The additional personnel are labeled members of the Organization of the Joint Chiefs of Staff, a euphemism which permits evasion of the legal restriction (with both executive departments and Congress winking at the extralegality). This staff, rich with rank, now has three lieutenant generals or vice admirals assigned to head its more important sections or divisions, and its director—a three-star general—may be given four stars if current suggestions are carried out.

As one would expect with a gigantic staff which tends to generate its own paper work, the workload of the Joint Chiefs of Staff steadily increases—from 887 papers or reports requiring some action by the JCS in 1958 to about double that number today. Something like a *de facto* hierarchical general staff now exists, with the Chairman of the Joint Chiefs as a kind of over-all Chief of Staff; and it busies itself with the ridiculous and the petty as well as the crucial and important. (The Joint Chiefs, for instance, determine the details of the administration and curriculum of the National War College and other joint service schools and have even solemnly considered such important matters as the advisability of establishing an all-service soccer team which might compete with European all-stars, and the numbers of cooks, and which services should furnish them, for a US headquarters in Europe.) Rep. Charles S. Gubser of California has estimated that there are now a total of 34,000 employees responsible to the Office of the Secretary of Defense (exclusive of separate service departments in Washington). Statistics like these indicate the revolutionary changes that have occurred within the Pentagon in the past fifteen—particularly in the past four—years. As Mr. Ries put it, the "dogma of centralization" has triumphed.

Many beside Mr. Ries worry about the capability of the present defense organization to withstand the strain of real war or protracted crises. There have been some disturbing signs of faltering and confusion during the Berlin crisis, the Cuban missile crisis, and one of the Gulf of Tonkin incidents.

The present Secretary of Defense has a computer mind, capable of absorbing and recording immense quantities of detailed data. He also has ferocious energy. The combina-

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²Management experts and contractors have pointed out that the exercise of centralized control by the Department of Defense over the services requires information and reports from the services. The self-generating and self-defeating nature of the workload imposed becomes apparent. The tighter and more centralized the control, the more reports that are required. The more authority taken away from the working level, the more paperwork that is required from those at the working level to back up their diminished authority.

³*The Management of Defense*. Baltimore: The Johns Hopkins University Press, 1964.

tion of these two qualities has enabled him, so far, to deal with what Mr. Ries calls the "minutiae that floods upward in a centralized organization." But even Mr. McNamara has several times given evidence of strain, and after Mr. McNamara—who? To decentralize the department so that the Secretary could have time, opportunity, and assistance to cope with major decisions would require a decrease rather than an increase in the staff of the Secretary—something that no democratic bureaucracy seems capable of accomplishing.

The centralized organization of the Pentagon and the accompanying growth of a bureaucracy—particularly in the upper echelons—explain in part the delays in development and procurement of new weapon systems. In effect, responsibility and authority have been separated in the Pentagon. Admiral Rickover gave several instances of delays caused by bureaucracy in testimony to a Senate Committee in 1958. Purchase of nuclear cores was delayed for six months "just because one staff person with no responsibility but with authority had on his own decided" against the purchase. In March 1964, he testified before a House Appropriations subcommittee on the question of nuclear power for a new aircraft carrier. The carrier itself was already approved by both Congress and the Defense Department. The Navy and most congressmen felt that such a major new investment should be as modern as possible, and that it should be powered with nuclear reactors rather than with oil, even though the initial cost would be considerably greater. But the subject was studied to death. Admiral Rickover testified: "The Department of Defense itself caused much of the delay. They considered the Navy's request to change it to a nuclear carrier for a year. The Department of Defense kept on asking for more information, more studies, more analyses. New studies and analyses are under way now on nuclear propulsion for the next carrier and other surface warships. These studies never end, and we don't build ships."

The services still have the legal responsibility for development and procurement but not the authority to implement their responsibility. Similarly, the responsibility for planning and execution has been separated. The Joint Chiefs no longer legally command anything; in the procurement field the services must often execute or carry out procurement plans they have not formulated (i.e., the TFX).

In an admirable attempt to promote some much-needed long-range planning in the armed forces and to control costs, Mr. McNamara instituted what is called the Five Year Force Structure and Financial Management Program, often dubbed "The Book." "The Book" tries to chart and elaborate all major details of service force structures (including sizes, types, and weapon systems required) being procured or developed, for the next five years. Any significant change in "The Book," including research expenditures, requires consideration by hundreds of people, including the Joint Chiefs of Staff and the Secretary himself, and an elaborate process of justification, review, and approval all along the line from lowest to highest echelons. Contracting, budgeting, progress on weapon systems—and even lawn cutting—are programmed and controlled in detail from various echelons of the Secretary's office, with streams of reports required. The services have complained that there is an inherent, built-in inflexibility to this system.

In addition to the Secretary of Defense and his deputy and the Chairman of the Joint Chiefs and the 1,570 supporting staff, all of the Assistant Secretaries of Defense have become, not *de jure*, but *de facto*, line operators as well as staff assistants. By virtue of authority delegated by

the Secretary, they can and do cut across service lines and intervene at the lowest echelons. Two offices, in particular, have a major influence in weapons development and procurement; unfortunately they are too often delaying factors rather than expeditors.

The Office of the Assistant Secretary of Defense (Comptroller) has completely changed in character under the McNamara regime. Charles J. Hitch, the incumbent, has, with the Secretary's approval, applied the methods he developed as an economic theorist at the RAND Corporation to military strategic programming. The cost/effectiveness of various weapon systems is analyzed on paper by his office, and he and his associates have a powerful voice in determining what kind of weapon will go to what service. Dr. Brown, the Director of Defense Research and Engineering, does another analytical job, supposedly from the technical and engineering feasibility point of view. His analyses are particularly important in the research-and-development stages.

Any projected weapon system has to run the gauntlet between the Charybdis of Mr. Hitch and the Scylla of Dr. Brown; but many other high- and low-echelon perils confront it also. The McNamara administration has established "for all large endeavors" (and for some that are not so large) what it calls a "Program Definition Phase" (PDP in Pentagon jargon). In Secretary McNamara's words, "before full-scale development is initiated, the specific operational requirements and the cost/effectiveness of the system must be confirmed, and goals, milestones, and time schedules must be established. . . . All the aspects of a development are tied together into a single plan which defines, for government and industry alike, what is wanted, how it is to be designed and built, how it will be used, what it will cost, and what systems and techniques will be used to manage the program. . . ."

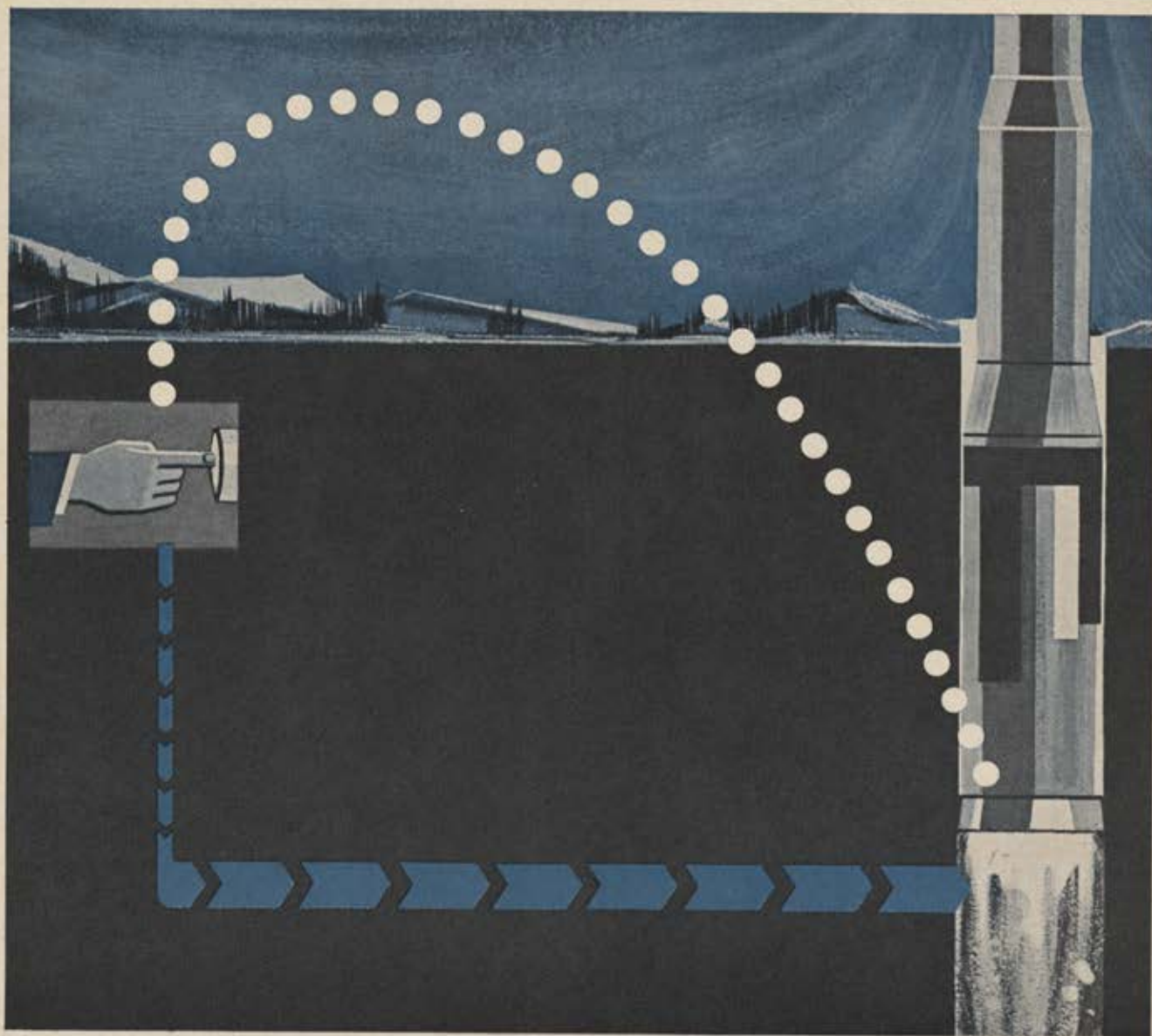
The PDP represents the Pentagon's search for "perfection on paper" before any operation begins. There is no doubt that it is an attractive theoretical management tool, but there is also not much doubt that it has delayed development and procurement of new weapon systems, and whether or not the end result in the form of "finished hardware" is actually any better or less expensive, it is still too soon to tell.⁴ The TFX (F-111) aircraft for the Air Force and Navy has been programmed and evaluated, analyzed and costed in detail on paper in the PDP; it is still in the development stage and may not be operational for years to come.⁵ This plane, which can vary the sweep

(Continued on page 75)

⁴Stanley Bernstein of the Raytheon Co., in a paper, "The Impact of Project Definition on Aerospace System Management," delivered at the first annual meeting of the American Institute of Aeronautics and Astronautics (June 29-July 2, 1964), used the mobile medium-range ballistic missile as a case history. He pointed out that contractors were expected to meet some twenty different requirements in a final PDP report. "... One may consider the several contractors who participated in the MMRBM effort," he said. "Even prior to Department of Defense program authorization in January 1962, companies like Hughes, Thiokol, Martin, and many others had been engaged in significant engineering efforts. When Program Definition was authorized, originally as a four-month effort, nine prime companies and many subcontractors and suppliers geared for maximum effort. The four months stretched to almost one year. Motivation has to be maintained. The present status of MMRBM is clouded. (Since this paper, MMRBM has been virtually killed.) Yet the participants must retain a level of interest in order to be ready to proceed if the program should become active. The maintenance of this motivation is a major management challenge. The requirement for stated performance incentive goals will, inevitably, lead to more conservative design and engineering during the Program Definition phase. . . . PD contracts should not be used as a means of postponing difficult government decisions or to decide what kind of military capability is required."

⁵The practice of "superstudy" is extending beyond the Pentagon. The SST, or supersonic commercial transport, is now called the "superstudied transport." Najeeb E. Halaby, head of the Federal Aviation Agency, recently said that "Whether or not it ever flies, it will easily be the most analyzed project in the government's history." If so, this is quite a record.

URGENT: Get the message to Minuteman—for double sure!



If Minuteman is ever actually used, it *must* work. And we have to assume that our missile bases would be under severe enemy attack.

That's why our Sylvania subsidiary, in developing the improved Minuteman Ground Electronics System, isn't taking chances. A second link—radio—has been added to the hardened underground cable link between control center and missile silo. This medium-frequency link, with hardened antennas, assures that command messages will reach the missile even during and after an attack.

In fact, the entire launch control system is designed to be surefire. Alternate control centers can take command if one is knocked out. Selected missiles can be fired, and their targets can be changed quickly.

Ground electronics for the improved Minuteman—another way that the vast capabilities of GT&E, directed through Sylvania Electronic Systems, are contributing to military preparedness.

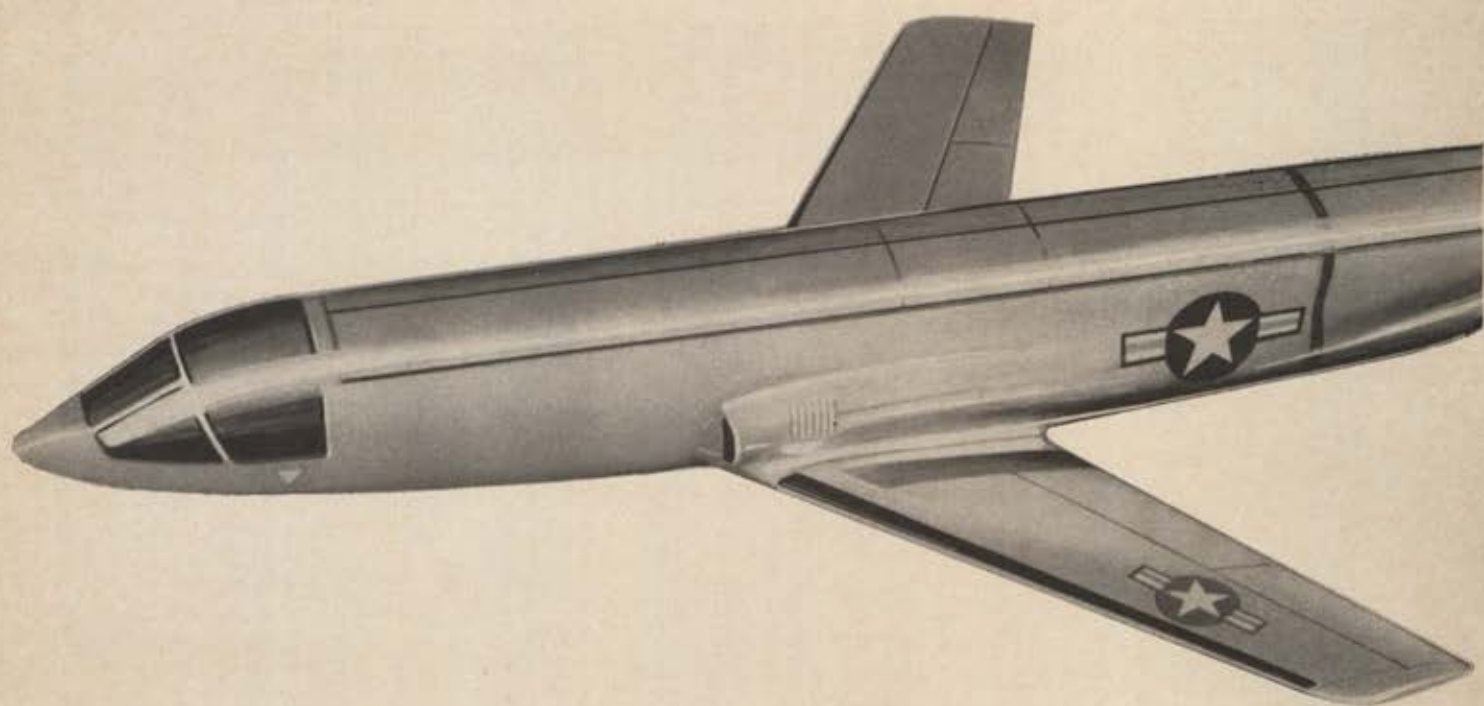
Sylvania Electronic Systems, Division of Sylvania Electric Products Inc., 40 Sylvan Road, Waltham, Massachusetts 02154.

GT&E

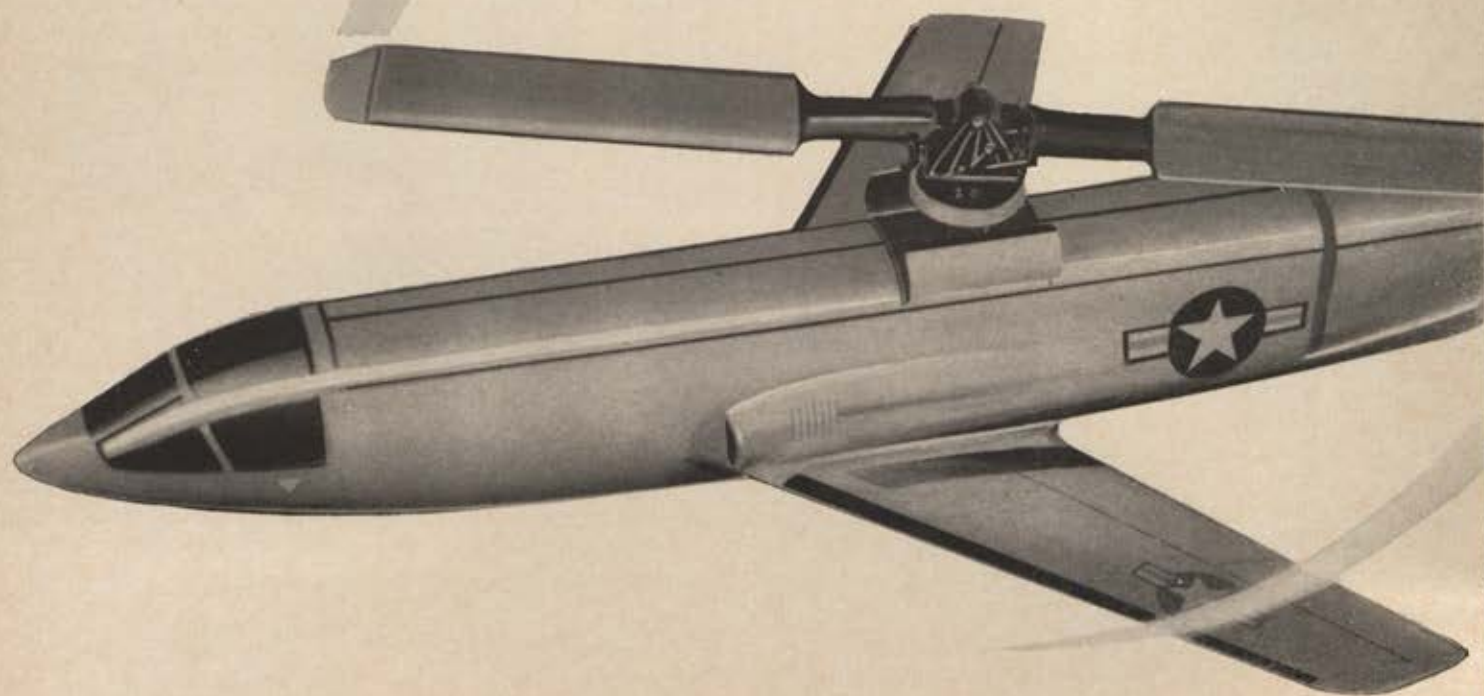
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**Is Sikorsky best qualified to build
a stowed rotor V/STOL aircraft?**





FLIGHT SIMULATOR: Tomorrow's flying today is a reality for Sikorsky engineers and test pilots, thanks to this flight simulator for studying a wide variety of vertical and short take-off and landing (V/STOL) aircraft. Laboratory facilities unmatched in the V/STOL field help support Sikorsky's intensive program of advanced research.

You decide:

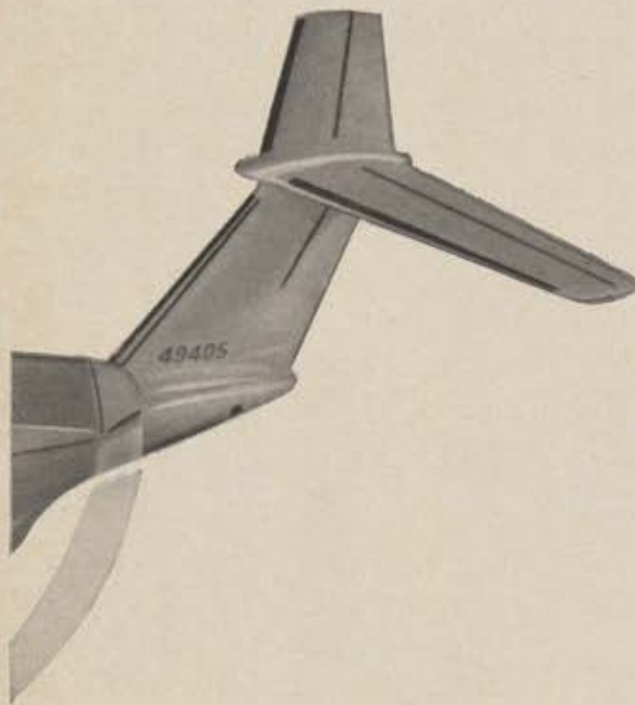
1. Sikorsky has developed a stowed rotor V/STOL design which combines efficient low speed and hover capabilities with the speed capability of a high performance aircraft. The design solution is simple, compact, versatile, and low in cost.
2. Sikorsky started work on its stowed rotor V/STOL concept in 1950.
3. By 1953, the company was testing a scale model stowed rotor in one of its wind tunnels.
4. In 1957, Sikorsky completed successful wind tunnel tests of a two-blade stowable rotor.
5. In 1958, Sikorsky completed plans for the first U. S. stowed rotor V/STOL aircraft. This company-funded project not only proved the concept, but laid the foundation for application of the concept to useful military missions.
6. Since 1958, Sikorsky has spent over one million man hours evaluating advanced V/STOL concepts.
7. The company has "flown" stowed rotor designs through its unique simulator. This simulator has thoroughly evaluated these designs without the prohibitive costs of building actual hardware.
8. Sikorsky has further evaluated its stowed rotor development with one of the largest analog and digital computer systems in American industry.
9. Additional facilities have included a variety of wind tunnels, test towers, fatigue laboratories, and flight research aircraft.
10. More military rotary wing aircraft have been built by Sikorsky than by any other manufacturer.

Sikorsky Aircraft has long followed a policy of "homework before hardware." Sikorsky has done its stowed rotor homework. It is now prepared to build the hardware.

Sikorsky Aircraft DIVISION OF UNITED AIRCRAFT CORPORATION

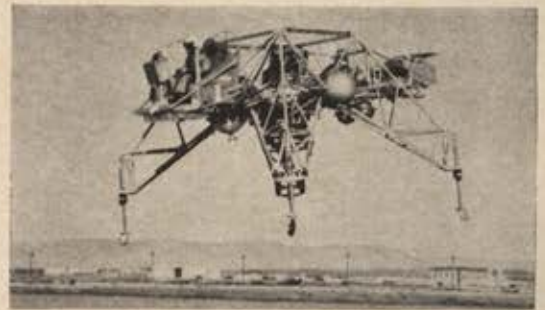
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A

STRATFORD, CONNECTICUT



How on earth do you land on the moon?

That's the problem Bell solved for NASA by creating the Lunar Landing Research Vehicle. Two of these spider-like moon-gravity simulators are already at NASA Flight Research Center, Edwards, California, engaged in research for future lunar landings and takeoffs. The gimbal mounted turbojet engine in the center of the vehicle is gyro stabilized in a perpendicular position at all times, regardless of vehicle attitude. Its automatically controlled downward thrust counteracts five-sixths of the earth's gravity in flight giving the pilot the "feel" of moon gravity. Reaction control rockets at the base of the four legs maintain altitude and control the attitude of the simulator in flight. This is another typical contribution of Bell science and engineering to man's conquest of space.



BELL AEROSYSTEMS Division of Bell Aerospace Corporation - A **Textron** COMPANY Buffalo, New York





Symbolic of the controversy between the services and Mr. McNamara's secretariat was the battle over the TFX, now designated the F-111, biservice fighter being developed by General Dynamics. On January 6, the F-111 (in foreground) demonstrated its variable-sweep wing. Above it, an F-106B.

of its wings (their angle to the fuselage) in flight, was forced into a preconceived and theoretical mold in the PD phase. Mr. McNamara insisted, against service objections, that Navy needs and Air Force needs could be satisfied by a single all-purpose plane, which could be flown from land fields and carrier decks on several entirely different types of missions. The attempt to achieve this—in theory and in blueprint form—required many months before designs acceptable to both services were evolved. The development contract was finally awarded to Convair and the first . . . developmental TFX . . . [successfully folded its wings in a test flight on January 6]. The Navy fears the finished version may be too heavy for carrier decks.

The finest fighter in the world today, the Navy's McDonnell F-4B Phantom II, which the Air Force is now buying in quantity in a slightly modified version, was the product of flight competition back in the 1950s when the PDP in its present rigid form was unheard of, and centralization in the Pentagon had not reached today's extreme. The McDonnell and Chance-Vought [now Ling-Temco-Vought] aircraft companies, in response to a Navy need for a supersonic fighter of certain given specifications, were each awarded developmental contracts for a small number of planes. The results were then actually flight-tested in competition. McDonnell won, but the Chance-Vought product was also good and was procured in more limited quantities for specialized reconnaissance and other missions for the fleet.

Many believe that this type of flight and interservice competition produces the best dividends. One service evolves the plane or engine and (after actual competition between several bidders) contracts for and procures the one best suited to its own specialized needs. That one may well be adapted—after it is operational—to the needs of another service.⁶ Each gets the type it wants, and a better plane or weapon than if it had been forced, on paper, into a common mold. For there frequently are incompatible requirements between service weapon systems, and the attempt to provide "commonality" in the interest of reduc-

ing costs may well increase cost and reduce combat effectiveness.

It is true, of course, that major weapons development projects have become far more complex and costly than they were ten to twenty years ago. In theory, the attempt of the Department of Defense to "define" a project and to refine it on paper before the steel is bent has a great deal of attractiveness. Many authorities who are loud in condemning the delays of the PDP system do not believe it is economically feasible—at least in all cases—to return to the old era of actual competitive service tests. Others, however, think that competitive testing of several different models, while more expensive initially, may actually save money eventually, chiefly because it may result in a better product. Eugene E. Wilson, retired naval officer and retired vice chairman of United Aircraft Corp., wrote in the September-October 1964 issue of *Shipmate*, the magazine of the US Naval Academy Alumni Association, that "the current practice of awarding production (and development) contracts to a single supplier, on the basis of contract guarantees unsubstantiated by competitive prototype performance . . . will not protect a hapless purchaser (the government) willing to risk his all on computation." The fundamental difficulty with PDP is that it has been invoked as an answer to *all* development and production problems, that it is interpreted too rigidly, and that there has been far too much dependence in the Department of Defense on what is essentially a management tool at the expense of judgment, engineering, and scientific intuition.

It is only fair to add that recently the complaints of the services and of industry have resulted in a recognition in the Defense Department of some of these faults. A new and standardized procedure for rating, evaluating, and selecting the winning contractors in a screening competition has been under preparation for two years and is now being presented—possibly for final approval—to the Office of the Secretary of Defense. For any large projects (exceeding \$100 million in production costs), authority will still remain at the highest levels; for smaller projects, authority may be delegated to lower echelons. The procedure may—but probably will not—lessen the time lag; certainly it will not change the emphasis on "perfection on paper."

In the Program Definition Phase of weapons development three high hurdles, in addition to countless evaluation procedures, cause many projects to stumble and fail.

One is the eruption of interservice rivalry instead of—in the best sense—interservice competition. A proposal for a new weapon or aircraft by one service is now picked to pieces and studied on paper by all services before even a minor development contract is approved. Now that their former degree of autonomy is restricted and actual development competition discouraged, the services know that the PD phase offers a now-or-never chance. Each service may produce a different concept or a different set of desired performance figures; a long "hassle" ensues to try to put them all into one weapon system. This occurred, notably, in the case of the TFX; it is happening now with the new COIN (counterinsurgency) aircraft which the Marines want to develop. The result is delay, sometimes a compromise as to performance.

A second factor causing delay and difficulties is the attempt by the Secretary's numerous assistants to eliminate what they call "gold-plating," or unnecessarily high performance figures or standards. The attempt is laudable, but it is sometimes carried to extremes, and it has been difficult, as Adm. George W. Anderson, former Chief of Naval Operations, pointed out, for men in uniform to ad-

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⁶There are countless instances of this kind of adaptation. In addition to the liquid- and air-cooled engines and the F-4B, the Air Force, for instance, uses the Navy-developed Sidewinder and Bullpup missiles.

just to the idea that a ten-mile-an-hour speed differential between our own aircraft and enemy planes may not—in the eyes of the Department of Defense—be important. To a pilot, that ten miles an hour, even though costly in terms of dollars, may be the difference between life and death.

It is in the PD phase, too, that the old bogey of “no operational or military requirement” becomes a major obstacle to weapons development. It is invoked at both high and low levels. Mr. McNamara has been rigid—though with some signs of a slight relaxation recently—about the statement of specific needs before development can start. The “operational requirement,” as an experienced naval officer puts it, “is another of the paper obstacles which are intended to ensure proper planning but which, when operated by people who have no real knowledge of the problems involved, frustrate progress.”

In the military exploitation of a new medium, like space, it is completely impossible to define, in the terms required by the PDP evaluations, the need for, or the performance characteristics of, a new vehicle. How can even a prescient scientist predict what usefulness a Manned Orbiting Laboratory will have? Yet the invocation of “no specific operational requirement” has delayed Air Force development of this highly important new project for at least two to three years.

Representative Chet Holifield's Military Operations Subcommittee of the House recently gave its view of what's wrong with the Pentagon. After a thorough study of Mr. McNamara's protracted efforts to merge military and commercial satellite systems, the subcommittee reported that two years had been wasted. It said: “We still detect uncertainty and overeconomizing in the Defense Department approach. . . . There has been overmanagement and underperformance . . . too many layers of supervision, the lack of clear-cut responsibility . . . and sluggish channels of . . . communication.”

Senator John Stennis, in common with many others, has decried the tendency to be negative, to object, to try to refine requirements in too much detail, to evaluate and study too much. Some weapon systems, he has said, “have literally been studied to death.” He cites the B-70 (which dates back in inception to 1954) as a prime example of what happens to a weapon systems development “when it is subjected to repeated stops and starts and when there is not a strong, orderly, and continuous program to bring it to completion.” This bomber, designed for long-range, high-altitude flight at three times the speed of sound, has encountered many technical difficulties and is well behind even a revised schedule. This was made certain by off-again-on-again programs in the Pentagon and by multi-layered, centralized organization there.

Before a final contract for a project is signed and actual development starts, an average of at least fifty signatures or approvals is required—sometimes as many as 100 or 200. Some individuals, required by legal or administrative

reasons to sign twice, have had to be briefed twice; by the time the second signature was needed they had forgotten what the contract was about.

It is true that centralization in the development and procurement field, epitomized by the Five Year Force Structure and the Program Definition Phase, was in part the outgrowth of inadequate management by the services of some research and development contracts. It was also the result of the failure of past Secretaries of Defense to exercise the power they have always had by eliminating—not service competition—but duplicatory and unnecessary service rivalry. But the cure has proved worse than the disease.

Healthy service competition can be encouraged and unhealthy service rivalry can be discouraged by:

1. Abandonment of attempts—keyed primarily to costs, not effectiveness—to force service weapon systems into “all-purpose” molds. “Commonality” develops naturally from actual technological accomplishments, not from “PDPs” or paper plans.
2. Return, insofar as possible, to competition in hardware rather than competition on paper. The end product is almost certain to be better, and ultimately may cost less.
3. Sponsorship, within a service, or by two or more services, of competitive research and development projects, all having a common goal, but each following different technological paths to that goal.
4. Definite selection by the Defense Department at the earliest possible stage of the best project; cancellation of the others.

The key lessons for tomorrow are two. Responsibility and authority must be coupled at *working levels* in the management of research and development and production contracts. And there must be a much higher degree of job stability and continuity in management than the rotational policies of the services have made possible in the past.⁷

Mr. Ries, whose studious book on defense organization cannot be accused of service or political partisanship, quotes Ernest Dale as writing in the *American Economic Review* for May 1961: “The greatest single bane of management today is its growing absolutism, its refusal to discuss or listen to different opinions.” Mr. Ries declares that “fantastic though it may seem, defense reformers have succeeded in turning the calendar back sixty years.”

Whether one agrees with this strong statement or not, there can be no basic disagreement with the testimony given to the Senate Armed Services Committee in 1949 by Ferdinand Eberstadt, one of the most perceptive students of defense organization. He said: “From shattered illusions that mere passage of a unification act would produce a military utopia, there has sprung an equally illusory belief that present shortcomings will immediately disappear if only more and more authority is conferred on the Secretary of Defense, and more and more people added to his staff. . . . I suggest that great care be exercised lest the Office of Secretary of Defense, instead of being a small and efficient unit which determines the policies of the military establishment and controls and directs the departments, feeding on its own growth, becomes a separate empire.”

Today the separate empire exists. Parkinson's law must be reversed if the Pentagon is to stop “feeding on its own growth” and if ideas, weapons developments, and imaginative policies are to be encouraged.—END

Mr. Baldwin, a graduate of the US Naval Academy, has worked as a military correspondent and Military Editor of the New York Times since 1929. He was awarded the Pulitzer Prize in 1942. He is the author of numerous books and is one of the most respected military writers and analysts in the field. His most recent book is entitled The New Navy, published in 1964. Prior to this he published a book on World War I, and in progress is a work on battles of World War II. The preceding article is reprinted by special permission from the January Foreign Affairs.

⁷As Rep. Melvin Price notes, one reason, for example, that the Army (nuclear) reactor program (a program for developing a small portable nuclear reactor which could provide power in remote areas) has fallen flat on its face is that the Army kept transferring out the managers of the program. There were six different managers in five years.



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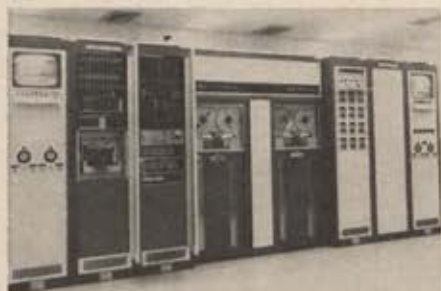


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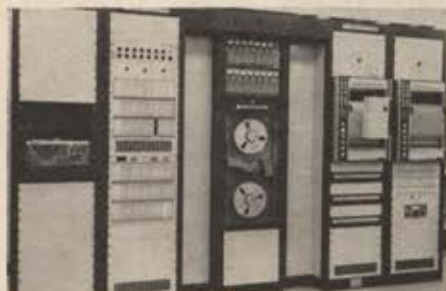
Pictured above is Hill Air Force Range, an airmunitions and propellant testing facility near Hill Air Force Base, Utah... now operational. F & M Systems' responsibility included conceptual and detailed design, fabrication, installation, and checkout of all instrumentation and control systems. F & M also conducted the first rocket motor firings and is responsible for training Air Force personnel. Among items to be tested are Minuteman and Genie motors and Mace and Bomarc boosters.



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News and Comment about Air Force People . . .

By Jackson V. Rambeau

AFA DIRECTOR OF MILITARY
AND INDUSTRIAL RELATIONS

The Results of Skillful Neglect

Secretary of Defense McNamara's plans for merging the Air Guard and Air Force Reserve were to be announced within days as this was written. But, whatever the decision, it will apparently have been arrived at without consultation with the Air Reserve Forces Policy Committee.

The decision not to present the Air Force's plans even to Secretary Zuckert's own official Reserve Forces Policy Committee before they were announced by Secretary McNamara demonstrates once again that the Committee's title is a misnomer.

A year ago General LeMay asked the Committee to produce some concrete recommendations on a merger. The best it could come up with was agreement that a single Air Reserve Force was desirable, but it failed to suggest how it might be done.

The Committee may be called together after the DoD announcement to give its after-the-fact blessing to DoD's actions. Messrs. McNamara and Zuckert have thus, in effect, suggested a more appropriate name for the group—the Air Reserve Forces Rubber-Stamp Committee.

It is perhaps not too difficult to understand why the Secretaries preferred not to submit the plan to the Policy Committee, or, to our knowledge, to brief interested congressmen before releasing the plan. Merger of the Air Reserve and Air Guard makes far less sense than the merger of the Army Reserve and Guard, as we noted last month. But Secretary of Defense McNamara—as witness the F-111 project—is bugged on commonality. What's good for the Army must *ipso facto* be good for the Air Force.

As a preliminary to the merger action, DoD announced on January 7 that all Reserve recovery units would be wiped out by the end of March. When this blow fell, about 8,000 Reservists were assigned to the forty-three groups and 112 squadrons still operating in forty-four states and the District of Columbia.

We have only the highest regard for these 8,000 men

who stuck with the program through all its "downs and downs" and tried valiantly to make it work.

The whole recovery mess should be a lesson to those in charge of Reserve Forces activities that the basic essential to an effective Reserve Forces unit is a valid and vital mission in national defense. This the recovery program never really achieved.

Embarrassingly Good

DoD's announcement on plans to transfer Air Force Reserve flying units to the Air National Guard will undoubtedly include a statement that the move will increase combat readiness of the units to be retained.

DoD may have a little trouble justifying such a statement to officers and men of the 459th Troop Carrier Wing, a Reserve unit commanded by Col. Charles Briggs with headquarters at Andrews AFB, Md. The 459th in December became the first complete Air Reserve Forces wing to qualify for a C-1 combat rating under newly revised, and more stringent, JCS criteria.

The wing, equipped with C-119s, is made up of three groups—909th at Andrews, commanded by Col. Clifford Weaver; 910th at Youngstown, Ohio, under Col. Randall W. Hendricks; and 911th, Pittsburgh, Pa., headed by Col. Donald M. Reed.

To win a C-1 rating, a unit must have at least ninety percent of its authorized personnel, and rate eighty percent or better in aircraft possessed, aircraft combat ready, and aircrews combat ready. Only eight Air Reserve groups—including the three above—and two Air Guard flying units were rated C-1 as of December 31.

Four Council Chairmen Named

Four AFA Council chairmen have been appointed by AFA President Jess Larson to serve from now until AFA's 1966 Convention in Dallas (see photos, below).

(Continued on following page)



Brig. Gen. John M. Campbell



Brig. Gen. Nicholas E. Allen



Col. Maurice I. Marks



CMSgt. C. F. Decowski

Brig. Gen. John M. Campbell, of Lincoln, Neb., heads the Air National Guard Council. He is a former Council member and is currently serving as an Air Guard representative on the DoD-level Reserve Forces Policy Board.

The Air Reserve Council will be led by Brig. Gen. Nick Allen, who last year headed AFA's Civilian Personnel Council. General Allen, a lawyer, is Deputy Commander of the 2d Air Reserve Region at Andrews AFB, Md.

Dr. Maurice I. Marks, of Indianapolis, Ind., a colonel in the Air Reserve, has been named chairman of the Medical Council. He has been a member of that Council for the last two years.

New chairman of the Airmen's Council is CMSgt. C. F. Decowski, USAF (Ret.), now a civilian employee of the Defense Communications Agency at Arlington, Va.

Still pending as we went to press are appointments to head AFA's Civilian Personnel and Retired Councils.

Col. Charles Briggs commands 459th Troop Carrier Wing, Andrews AFB, Md., only wing in Reserve Forces whose units are all rated C-1.



The Great, and Not So Great, Societies

Among the long string of visitors to the LBJ ranch during the holidays were the four service chiefs, each of whom in his talk with the President is said to have emphasized the urgent need for a military pay raise this year.

The President is reported to have passed their comments on to Deputy Secretary of Defense Cyrus Vance. On his return to Washington, Mr. Vance called in William Gorham, who is Deputy Assistant Secretary of Defense for Manpower Studies and Requirements.

Mr. Vance's directive to Mr. Gorham was uncharacteristically vague and naive.

"See what's bothering the service chiefs about pay," he said.

Mr. Gorham, who conducted the studies that led to the 1963 pay act and has been in close touch with the progress of the USAF-initiated pay study which has been informally endorsed by all the services, knows very well what's bothering the chiefs: It's the fact that the Defense Department's budget contains no provision for new pay raises this year.

Meanwhile, the military reenlistment rate in all services is steadily sinking. The Air Force is now down to 29.5 percent. The Army is just under the Air Force rate among its volunteers but is keeping less than four percent of its draftees. The Navy's reenlistment rate is twenty percent among shore-based sailors, seventeen percent aboard ship.

Some turnover is, of course, desirable and necessary. USAF made a thorough study of the subject a few years ago and set the optimum "selective retention" rate at fifty-five percent among first-term airmen.

The difference between that fifty-five percent goal and current reenlistment rates in all services is costing the US taxpayer, by conservative estimate, more than \$2 billion a year.

The Air Force's pay study recommends pay reforms for all services which would total about \$800 million a year. With a boost of that size, the Air Force believes the services can keep most of the men they need. If the study proved only half right, it would still more than pay for itself.

This is what's "bothering" the service chiefs. Mr. Gorham knows these figures, undoubtedly better than we do. But DoD's experts, who can figure the cost/effectiveness of a piece of hardware down to the Nth decimal point, apparently are less conversant with human values.

There are some very keen judges of human values, though, both in the White House and in Congress. It is to them, apparently, that servicemen and their families must look for help.

All they ask is that the goals for the Great Society, which President Johnson expressed in his campaign speeches and State of the Union message, be applied to service families as well as to other elements of our population.

Promotion by the Numbers

A historical vignette from World War II concerning two of the Pentagon's most prominent figures can be revealed now that one of them has retired. This is how it was told to us by someone who was there.

When Brig. Gen. Curtis E. LeMay arrived in India to take over the XX Bomber Command in July 1944, he was concerned at the lack of detailed information available to him on the resources of his new command—planes, crews, fuel stocks and consumption rate, munitions, etc. In the ETO he had become familiar with the pioneering work done by the AAF in statistical services techniques, so he fired off a message to General "Hap" Arnold in Washington asking for one of his bright young staff services officers.

A reply came back from headquarters saying that one of their best men, a captain, was on the way. He would be on temporary duty, Washington said, because he couldn't be spared indefinitely, but there would be time for him to set up a system and train members of General LeMay's staff in the procedures.

When the captain arrived soon afterward, General LeMay bluntly explained what he wanted. The captain polished his glasses and went to work. Within forty-eight hours he had collected the data and briefed General LeMay.

"Fine," said LeMay. "Just what I need. Now keep those figures coming."

Pleased with the captain's work, General LeMay soon promoted him to major, disregarding the technicality that his promotion authority didn't extend to a TDY officer. Three months later he boosted him to lieutenant colonel.

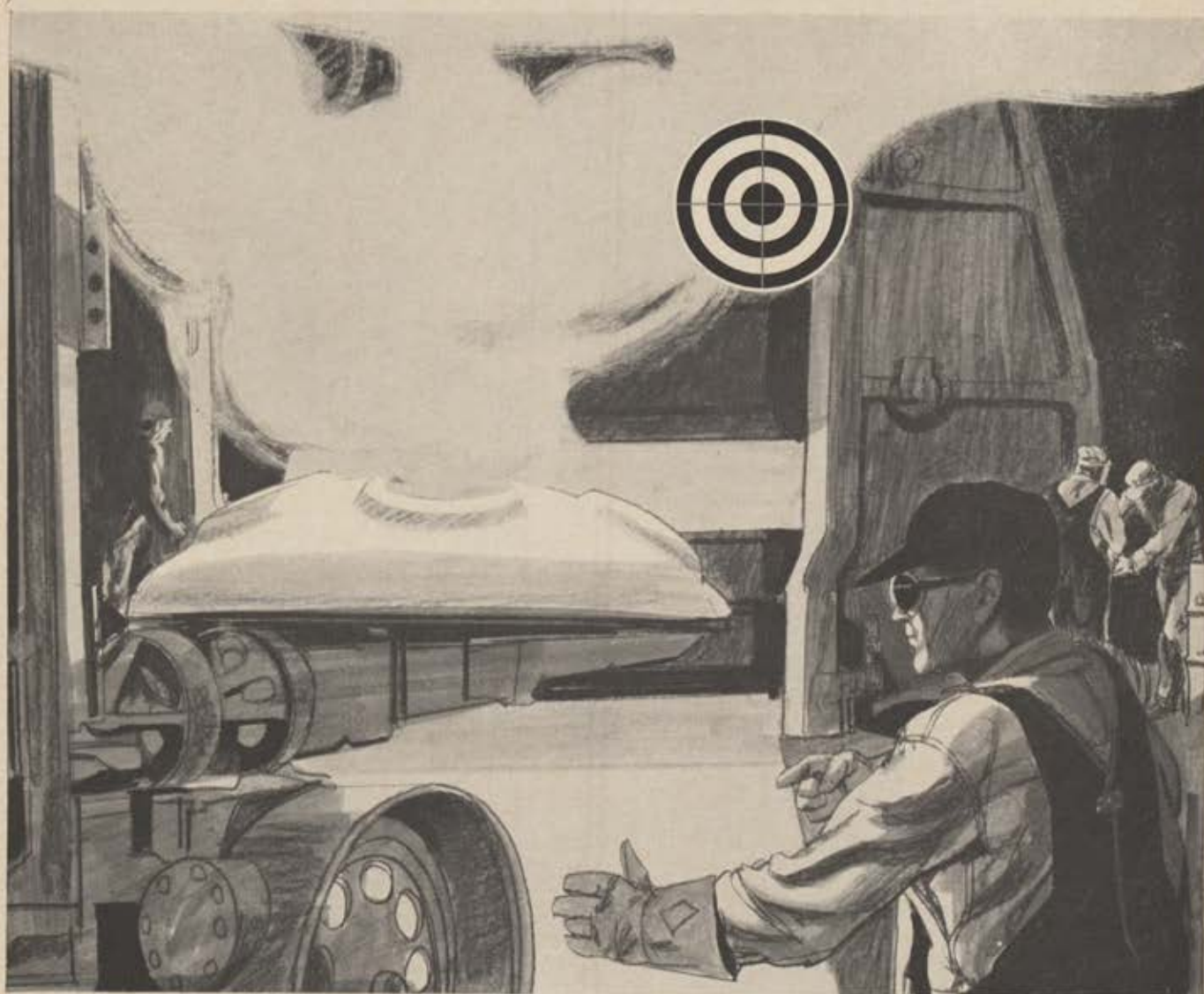
Then one day a wire came in from Washington. The captain had been out there long enough, it said, and directed that he return to headquarters.

General LeMay had no intention of giving up an able staff member without a struggle. He replied that the lieutenant colonel was urgently needed and requested that he be permanently assigned to his command.

A laconic inquiry came back from Washington. General LeMay's message had given the captain's rank as lieutenant colonel, it noted, and requested clarification.

(Continued on page 83)

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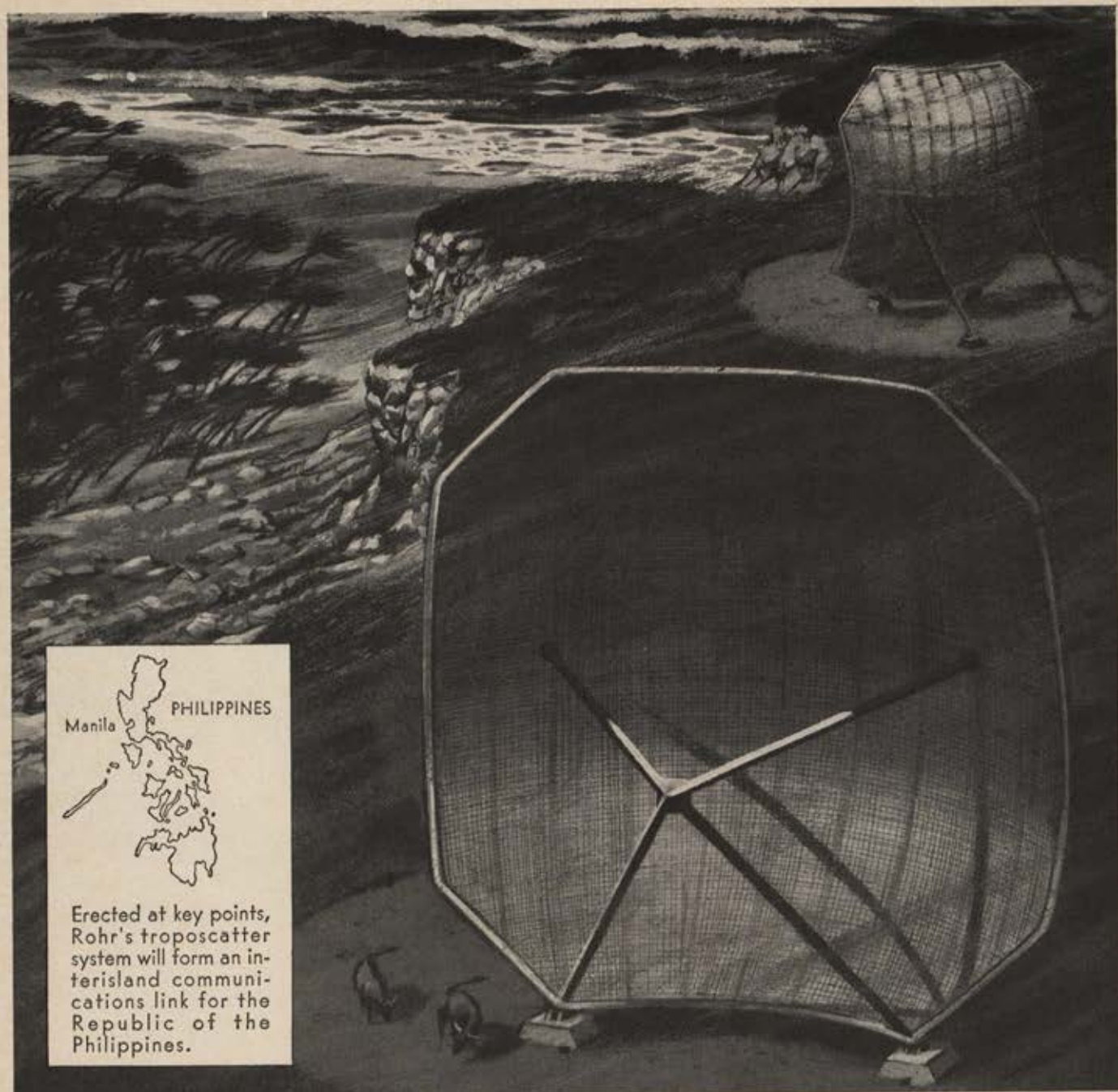
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New Director of Plans at Hq. USAF is Maj. Gen. Seth J. McKee, former Commander of SAC's 821st Division, Ellsworth AFB, S. D. He served as SAC's Director of Plans from July 1962 to February 1964.

General LeMay explained that the officer had been doing such an outstanding job that he had promoted him—twice.

In reply came a top-priority message signed by Arnold. "You are directed to return Lt. Col. Robert S. McNamara without further delay," it read, "and effective immediately your promotion authority is withdrawn."

STAFF CHANGES . . . Maj. Gen. George S. Brown, from Asst. to the Cmdr., MATS, with duty station at McGuire AFB, N. J., to Cmdr., Joint Task Force 2, Sandia Base, N. M. . . . Maj. Gen. Stanley J. Donovan, from Chief, MAAG, Spain, and Chief, Joint US Military Gp., Spain, to Det. 24, JUSMAG-MAAG, Spain . . . Brig. Gen. Richard O. Hunziker, from Dep. Cmdr., 1st Strategic Aerospace Div., SAC, Vandenberg AFB, Calif., to Cmdr., 821st

Strategic Aerospace Div., SAC, Ellsworth AFB, S. D., replacing Maj. Gen. Seth J. McKee . . . Brig. Gen. William B. Kyes, from Cmdr., 11th Strategic Aerospace Wg., SAC, Altus AFB, Okla., to Cmdr., 47th Air Div., SAC, Castle AFB, Calif., replacing Brig. Gen. William Yancey . . . Brig. Gen. Lewis E. Lyle, from Cmdr., 818th Strategic Aerospace Div., SAC, Lincoln AFB, Neb., to Cmdr., 13th Strategic Missile Div., SAC, Warren AFB, Wyo., replacing Brig. Gen. William S. Rader . . . Brig. Gen. Everett A. McDonald, from Chief, Control Div., SAC, Offutt AFB, Neb., to Cmdr., 822d Air Div., SAC, Turner AFB, Ga., replacing Brig. Gen. Woodrow P. Swancutt . . . Maj. Gen. Seth J. McKee, from Cmdr., 821st Strategic Aerospace Div., SAC, Ellsworth AFB, S. D., to Director of Plans, Office DCS/Plans and Operations, Hq. USAF, Washington, D. C. . . . Brig. Gen. William S. Rader, from Cmdr., 13th Strategic Missile Div., SAC, Warren AFB, Wyo., to Dep. Cmdr., 1st Strategic Aerospace Div., Vandenberg AFB, Calif., replacing Brig. Gen. Richard O. Hunziker . . . Brig. Gen. Woodrow P. Swancutt, from Cmdr., 822d Air Div., SAC, Turner AFB, Ga., to Dep. Director of Operations for Strategic/Defense Forces, Office of DCS/Plans and Operations, Hq. USAF, Washington, D. C. . . . Brig. Gen. William R. Yancey, from Cmdr., 47th Air Div., SAC, Castle AFB, Calif., to Deputy for Reconnaissance, Hq. ASD, AFSC, Wright-Patterson AFB, Ohio.

PROMOTIONS . . . To brigadier general: Thomas H. Beeson, Maurice F. Casey.

RETIREMENTS . . . Maj. Gen. Emmett B. Cassidy, Gen. Curtis E. LeMay.—END

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—Gen. Curtis E. LeMay, in a letter to all Air Force personnel.

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Coming Attractions: The new 8- to 10-place turbo-prop Stallion (left) and the 6-place Twin Courier (right), both available commercially by mid-1965. * also known as The Caballero



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AFA NEWS

CHAPTER OF THE MONTH

Dallas Chapter, Texas, Cited for

effective programming in support of the AFA mission by contributing to a better public understanding of the role of the USAF.

Dallas area military, industry, and civic officials joined AFA's Dallas Chapter and the Dallas Health and Science Museum in a special Pearl Harbor Day Memorial Luncheon meeting December 7.

The luncheon featured an address by Lt. Gen. Herbert B. Thatcher, Commander of the Air Defense Command (ADC), and the unveiling by Mrs. Thatcher of a portrait of the General, painted by Dallas artist Dmitri Vail.

The portrait will be included in a series which Mr. Vail is painting of military, scientific, and aerospace celebrities and will hang for a time in the Dallas Health and Science Museum.

In his address, General Thatcher listed some of the advanced aspects

Deputy Commander, Second Air Force, representing Lt. Gen. David Wade, Second Air Force Commander, stated in his remarks, "The Barksdale family pavilion will be a memorial to the good relations that exist between civilians and the military in this area."

In his remarks, Mr. deBerardinis indicated that other AFA Chapters are planning to copy the Barksdale project in areas where they are needed (see cut).

• • •

AFA's newest State organization was instituted at a unique statewide meeting recently. More than 200 members and guests attended a reception and dinner hosted by the Central Florida Chapter at the Orlando AFB Officers' Open Mess. President

installed by Gus Duda, AFA Organization Director: Martin H. Harris, President; Herman T. Allen and George J. Burrus, III, Vice Presidents; Wayne A. Hilton, Secretary; and Joe Damsker, Treasurer.

Immediately after the meeting, members and their families and friends traveled by bus to Patrick AFB for a luncheon, hosted by the Cape Canaveral Chapter, and a tour of the Cape Kennedy and Merritt Island facilities.

During the luncheon ceremonies, AFA President Larson delivered a short address and also presented the AFA/Air Force Systems Command award for Support Management to Col. Raymond A. Yerg, Deputy for Bioastronautics, Hq. Air Force Missile Test Center, Patrick AFB.

• • •

At the Passaic-Bergen, N. J., Chapter's recent Sixth Annual Wright Brothers Day Dinner, John Currie, Chairman of the Awards Committee and Past National Director of AFA, presented the Chapter's Air Power Award to Edward P. Schinman, Chairman of the Board of the Bogue Electric Manufacturing Co., for his years of support and contributions to the Chapter.

For his work in making known the need for air strength, Nathan Lane, Chapter President, was presented a trophy from the Curtiss-Wright Corp. Les Mead, Assistant to the Corporate Director of Public Relations, made the presentation.

Following the awards ceremonies and remarks by Charles Van Wagner, personal representative of Harry B.

(Continued on following page)



Shown at Dallas Chapter's Pearl Harbor Day Memorial Luncheon are Lt. Gen. Herbert B. Thatcher and Mrs. Thatcher; Dixie Carmichael, Dallas Health and Science Museum Director; Dr. W. J. Hesse, Chapter President; and M. L. McLaughlin, AFA National Director.

of his command, praising the efforts of individual members of ADC. He ended with a warning against complacency.

During the meeting, the following officers were installed to serve the Chapter for 1965: Dr. W. J. Hesse, President; Ben Oram, Vice President; Nathan G. Mehaffey, Secretary; E. E. Skinner, Treasurer (see cut).

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Ground-breaking ceremonies were held recently for a \$25,000 family pavilion for the use of alert crews and their families at Barksdale AFB, La.

Cosponsors of the project, called "Project Appreciation," are the Air Force Association (Louisiana), the Ark-La-Tex Airpower Council, and the Military Affairs Committee of the Shreveport Chamber of Commerce. N. W. deBerardinis, AFA's South Central Regional Vice President, is General Chairman of the project.

Maj. Gen. William E. Eubank,

Jess Larson was the guest of honor and featured speaker at the dinner.

At a business meeting the following morning, presided over by A. P. Phillips, Southeast Regional Vice President, the State unit was organized and officers elected by representatives of the five Florida Chapters. The following officers, to serve for 1965, were

Breaking ground for "Project Appreciation" at Barksdale AFB, La., are N. W. deBerardinis, General Chairman of the project and AFA's South Central Regional Vice President; and Lester C. Haas, architect for the family pavilion project.





Nathan Lane (third from left), Chapter President and winner of a trophy from the Curtiss-Wright Corp., and Edward P. Schinman (far right), winner of the Chapter's Air Power Award at the Passaic-Bergen Chapter's Wright Brothers Day Dinner.

development of technical management methods."

In the feature address of the evening, entitled "Increased Emphasis on In-House Laboratories," Maj. Gen. Fred J. Ascani, Commander, Systems Engineering Group, RTD, disclosed that a proposal for a research and technology center complex for Wright-Patterson AFB is now under consideration by RTD officials.

Tom Frawley, news director of Station WHIO-TV, served as Master of Ceremonies for this outstanding event.

Haines, Publisher of the Paterson News, a film on the Minuteman missile was shown.

Also among the distinguished guests attending were: Thomas McGuire, Honorary Base Commander at McGuire AFB; Sal Capriglione, President of AFA's New Jersey Organization; Maj. James Transue, Deputy Chief of the Development Engineering Division of the USAF's Newark Contract Management District; and Rabbi Arthur T. Buch, who delivered the invocation and benediction (*see cut*).



Milton Caniff receives Indian headdress and membership scroll from John and Stella Larney of Oklahoma Seminoles. From left are Haskell Martin, AFA Oklahoma Pres.; Clint Brandt, Oklahoma City Chapter Pres.; Maj. Gen. M. F. McNickle, Oklahoma City AMA Cmdr.; Joe Shosid, Southwest Regional VP.



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THIS SPACE CONTRIBUTED BY THE PUBLISHER

The Van Cleve Hotel in Dayton, Ohio, was the scene of the Wright Memorial Chapter's recent Awards Banquet.

Following the welcoming address by Robert V. Van Trees, Chapter President, George A. Gardner, Vice President of AFA's Ohio Organization, presented the Chapter's 1964 Air Power Award to Lester J. Charnock, Technical Director, Systems Engineering Group, Research and Technology Division (RTD). Charnock was cited for "outstanding contributions to the military strength of the nation and the

AFA's Beaver Valley Chapter and the St. Veronica Parent Teacher Guild (PTG) of Ambridge, Pa., recently co-sponsored a two-day speaking tour of Beaver County for Maj. Joseph B. Roberts, Jr., Director of Information, USAF office of Aerospace Research, and his assistant TSgt. Leo Warden.

James Simon, Chapter President, and Edmund Gagliardi, PTG President and Chapter Past President, reported that Major Roberts spoke to more than 2,500 people at county high schools and a PTG meeting.

—DON STEELE

William E. Bennett, President, AFA (Mich), introduces Gen. Mark E. Bradley, Jr., Cmdr., USAF Logistics Command, Wright-Patterson AFB, to joint meeting of Kalamazoo Chapter and Kalamazoo Management Assn.



Bob Stevens'

"There I Was..."

"I tell you—it was hell on the home front! I was so scrogged up by the end of my delay en route in the ZI that it was a pleasure to get back to a combat theater. In fact, when I arrived in England I put out a service star for mother back in Poughkeepsie. . . ."



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With more than 12,000 participants and more than \$175,000,000 insurance in force, AFA Military Group Life Insurance continues to be the best protection for all military families. Eligibility has now been broadened to include *all* officers and enlisted men on active duty, in the National Guard, and in the Ready Reserve.

Military Group Life Insurance provides a graded amount of coverage, with a top amount of \$20,000 depending on age and flying status. The death benefit is *increased by 50%* if death is caused by any kind of accident, including an aviation accident.

Policyholders may also keep their insurance in force

at the low group rate after they leave the service, and until age 65 — provided their coverage has been in effect for at least a 12-month period prior to date of separation.

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Grounded policyholders receive payments equal to 80% of their flight pay (tax free) for periods up to two

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

This plan assures members of no loss of income if they are returned to flying status within the benefit period. If grounding is permanent, they have sufficient time to adjust to a lower-income level.

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

Objectives

- To assist in obtaining and maintaining adequate airpower for national security and world peace
- To keep AFA members and the public abreast of developments in the field of aviation.
- To preserve and foster the spirit of fellowship among former and present personnel of the United States Air Force.

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Active Members: US citizens who support the aims and objectives of the Air Force Association, and who are not on active duty with any branch of the United States armed forces—\$6 per year.
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