JANUARY 1967 / 60c

AIR FORCE

and **SPACE DIGEST**

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

The Small World of Sergeant Pfenning

Another side of the air war in Vietnam—one of the youngsters from Go Denh orphanage wins a broad smile from SMSgt. Elmer E. Pfenning, Orlando, Fla., first sergeant of a communications squadron at nearby Phan Rang Air Base in Vietnam. The Sergeant's unit has undertaken a program of help for the orphanage.

Also In This Issue:

No more Lost Battalions...

or patrols either for that matter. With the new lightweight Sperry Phoenix Company locator beacon any ground unit can furnish its support aircraft with a continuous indication of its position, even when operating in dense jungles, at night, or under heavy cloud cover. A DME capability allows the aircraft to pinpoint the position of the beacon at any time without the necessity of remaining directly overhead. In addition, the beacon provides a voice communications capability and a glidepath capability which turns almost any clearing into an all-weather airfield. For more information about the Sperry Phoenix Company tactical beacon, write or call

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SPERRY PHOENIX COMPANY, Phoenix, Arizona

HISTORIC first picture of the earth taken from vicinity of moon. Picture, shot by NASA's Lunar Orbiter, gives vivid close-up view of cratered lunar surface. Lunar Orbiter, designed and built by Boeing, was first U.S. spacecraft to orbit the moon and to photograph far side of moon. Lunar Orbiter I flew and maneuvered flawlessly throughout its mission. It photographed thousands of square miles along moon's equator to help NASA select best landing sites for America's Apollo astronauts. Boeing scientists and engineers, with NASA personnel, controlled Lunar Orbiter's flight. NASA's Langley Research Center is Orbiter's systems manager. Orbiter II was launched Nov. 6 to photograph 13 additional areas for possible use as moon landing sites.

Capability has many faces at Boeing

PGH (Patrol Gunboat-Hydrofoil), designed and being built by Boeing, will be first of its kind for U.S. Navy. Propulsion is by water-jet engine.

NASA's Apollo/Saturn V moon rocket, largest, most powerful in world, is moved on a transporter as large as a baseball diamond. Boeing builds first stage booster, generating thrust equivalent to 160 million hp and provides systems engineering and integration support on entire Saturn V system.

NEW ERA in jet travel will be ushered in by Boeing 747, now being built. Boeing 747 will carry up to 490 passengers and be first jet with promenade-deck roominess, staterooms, lounges. 747 will fly faster (625 mph) than today's jets. Already ordered by: Air France, American, BOAC, Continental, JAL, Lufthansa, Northwest, Pan American, TWA, United.

BOEING

We installed these for a customer who wanted the most modern telephone system he could get.

We also installed transistorized central exchanges for this customer — the most advanced type.

So why the old-fashioned crank phones?

Because the customer is a newly emergent nation, and power supplies in many of the towns are not dependable.

On the other hand, skilled technicians are scarce too, so the transistorized switchboards are needed to keep maintenance at a minimum.

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Some of the jobs are huge and complex, like the Pacific Scatter System that Page built and now manages for the U.S. Department of Defense. It's 7,500 miles long, uses ionoscatter, troposcatter, microwave, and vhf. It provides the only continuously reliable message service across the Pacific from Hawaii via the Philippines to Okinawa.

Some jobs are fast, like the Voice of America station in Liberia that Page designed and installed in 56 days, or two Atlantic Missile Range terminals completed in 60 days.

Others are fast and dangerous, like the military communications systems built by Page that blanket South Vietnam.

And some are fun, like the system Page designed and installed for the Government of the Bahamas. It brings modern telephone service to all the principal islands, and is operated and maintained by Bahamian citizens trained by Page.

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FRED BUEHRING, PRESIDENT OF LTV ELECTROSYSTEMS, INC.

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AIR FORCE
and SPACE DIGEST

The Magazine of Aerospace Power
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VOLUME 50, NUMBER 1 **JANUARY 1967**

Guest Editorial

Getting Deconfused About Wars

By Russell Baker

One of the freshest, brightest interpreters of the Washington scene is the New York Times*'s Russell Baker. His "Observer" column on the* Times *editorial page is always good for a chuckle, and often for a real belly laugh. In more than twenty years of observing and interpreting the Washington scene we have often felt overwhelmed by gloom and doom. A dose of Baker always helps. This one helped so much that we would like to share it.*—J. F. L.

When things get really baffling, the place to go in Washington is the Ministry of Deconfusion. You go through the front door and tell the guard what you are confused about, and if it is Vietnam, he refers you to Miss Klem.

Miss Klem says that you are in the wrong place and refers you to Mr. Craven. Mr. Craven is in conference and cannot be disturbed. His secretary suggests that you try Mr. Curlew. Mr. Curlew is out of the country; having been reassigned from Vietnam to the Congo, he is in Africa trying to deconfuse himself about Moise Tshombe. His secretary refers you to Mr. Thaxter.

It is an almost certain bet that Mr. Thaxter will be on sick leave. The wise maneuver is to go to the cafeteria and eavesdrop until you identify a man obviously capable of deconfusing you on Vietnam. His name will be Mr. Wenlock. If you follow Mr. Wenlock back to his office and stick a foot in his door, you can corner him before his secretary has a chance to tell you he is in conference.

"I need a thorough deconfusion on Vietnam," you tell him. He will try to brush you off by murmuring, "American honor," "keep our commitments," "ready to negotiate," "Munich," and other banalities.

Say, "You're talking nonsense, Wenlock. Are you going to deconfuse me, or do I have to mention your name to Senator Fulbright?" That usually suffices, and the process of deconfusion begins. Like this:

Q. Will you please tell me first whether to call this military conflict the Vietnam war or the Vietnam War?

A. This is not a War. It is a war. World War II, World War I, the Spanish-American War, the War Between the States, the Mexican War, the War of 1812, and the Revolutionary War were Wars. In Vietnam what we confront is merely a war.

Q. When did the Vietnam war begin?

A. Nobody knows. That is one of the reasons it is not a War. We are trying to find the date on which it began, but we are not very hopeful. No two people agree on when it started, and a few believe that it hasn't started at all yet.

Q. As a citizen, what can I do to help win the war?

A. You can break the habit of asking questions like that one. The President made it clear over two years ago that he would not send American soldiers to fight a land war in Asia. His aim is simply to bring the aggressors to the conference table. These are the reasons we cannot call the affair a War. Since it is not a War, the good citizen can best help his country by not protesting about bloodshed. The President merely expects the men who are there to come back with that coonskin on the wall. Does this deconfuse you?

Q. Should I feel guilty about continuing to live the good life while my countrymen are suffering in the pursuit of the coonskin? It seems to me that in past wars people who went to fancy-dress balls and took vacations in Las Vegas in wartime were despised as war profiteers.

A. There you go again confusing Wartime with wartime. You don't seem to grasp the distinction between War and war. In war we have created another new miracle convenience for the affluent classes. It is as different from War as detergent is from yellow laundry soap.

Q. Deconfuse me more thoroughly on that point.

A. In War the affluent were required to pitch in and make a few sacrifices. In war, all we really need to do the job are the non-affluent. Their sons handle the bloodshed while their parents sacrifice certain Government-financed social benefits to provide the Government with the additional money needed to maintain the war. This means that there are no unpleasant financial demands on people like you.

Q. Isn't it unfair to make the non-affluent foot the bill?

A. Of course not. It's their sons who are fighting the war. Why shouldn't they support them?

Q. Then you can assure me that there is absolutely no reason why I should feel guilty about not contributing a thing to the war?

A. But you're making sacrifices, man. The war has contributed to the tight-money situation. That means it's harder for you to buy yourself that new mink dinner vest this year. It has inflated prices. That means you're sacrificing more of your salary for your sirloins. Why, we might even ask you to pay a few hundred dollars more in taxes next year.

Q. Still, it doesn't seem like much, does it?

A. Of course it doesn't. But you've got to remember, young man, that this is war!—END

Here come the corsairs

Again . . . again . . . and again

First one . . . Then three . . . And suddenly a sky full of A-7 Corsair II's streak over the horizon . . . on the deck. They slip swiftly and neatly under radar . . . and SAMs.

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When jumped in its environment the highly maneuverable Corsair is capable of taking care of itself . . . versatile . . . rugged . . . this is the A-7 Corsair II . . . now in quantity production by the Vought Aeronautics Division.

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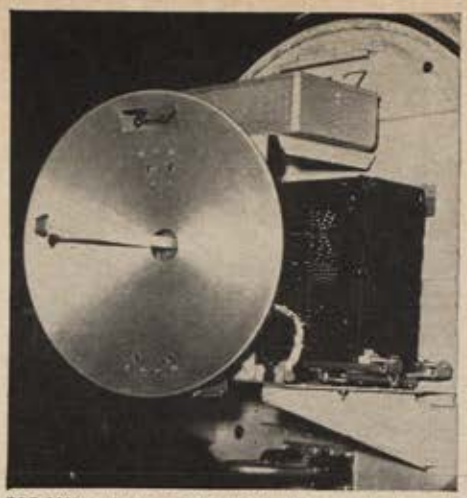
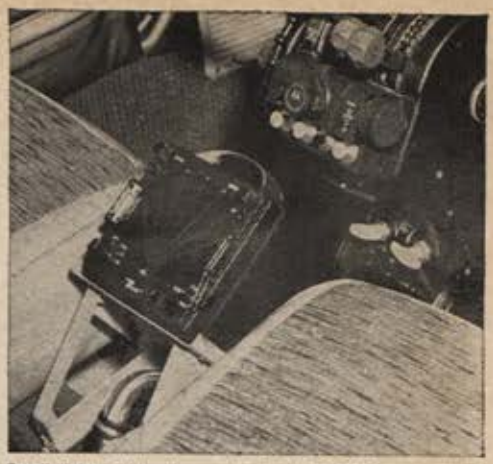
Even daylight viewing is easier with RDR-100, because of its exclusive variable scan antenna.



RDR-100's antenna can be used with a small radome to preserve the appearance of your aircraft.



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Like complete information on the new Bendix Trophy Line RDR-100? Just contact Bendix Radio Division, Avionics Products, Baltimore, Md. 21204.

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AIRMAIL

Blame for Pearl Harbor

Gentlemen: Mrs. Roberta Wohlstetter's article "Sunday, December 7, 1941, and the Monday Morning Quarterbacks" [December 1966], is fine as far as it goes. But while it deals effectively with those who saw the Pearl Harbor catastrophe as a giant conspiracy, it does not at all answer adequately the pointed thesis that Pearl Harbor amounted to a *collective* failure in responsibility.

To infer strongly that we were primarily victims of fate and history, that events had progressed out of control, does not relieve us of responsibility today. Thus, it is clear from the evidence as presented by Mrs. Wohlstetter in her book, *Pearl Harbor: Warning and Decision*, that the magnitude of the tragedy need not have been as great as it developed.

Pearl Harbor was, above all, a human story, laced with presumptions and fallibility of ordinary human beings. For the US, all of the data we possessed failed us because it got bogged down in the quagmire of governmental bureaucracy. Lack of communication between the topmost levels of government and critically placed officials; between agencies; between the Army and Navy; and within the Navy itself—all of this spelled disaster.

But this was not all. Responsibility had been poorly defined and poorly understood both in Washington and in the field. And our analysis of the Japanese mind was faulty, as it usually is when we are up against an Asian nation. The information at hand was molded to fit our preconceived ideas. And for these serious errors in analysis and judgment, those in positions of authority must certainly take some responsibility.

Today, a great deal more than merely pleasant reassurance that things were beyond our control is needed. The danger is that one day the web may be spun again. The context will not be the same. The locale will be different. But the human syndrome will be the same.

As Herbert Feis has pointed out, history can indeed be capricious. Our duty and responsibility is to see that another Pearl Harbor never happens again, technological or otherwise. Washington had a great deal more information, especially on the critical political picture, than did Hawaii. From the available evidence we possess today, it seems that the theater commanders received a disproportionate share of the blame for the Pearl Harbor tragedy.

Serious mistakes and errors of judgment were committed. Far from the majority of them occurred in Hawaii and the Pacific.

HERMAN S. WOLK
USAF Historical Division
Liaison Office
Silver Spring, Md.

Reprints for Educators

Gentlemen: After a number of false starts on the part of the freight lines, the reprints of "Finding Your Way in Space" [by Maj. William A. Cohen, August '65 issue] have been delivered to the Air Force Academy. I appreciate very much the fine support you and the Air Force Association continue to give the Academy.

The reprinted article on space navigation will be given to each educator who visits the Academy as part of our orientation program. Copies will also be sent to all Liaison Officers. Our hope is that these will find their way into the hands of high school math and science teachers and aviation club advisers for use in class projects as a means of stimulating interest in aerospace. These teachers and advisers will be told that they may request additional copies as necessary.

Though the project will be difficult to evaluate, I hope its ultimate effect will be an even higher level of interest in the Air Force Academy by outstanding high school boys. Thank you very much for assisting us.

LT. GEN. THOMAS S. MOORMAN
Superintendent
USAF Academy, Colo.

Eye-openers

Gentlemen: Your magazine is superb. Every article is informative and the pictures are extraordinary. The advertisements, too, are interesting. Some articles in your splendid September issue should be reprinted, verbatim or excerpts, in the daily newspaper publications. I am referring to the editorial "Technology—Servant or Whipping Boy?," by John F. Loosbrook, and the excellent articles "USAF's Score in Limited War: Impressive," by Gen. John P. McConnell, and "Do They Want Us There?" [in Vietnam], by J. S. Butz, Jr.

These, as well as other articles in the magazine, were real eye-openers to me. . . . The articles are important to every citizen because they offer the only sensible reasons for our presence in Vietnam. They are important, too, because they demonstrate the significance of producing the best military technology for America's security. . . .

DONALD A. SIKORSKI
Westmont, Ill.

And Another Coming Up

Gentlemen: It is seldom that I get the chance to point out a misstep in AIR FORCE/SPACE DIGEST, but the issue for November erroneously states on page 24 ["*Aerospace World*"] that the Lockheed F-104 is used in thirteen countries.

You may want to remind your writers that it is actually used in fourteen countries: Belgium, Canada, Denmark, Greece, Italy, Japan, Nationalist China, Norway, Pakistan, Spain, The Netherlands, Turkey, United States, and West Germany.

BENJAMIN H. COOK
Director of Public Relations
Lockheed-California Co.
Burbank, Calif.

● *No excuse, Mr. Cook. We missed one. And with Jordan soon to acquire Starfighters, the number goes to fifteen.*—THE EDITORS

UNIT REUNION

Yanks of the "Eagle Squadrons"

Members of the "Eagle Squadrons" of early World War II Battle of Britain fame are seeking "lost" comrades for a two-day 27th reunion on March 17-19, 1967, at Hamilton AFB, Calif., and San Francisco. For details former "Eagles" are urged to contact

Maj. Gen. Carroll W. McColpin
Commander
Fourth Air Force (ADC)
Hamilton AFB, Calif.

News,
Views
& Comments

AEROSPACE WORLD

By Allan R. Scholin

ASSOCIATE EDITOR, AIR FORCE/SPACE DIGEST

WASHINGTON, D. C., DEC. 15 First pictures showing the entire disc of the earth are being taken by NASA's first Applications Technology Satellite (ATS-1), launched from Cape Kennedy, Fla., December 6. One of its photos is shown below.

Among the most versatile satellites ever developed, ATS-1 is, at this writing, being guided into a stationary orbit 22,300 miles above the equator near Christmas Island in the mid-Pacific. In addition to taking the first high-quality cloud-cover pictures over the entire circumference of the earth, it is capable of relaying television, both color and black and white, and voice communications between stations in North America, Asia, and Australia. Pairs of stations are able to communicate simultaneously.

Among other experiments being performed with ATS-1 are voice communications between a ground station and an airplane in flight; transmitting weather maps from the Environmental Science Services Administration (ESSA) facility at Suitland, Md., to stations in the US, Japan, and Australia; an electronically de-spun antenna which rotates in the opposite direction to the spacecraft spin to produce signals ten times stronger than would otherwise be possible; and a package of seven scientific experiments to measure effects of its environment on the spacecraft.

The Space Systems Division of Hughes Aircraft Company designed and built the ATS-1, first of five to be launched over a period of two and a half years. It was boosted into orbit by an Atlas-Agena rocket.

This photo of almost the entire disc of the earth was taken on December 9 from an altitude of 23,000 miles over the Pacific by the spin scan cloud camera aboard NASA's Applications Technology Satellite (ATS-1). The relatively cloud-free area in the upper center exposes Central America and southern portions of North America. This type of picture can be made once every twenty minutes.

☆

The announcement by the USSR early in December that it is sending another hundred late-model MIG interceptors to North Vietnam points up a growing gap in US Air Force air-to-air intercept capability.

In engagements so far, the US has racked up a 5-to-1 kill ratio against North Vietnamese MIGs. Most US victories have been scored by USAF and Navy F-4 Phantom IIs. F-105s have destroyed three. Neither of these planes is as maneuverable as the MIG-21, particularly at altitude. They have achieved their victories through superior flying skill of US pilots and more effective use of missiles.

If a higher percentage of these fighters must be assigned to MIG-Cap roles, the US will have to cut down on its fighter-bomber missions over North Vietnam. Moreover, the slow but inevitable attrition rate of the F-105 is hastening the day when USAF may have to withdraw the Thunderchief from combat. That day will be reached when the number of F-105s in the US is insufficient to train pilots to replace those completing tours in Southeast Asia. At that point, the F-4 will carry almost the entire USAF load in bombing North Vietnamese targets.

These facts are lending urgency to

USAF flight tests of the Lockheed CL-901 air-superiority fighter, an advanced version of the F-104 Starfighter, employing the General Electric J79-J1Q engine with 17,900 pounds of thrust, vs. the 15,800-pound thrust of the J79-11 in the F-104. The F-104 is the only plane in the US inventory today which is deemed capable of meeting the MIG-21 on its own terms at any altitude. But USAF has less than 100.

The CL-901, now being evaluated by the Tactical Air Command, is comparable to the F-104S being built for the Italian Air Force. USAF has asked Lockheed to quote prices in production blocks up to a thousand. So far this is little more than a paper exercise, one of dozens the Air Force carries out each year in evaluating various alternative procurement possibilities. But if cost studies show that a mix of F-4s and an interim air-superiority fighter is preferable to an all-Phantom fighter force, the CL-901 is a prime prospect.

Lockheed is working also on two other advanced Starfighter designs, both employing the J79-J1Q. The CL-981 is a later version of the CL-901, with twenty-seven-percent greater wing area and improved avionics. The CL-1010 is similar to the CL-901/F-104S but will carry Sidewinders as well as Sparrow missiles and an improved solid-state fire control system. It is being offered to the Japanese Air Self Defense Force to meet its FX requirement for the 1970s.

☆

When the Air Force announced plans to buy the North American OV-10A light armed reconnaissance aircraft (LARA), it indicated they would be used to replace the Cessna O-1 Bird Dog in forward air controller duties in Vietnam. This magazine's Technical Editor, J. S. Butz, Jr., reported some months ago that FACs were eagerly looking forward to getting the OV-10A because its two engines would make it less vulnerable to ground fire and it would carry armament enabling the FAC to help ground troops fight off a Viet Cong ambush in the critical minutes before fighter-bombers can reach the scene.

But FACs won't get the OV-10A. Instead, the Air Force is buying the Cessna 337 Super Skymaster, selected over six other off-the-shelf lightplanes after field tests at Eglin AFB, Fla. It employs two 210-horsepower Continental IO-360 engines, one mounted conventionally in the nose, the other in the upper rear of the fuselage, driving a pusher propeller between twin tail booms. Other improvements over the O-1 are its 200-mph top speed, a rate of climb of 1,300 feet per minute, and endurance of more than five hours per flight. With a maximum gross takeoff weight of 4,200 pounds, about fifty percent more than the O-1, it can readily be fitted with wing pylons to carry a light weapons payload.

The OV-10A is now expected to perform specific combat support missions, supplementing USAF's bigger fighter planes.

The Lockheed CL-901 Super Starfighter, shown taking off on its first flight at Palmdale, Calif., late in November, is being evaluated by the Air Force as an interim air-superiority fighter. USSR's announcement that it is furnishing 100 more MIG interceptors to North Vietnam to oppose US raids may force the US to assign more planes to defend fighter-bombers against air attack.

Selected by USAF to replace the O-1 Bird Dog for Forward Air Controllers in Vietnam is the Cessna 337 Super Skymaster. It is powered by two 210-horsepower Continental IO-360 engines, cruises at 190 mph, climbs 1,300 feet per minute, and can stay aloft five hours. With maximum gross takeoff weight of 4,200 pounds, it can carry pilot, observer, and a modest weapons payload.

☆

Fairchild Hiller's Republic Division has been selected by the US Air Force to work with a West German firm on the prototype definition phase of the joint US-Federal Republic of Germany V/STOL fighter project.

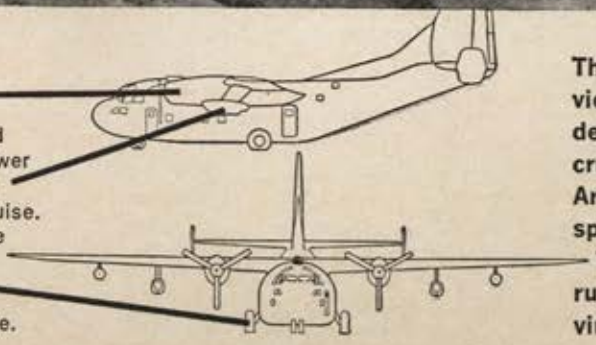
Republic design specialists are working with representatives of Entwicklungsring Sud, a consortium of Boelkow, Heinkel, and Messerschmitt companies, selected by the FRG defense ministry to handle its share of the project.

First step is for the two manufacturers to draw up a joint management plan, describing how they expect to work together. This is to be submitted to the two governments by April. At that time the US and FRG will decide whether to proceed with the contract definition phase, in which Republic and EWR would put together engineering studies showing how the plane would be built and how closely

(Continued on page 14)

Best Buy in STOL Assault Transports

COMING...



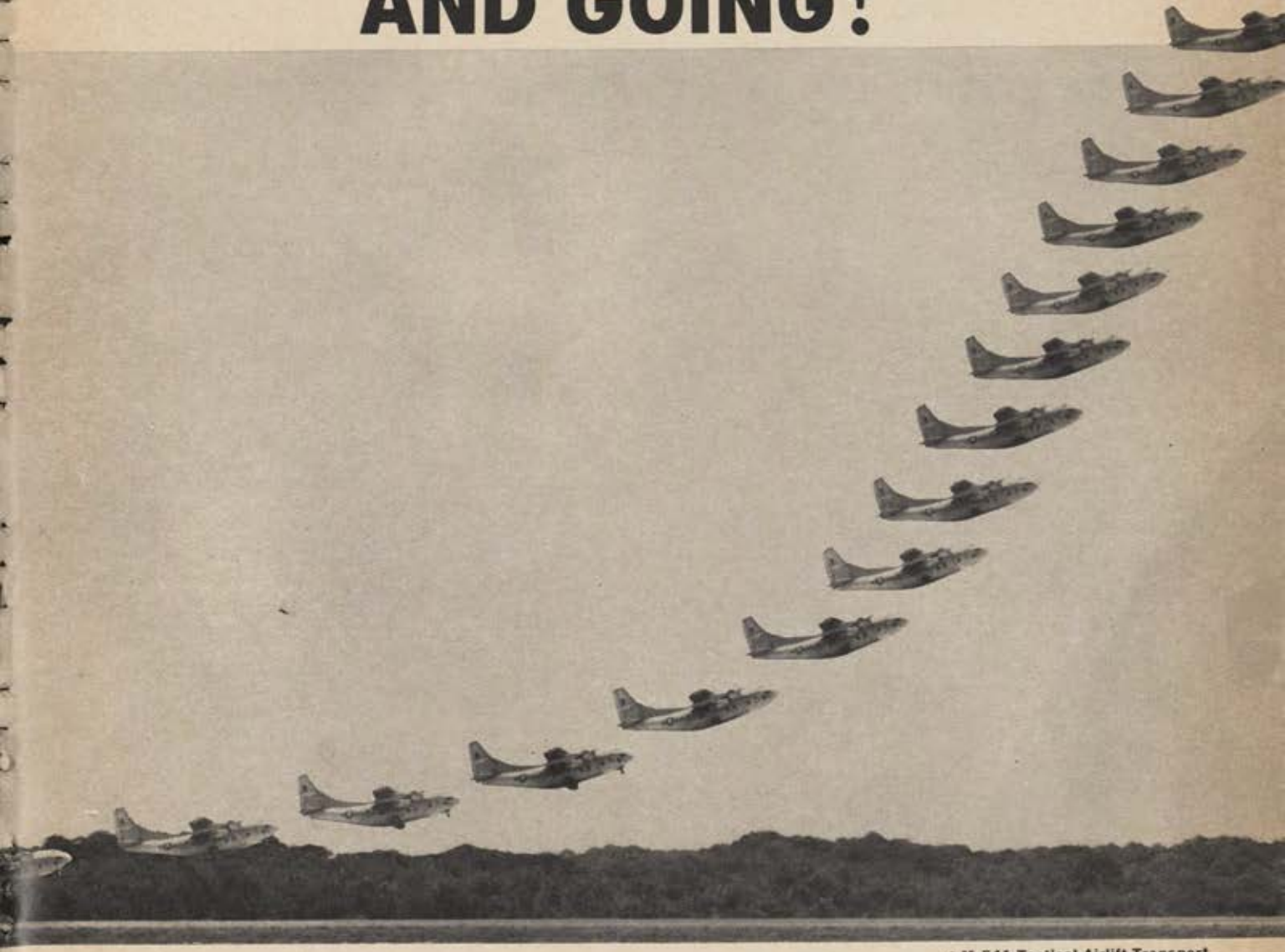
- New T64 turboprop engines for greater power, faster cruise.
- Two J85 jet pods add reliable four-engine power for STOL lift-off, steep climb-out, and dash cruise.
- New wide-tread, large wheel landing gear provides greater stability, unmatched rough-field performance.

This latest model of the combat proved C-123 provides uncomplicated STOL performance for retail delivery of 10 ton loads into and out of typical short, crude strips. It can haul every critical item in the Army TO&E. Surprised? You shouldn't be. It was specifically designed to do just that.

The C-123L is neither mouse nor elephant—just a rugged work horse created to operate in hostile environments with minimum and simple maintenance.

C-123L*

AND GOING!



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AIRCRAFT DIVISION

Drawing shows hovering flight of Lockheed XV-4B, to be used in acquiring V/STOL data in preparation for evaluating US/FRG fighter.

it will match desired performance requirements. This would take another six months, ending sometime this fall.

If both governments then agree to go ahead, they will award contracts totaling $500 million or more to build twelve prototypes for joint testing. The first of these would be ready to fly about 1970, with testing and evaluation expected to last a year or more. After that, if either or both governments decide they want the plane, it would go into quantity production, with first deliveries to operational units by 1973 or 1974.

West Germany is cooperating in all development phases except for powerplants, which will include both vertical lift and lift-cruise engines. Great Britain has a share in the former, with Rolls-Royce cooperating with the Allison division of General Motors on its development. Three US firms are competing on lift-cruise engines—Curtiss-Wright, Pratt & Whitney, and General Electric—with the winner to be selected before the US-FRG decision on prototype production.

General dimensions of the V/STOL fighter will apparently be slightly below those of the McDonnell F-4. Gross takeoff weight will be about 45,000 pounds, with a six-ton weapons payload. Its range in VTOL mode will be about 450 miles, far below that of the Phantom II, though it could be augmented by refueling.

But the plane's design is expected to offer a variety of alternatives. For long-range deployment, or in STOL operations from conventional airstrips, its vertical-lift engines will be easily removable, replaced by fuel cells to extend range or augment the weapons payload.

With wings swept, it is to fly at Mach 2 or better. Extended, its wings will permit long loiter over the combat zone. Its advanced avionics will enable it to fly and find targets in any weather, day or night.

Neither the US nor West Germany foresees any major technical problems in designing and producing the V/STOL fighter, but neither admits to any real need for the plane right now, either.

In a statement accompanying its official release, the Pentagon said

NEW BOOKS IN BRIEF

Basic Tactics, by Mao Tse-tung, translated by Stuart R. Schram, is the first English translation of Mao's lectures for future Chinese guerrilla leaders in 1938, wherein he outlines all the basic guerrilla strategems—from surprise attack, enemy harassment, ambush, and instilling a resolute spirit in the troops, to the importance of entertainment in building troop morale. Frederick A. Praeger, N. Y. 149 pages. $4.95.

Brassey's Annual, the Armed Forces Year-Book, 1966 edition, is an up-to-date potpourri of the status of aircraft and missile research, disarmament, manned space systems, discussions of acclimation to life at sea, as well as the state of the services, problems of modern command, and panic in war. Frederick A. Praeger, N. Y. 400 pages. $16.50.

The China Danger, by Richard L. Walker. In its objective "to plan and give effect to programs of education on Communist tactics, strategy, and objectives . . ." the Standing Committee on Education Against Communism has sponsored this book to help better understand the danger of an evolving Communist China. American Bar Assn., 1155 East 60th St., Chicago, Ill. 60637. 138 pages. $1.

Jump to the Land of God, by Lt. Col. William B. Sinclair, USAF. Caught in a violent Himalayan storm, communications and fuel gone, a cargo plane strayed into Tibet on November 30, 1943, and flew over the Holy City of Lhasa, where its crew was forced to jump into an incredible land. Caxton Printers, Caldwell, Idaho. 313 pages. $6.95.

Museums Directory of the United States and Canada is a helpful guide to the scholar and traveler wherein all museums such as Kill Devil Hills and the National Air Museum are listed with an account of their collections, hours, addresses, telephone numbers, etc. Publication Sales, American Association of Museums, 2306 Massachusetts Ave., N.W., Washington, D. C. 20008. 1,039 pages. $8.

On the Uses of Military Power in the Nuclear Age, by Klaus Knorr. A professor of economics and director of International Studies at Princeton University explores recent changes in the nature, function, and value of military power in international relations. Princeton University Press, Princeton, N. J. 185 pages. $5.

Peace or Peaceful Coexistence?, by Richard V. Allen, attempts to shed light on the difference between peace and the intentionally deceptive slogan of "peaceful coexistence" which Communist rulers have chosen in seeking to disarm the free world. American Bar Association, 1155 East 60th St., Chicago, Ill. 60637. 233 pages. $1.

The Plane that Changed the World, by Douglas J. Ingells, is not only a biography of the DC-3 but also an illustrated description of all aircraft designed and produced by Douglas Aircraft Company. Aero Publishers, 329 Aviation Rd., Fallbrook, Calif. 92028. 256 pages. $9.95.

The Search for Amelia Earhart, by Fred Goerner. The author sheds some light on the mystery which for years has surrounded the fate of the famous aviatrix and her navigator, Fred Noonan, who vanished on the last leg of their globe-circling flight in 1937. Doubleday & Co., N. Y. 326 pages. $5.95.

Why Vietnam?, by Frank N. Trager, describes the Indochinese peninsula both before and after the arrival of the French, outlining events that led to eventual Communist control of North Vietnam, to Dien Bien Phu, and to the 1954 Geneva Accords. Frederick A. Praeger, N. Y. 238 pages. $4.95.

—JAQUELINE A. DAVIS

CONTINUED

flatly it has no operational requirement "at this time," but added that "studies are being conducted on tactical doctrine and tactics for tactical aircraft in the 1970-80 time period *(see below)*. As soon as these studies are completed, the military requirement problem will be undertaken. This decision will be made prior to proceeding with the production of prototype aircraft."

How about the Luftwaffe? "They have a real interest in the potential of such an aircraft," the Pentagon statement declared, "and most likely will study and evaluate the aircraft in much the same way that the US plans to do."

Some observers in Britain claim that the US sought joint development only to reap the benefits of extensive German research into V/STOL fighters. The British view may be clouded by the fact that it is trying to prod France into continuing with their own joint advanced fighter program.

Only a few weeks ago, Lt. Gen. Johannes Steinhoff, Luftwaffe commander, told a group of German aviation writers that he was skeptical on the concept of a VTOL fighter. It is possible that his remarks were not adequately translated, that he might have been referring to near-term strictly VTOL projects, as distinguished from V/STOL, for those close to the US-FRG program insist he is actively backing the effort.

One indication in support of that view is that he has rejected any suggestions that the Luftwaffe is considering an early replacement for its accident-plagued F-104G Super Starfighters. The McDonnell F-4 with British Spey engines had been proposed. Instead, it now appears likely that West Germany will stick with the F-104Gs, rather than subject its pilots and ground crews to another reconversion, with the Starfighter force remaining operational until the time period when the V/STOL fighter could become available.

☆

The Defense Department is driving hard to acquire more V/STOL data as a basis for evaluating prototypes of the US-FRG fighter.

USAF has awarded a $5.67 million contract to North American for "advanced development of a total integrated flight control technology, including equipment, and the conducting of flight tests necessary to verify the technology." North American is supposed to complete its work by March 1970, just before the first US-

(Continued on following page)

ADC's 30th Air Division, represented by its Commander, Col. Joseph H. Belser, right, receives Gen. Frederic H. Smith, Jr., Trophy at Sioux City AB, Iowa, Nov. 18. Lt. Gen. H. B. Thatcher, ADC Commander, makes presentation, flanked by Maj. Gen. Thomas McGehee, left, 10th AF Commander, and Gen. F. H. Smith, Jr., USAF (Ret.), former USAF Vice Chief of Staff, for whom trophy is named. It goes annually to division with top ground control units.

Five USAF astronauts assigned to NASA's Manned Spaceflight Center at Houston, Tex.—all veterans of Gemini orbital missions—receive wings denoting upgraded Air Force pilot ratings from Gen. J. P. McConnell, USAF Chief of Staff. From left, the Chief awards Command Pilot wings for fifteen years' flight duty to Col. Frank Borman and Lt. Col. Virgil I. Grissom, and Senior Pilot wings to Lt. Cols. David R. Scott, Michael Collins, and Edwin Aldrin.

FRG models could be expected to be ready for test.

As part of its project, North American is scheduling more than 300 flights in an XV-4B Hummingbird, which Lockheed Aircraft Company is modifying under a separate $975,000 USAF contract.

The XV-4B will be powered by six General Electric J85 turbojets, with total thrust of 18,000 pounds, compared to the 6,600-pound-thrust generated by two Pratt & Whitney JT12A-3 jets in the XV-4A developed by Lockheed for the Army. Gross takeoff weight will be increased to 12,580 pounds, compared to 7,200 pounds in the XV-4A.

Meanwhile, the Air Force and NASA are embarking on a new series of flight tests at Edwards AFB, Calif., employing six British P.1127 Kestrels *(see also page 61)*, not with a view toward ordering more Kestrels but to acquire additional V/STOL operational data. Northrop has been engaged to maintain and refurbish the Kestrels under separate contracts to USAF and NASA.

☆

A new consortium to build the Northrop F-5 Freedom Fighter in Europe is indicated by the decision of The Netherlands to replace its Republic F-84 Thunderstreaks with the F-5. Belgium, which had joined with the Dutch in a year-long evaluation to select a new fighter, is expected to follow suit after Parliamentary approval in February.

Total requirement for the two Low Countries is estimated at about 225 aircraft, almost evenly split between them. In announcing its plans to purchase the F-5, The Netherlands made it clear that the plane will be "coproduced" in Europe, which could mean assembly entirely from parts supplied by Northrop or, more probably, production of some components in Europe. Spain is already under way on a coproduction deal with Northrop.

Another potential customer for the Dutch-Belgian combine is Austria, which still hasn't made up its mind on a replacement for its two squadrons of SAAB J.29 fighter-bombers, now more than ten years old. Sweden has offered Austria the J.35 Draken, soon to be replaced in the Swedish Air Force by the J.37 Viggen. But the Austrians are also considering the French Mirage III and the Soviet MIG-21.

The European-built F-5 will be similar to the Canadian CF-5, powered by two General Electric J85-15 engines with 4,300-pound thrust each, compared to the 4,050-pound-thrust J85-13 in USAF F-5As. It will also be equipped with a two-position nose gear to reduce takeoff roll by increasing the wing angle.—End

INDEX TO ADVERTISERS

What's new in monitoring personnel for radiation exposure?

The latest advance in dosimetry (monitoring of personnel-exposure to nuclear radiation) is the Amperex TLD system, based on the Schulman* Thermoluminescent Dosimeter. The TLD system permits rapid and accurate dose measurement over the entire range of interest. It is simple in operation, low in cost and reliable and accurate.

Worn like a fountain pen, the Amperex TLD records ionizing radiation doses from 10^{-5} to 10^{4} Roentgens (and equivalent thermal-neutron energies). Irradiation of the TLD sensitive element affects its crystal lattice. When subsequently heated in the Dosimeter Reader, the affected crystals emit an amount of light proportional to the irradiating dose. The Reader automatically measures the emitted light and indicates the dose in appropriate units.

Separate doses exceeding 10^{3} Roentgens can be accumulated in the TLD before each readout and the process of irradiation and readout may be repeated indefinitely, with no loss of accuracy. The life of the TLD sensitive element is essentially unlimited.

The TLD is accurate at any temperature from −45°C to 170°C and it is designed for rugged field use by military personnel. Neither reduced ambient pressure of 0.1 atmosphere, nor extended storage, severe shock, immersion in water or exposure to salt spray have any effect on its performance or life.

Readers for Amperex dosimeters are available for both field use and laboratory, and are easily operated by non-technical personnel. Readout is virtually instantaneous—the entire process takes less than 30 seconds per dosimeter—and is practical for monitoring large numbers of personnel as often as desired.

For complete information on the Amperex line of Dosimeters and Dosimeter-Readers for field or laboratory, write: Amperex Electronic Corp., Nuclear Products Department, Hicksville, Long Island, N. Y. 11802.

In Europe: M.B.L.E.
80 Rue Des Deux- Gares Brussels 7, Belgium

**Dr. James H. Schulman, patent No. 3,115,578*
Reference: Review of Scientific Instruments, Vol. 31, Dec. 1960. Pages 1263-1269.

Amperex

TOMORROW'S THINKING IN TODAY'S PRODUCTS

AIRPOWER in the news

By Claude Witze

SENIOR EDITOR, AIR FORCE/SPACE DIGEST

Do It the Hard Way

WASHINGTON, D. C., DECEMBER 12

By this date in January, Congress will be in session and waiting for the *real* start of the New Year. That is the day President Johnson delivers the budget for Fiscal 1968.

Let there be no doubt about it, the war in Vietnam will be mentioned in most headlines concerned with the nation's financial outlook. An educated guess is that the Defense Department request will be for at least $73 billion. A year ago the figure was $59.9 billion.

For all practical purposes, the difference represents the cost of the Vietnamese War, and $13.1 billion is a modest estimate. Senator John Stennis, chairman of the Preparedness Investigating Subcommittee of the Committee on Armed Services, says the war now costs $2 billion a month or more. He said Vietnam is the most pressing issue on the American scene today, and added:

"Until we achieve a military victory, or otherwise end the war by an honorable settlement, economic conditions in the United States will be very uncertain; prices will rise and inflation will continue; the national budget will continue to be unbalanced; and political issues will remain confused."

There has been a great deal of recognition this month of the fact that last year's defense budget of $59.9 billion was not intellectually honest. President Johnson now admits it should have been closer to $68 billion, and he will ask Congress for supplemental funds to correct the error.

Senator John Stennis, challenging the management of the war, says that Vietnam is now costing us $2 billion a month.

Defense Secretary Robert S. McNamara denies there was an error in arithmetic. He says the Pentagon needs more money because it made a mistake in its estimate of when the war would be over. He had foreseen victory by June 30, 1967, the eve of Fiscal 1968. How that date was chosen he has not made clear, but he will get a chance to explain it when he faces the House and Senate committees between now and early spring. The Secretary has said the date was an "arbitrary assumption."

For Fiscal 1968, President Johnson has made clear, the assumption will be that the war will continue.

"We will review every request on the basis of a full year's operation," he said, "and ask for all the funds that the Chiefs, the Secretary, and the President agree will be needed without a supplement."

From the early talk on the budget and the persistent way that the war continues to dominate the news since election day, it is apparent that the entire management of the struggle will get close scrutiny. Senator Stennis has sent a team to Southeast Asia, and a couple of weeks ago he gave a preliminary report on their findings.

His comments are focused on what he has found of faulty management. "The time for half measures in this war has long since passed," he said, and added:

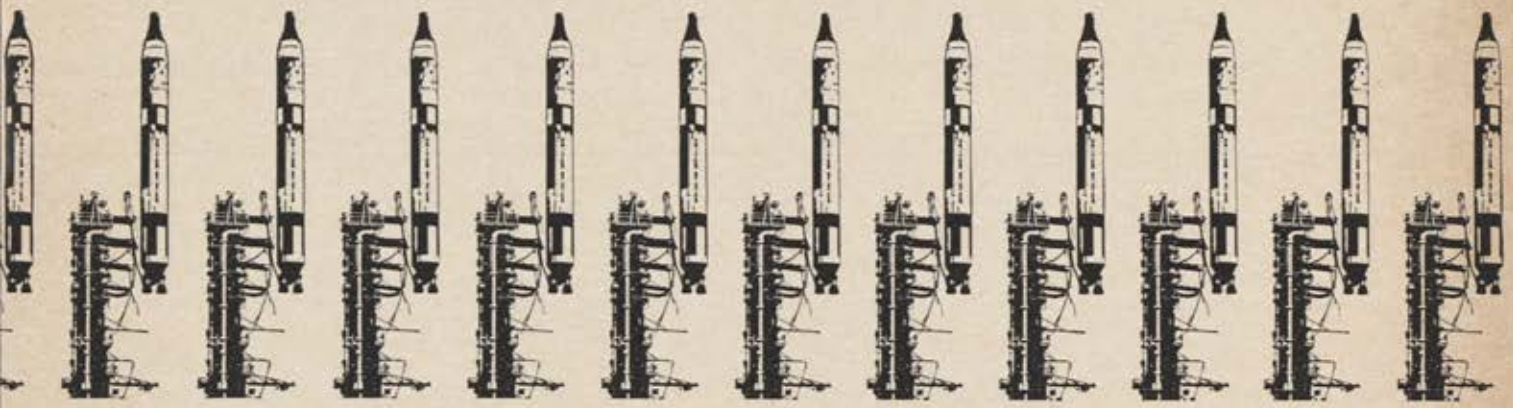
"Our highest government officials should now review the situation thoroughly and decide once and for all what our national policy objectives in South Vietnam are and the time frame within which they should be accomplished. Then the American people should be fully advised of

(Continued on page 20)

An Army Travels on Its Stomach

Reprinted by permission from Newsday, Inc.

NASA's Project Gemini has come to its end, and our pride as a participant is boundless. Martin's job was providing the U.S. Air Force Titan launch system, the vehicle that lifted American hopes as it rocketed the Gemini astronauts aloft from Cape Kennedy in stirring procession . . . Gus Grissom, John Young, Jim McDivitt, Ed White, Gordon Cooper, Pete Conrad, Frank Borman, Jim Lovell, Wally Schirra, Tom Stafford, Neil Armstrong, Dave Scott, Gene Cernan, Mike Collins, Dick Gordon, Buzz Aldrin . . . transporting them with tender loving care, flawlessly and precisely to their target points in space.



The same care and skill, the same capabilities for integrating the work of hundreds of companies into a super-dependable system such as the Titan are dedicated now to future space projects. A new kind of orbital spacecraft that flies like an airplane. Interplanetary vehicles. Lightweight power sources for prolonged voyages. Space propulsion systems. And some others.

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these decisions and their decisions supported no matter how costly or difficult they may be."

Like every other report out of Vietnam, the one from Mr. Stennis, far from assuming the war will end in 1967, predicts "it may take many years" of bloody fighting. And, also like other reports, the Senate investigation finds the American military forces are "magnificent" and "the finest fighting men the world has ever seen."

The faults are never with the man in uniform. It is on the administrative, policy-making, and management side of the effort that weaknesses are disclosed.

Mr. Stennis was specific:

"The sending of additional troops on a piecemeal incremental basis and funding the war on an after-the-fact basis is not the solution. It will certainly be less costly both in terms of human life and ultimate cost if we take the necessary steps and send in enough troops now in order to bring the enemy to terms rather than let the war drag along for several years."

This probably is the first suggestion from Capitol Hill that Congress itself is interested in the cost/effectiveness of what we are doing. And that it may have some suggestions on how our cost/effectiveness can be improved. To make this clear, Mr. Stennis continued:

"In spite of our gains, in spite of our increased forces, in spite of the improvements in our logistical situation, we are still confronted with essentially the same problems which existed twelve months ago, and are not significantly closer to bringing the war to a conclusion. Time is running out. We must take the necessary action now. We must step up the military action which is necessary to win the war or be prepared to accept a bloody war of attrition which may last ten or twenty years. This we must avoid at all costs.

"In addition to stepping up our ground forces and ground action, we should redouble our efforts to stem or reduce the flow of men and supplies from North to South Vietnam. As part of this we should widen our bombing of North Vietnam and strike all militarily significant targets."

In this, the Senator was in agreement with experienced veterans from the front, who are making an outspoken effort to lift some of the restraints. Letters on the subject have appeared in the press and, more frequently, arrive in the mail on Capitol Hill *(see also page 23)*.

Mr. Stennis echoed one frequent plea:

"We should take steps to close the port of Haiphong and other ports in North Vietnam through which a very significant portion of their war-making potential comes in-country.

"The method of doing this should be left to the judgment of our military authorities. If we do this it will cripple the Hanoi government war effort and thus reduce American casualties.

"By doing these things and by laying down and announcing a firm policy program and objective for victory, we may convince Hanoi that we plan to see it through and that we will be neither driven out [nor] worn down. Convincing the Communists that we are determined to win is one of the first and most fundamental steps on the road to victory."

The Senator then directed his spotlight on the decision-makers, giving them credit for good faith, but declaring "the course now being followed will not produce victory." And he had another reference to the cost/effectiveness of our effort:

"To me, our present course of action is the most costly in terms of lives and money of any that we could follow."

In the midst of widening criticism, the mail from veterans, and the growing awareness of Congress that the management of this war results in waste of men and money, Secretary McNamara has been unusually silent. The only major rebuttal as the Christmas season came near was from Dr. Harold Brown, Secretary of the Air Force.

USAF Secretary Harold Brown says airpower has proved our best weapon in Vietnam but must be used responsibly.

Dr. Brown, in effect, rebuffed the concept of Senator Stennis and men in uniform who speak of winning the war. Taking his words from President Johnson, he emphasized that our purposes in Vietnam are limited. We do not want to conquer North Vietnam, or invade or destroy it. Hence the restraints, and the use of what the Secretary calls "responsible" military power.

In South Vietnam USAF operations were described by the Secretary as being in support of ground forces, attacks on enemy units not engaged and supply routes, reconnaissance, airlift, and heavy bombing. In North Vietnam, the USAF mission is to impede support for the Viet Cong in the South and convince Hanoi it cannot win, a feat that is not easy while Hanoi knows it will not be conquered, invaded, or destroyed.

Secretary Brown gave an accounting of the fully adequate performance of the Air Force, listed against the policy restraints set down by the Administration. He went back to the end of 1964, a few months after the Gulf of Tonkin incident, when the Viet Cong prepared for large-scale operations to take over South Vietnam. The offensive did not succeed, largely because of "the best air-ground teamwork in the history of modern warfare."

The Secretary mobilized figures showing that by the end of 1965 the Air Force, Navy, Marines, and Vietnamese Air Force were flying more than 13,000 tactical strike sorties a month in South Vietnam. Enemy casualties were about 35,000 for the year. Only 17,000 were recorded in 1964. The escalation of the air war is disclosed in the data for the six months from June through November of 1966. In that period there were more than 63,000 strike sorties, with USAF accounting for more than sixty percent of the total.

Most impressive is the cost/effectiveness of airpower in

this situation. It has enabled us, the Secretary said, to "consistently defeat enemy units with considerably less than half the number of men required by the often-quoted 10-to-1 ratio thought necessary by some to deal with guerrilla forces and relatively small regular units in jungle warfare."

Bombing attacks in South Vietnam by Guam-based B-52 bombers were started in June 1965. Prisoners say they fear this more than any other type of American action. Dr. Brown said the B-52 raids have kept the enemy constantly off balance, prevented concentration of his forces, destroyed his supply bases, and denied sanctuary in the jungle. In 1965 they flew about 1,000 sorties. The figure jumped to nearly 5,000 for the first eleven months of 1966.

In North Vietnam, the effort to curb infiltration to the South is growing more effective, Dr. Brown said, as improvements are made in intelligence, tactics, techniques, and equipment. Infiltration of troops (Senator Stennis gives the figure at 7,000 a month) is not the full measure of our effectiveness, according to the Secretary. He said the true value of the interdiction campaign is in what it does to the supply routes. Food, ammunition, and equipment shortages seem to be causing a decline in large-scale enemy attacks.

The Air Force and Navy have escalated the number of air missions to North Vietnam from 553 in February 1966, to 3,621 in September. The Secretary said that in eighteen months the airmen destroyed or damaged more than 7,000 trucks, 3,000 railway cars, 5,000 bridges, and 5,000 barges and boats. Damage to roads and bridges also helped to bring about "serious degradation of the North Vietnamese logistic net." Dr. Brown estimated that after North Vietnamese troops arrive in the battle area they do not receive more than fifty percent of their required supplies. Also, that "somewhere between 200,000 and 300,000 people are needed to repair damage to roads, bridges, and railroads."

The Secretary said we have destroyed two-thirds of the enemy's original oil storage capacity, the bulk of his ammunition storage and explosive manufacturing facilities, and nearly all bridges outside the Hanoi and Haiphong areas.

He did not discuss the targeting system itself, but acknowledged there are others that have not been hit. The reason:

"In some cases they support a civilian economy which we do not want to destroy because of the suffering it would cause the civilian population. In other cases, these potential targets are close to urban residential areas. In still other cases, they do not significantly affect the enemy's ability to continue fighting—at least in the short term.

"All of these targets are hostages to US airpower which operates over North Vietnam every day. Such operations are a constant reminder to the leaders of North Vietnam of an airpower potential that is being used responsibly and with restraint."

Without being critical, Dr. Brown made the observation that a large number of nonmilitary people "are willing to give advice—or at least opinions—on military affairs." He has noticed that the same people who would not tell a lawyer or doctor or economist what should be done will not hesitate to provide advice for a military man.

Priorities for Peace

On December 6, the day before the twenty-fifth anniversary of Pearl Harbor, a group of about 400 men held an all-day session at the Plaza Hotel in New York. The meeting was called "The First Interprofessional Forum on Priorities for Peace" and was organized by the National Strategy Information Center, Inc.

"WHILE THEY PRAISE THE LORD, WE'LL PASS THE AMMUNITION."

Reprinted by permission from Bill Mauldin, Chicago Sun-Times

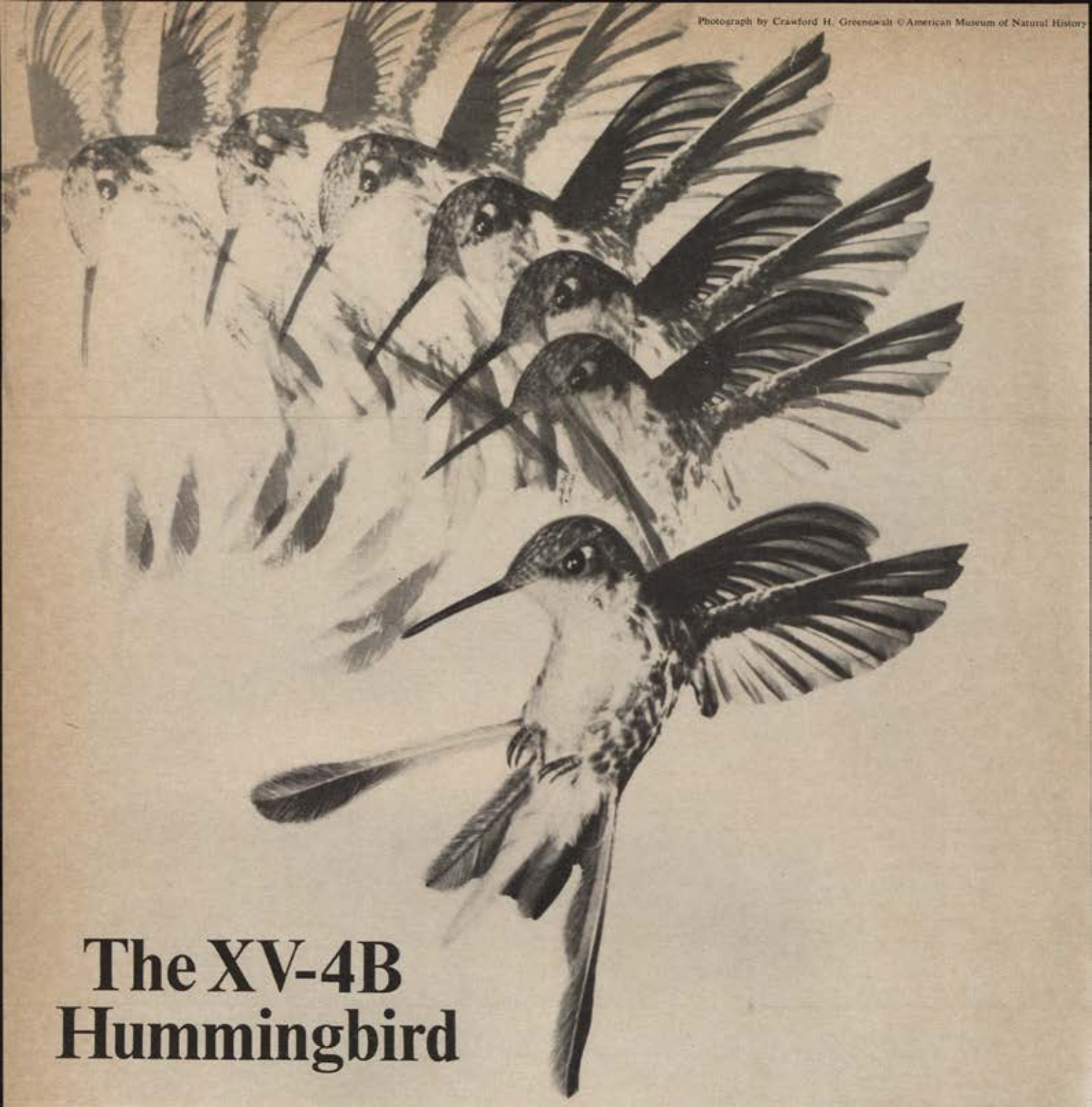
There was a short look back, at Pearl Harbor, and a long look ahead. In the look ahead, the NATO problem persisted. It was discussed by Dr. Henry Kissinger of Harvard University and Gen. Alfred M. Gruenther, a former SHAPE Commander, and neither one of them predicted a lasting solution to the current upset. If they agreed on anything specifically, it was that Americans are too hasty to put all the blame and onus on President de Gaulle.

There was an examination of the Red Chinese military threat by Dr. Ralph L. Powell, who sees in that country a grim determination to compete with the biggest of the world powers. He can cite statistics to prove it.

Then USAF's Col. Raymond S. Sleeper and Dr. John J. Ford lectured on Soviet cybernetics. They agree that the Russian ambition to control the world can be furthered by this science. They found people in the audience who did not agree with them.

The keynote was set by Adm. Arleigh A. Burke, who did talk about Pearl Harbor and the element of surprise. He said the Japanese achieved strategic and tactical surprise when they clobbered our Navy that Sunday morning. Then he looked ahead and warned of another kind of surprise: technological.

The Admiral said we must not put our trust in the leaders of a nation that is already suspect. He warned that in today's technological world surprise is not only possible, it is easier to achieve. And it is deadlier. The next time, Admiral Burke believes, surprise will kill us if we don't know how to deal with the situation. Remember Pearl Harbor.—END



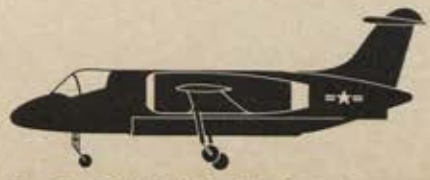
The XV-4B Hummingbird

America's first direct lift, diverted thrust V/STOL jet.

The XV-4B Hummingbird will be America's first diverted thrust V/STOL jet with separate direct lift engines. Its primary mission: to determine acceptable levels of flight control and design parameters for VTOL aircraft yet to come.

The XV-4B is uniquely suited for its task. Four vertically-mounted J-85 turbo-jet direct lift engines and two horizontally-mounted J-85 lift/cruise engines provide outstanding VTOL performance. Equipped with a variable stability flight control system, the new Hummingbird will be used as a flight research vehicle in the Air Force VTOL integrated flight control system program. This program will involve investigation of the interrelated effects of control systems and cockpit displays, as well as sensor and aerodynamic characteristics relating to VTOL handling qualities.

Backed by a number of advanced Lockheed R&D projects directly related to VTOL flight, and the world's largest privately-owned V/STOL wind tunnel, the XV-4B Hummingbird will be just one measure of our continuing and ever-expanding commitment to the world of V/STOL design decisions of tomorrow.



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Who's in Charge Here?

AIR FORCE
JANUARY, 1967

As we know from the origin of the word *snafu*, war is a difficult, if not impossible, thing to manage. But management is necessary, and today the Defense Department is reputed to be in the hands of management experts. With all this talent, there are convincing signs and reports that the war in Vietnam, fought as competently as uniformed men can do it under imposed restraints, is poorly managed. Letters from dedicated pilots at the front and the testimony of veterans make this clear. It is time to consider . . .

The Case for a Unified Command: CINCSEA

By Claude Witze

SENIOR EDITOR, AIR FORCE/SPACE DIGEST

WASHINGTON, D. C., DECEMBER 15

IT IS almost impossible to insulate oneself from the debate and public discussion about the war in Vietnam, particularly in Washington, where the US participation is being managed.

You meet soldiers on the street wearing the green beret. There are pictures in the papers of the wounded at Walter Reed Hospital. There are almost daily bulletins from the Pentagon on how many more men we will have to mobilize and send across the Pacific. There is the constant stream of military and civilian personnel, back in the capital after a tour of duty and eager to talk about it. All of them have opinions.

Then there is Congress, with a justified vital interest and, for 1967, a changed political complexion. The White House is always in the war news, whether the dateline is 1600 Pennsylvania Ave., Manila, or Austin, Tex.

Generals just back from the front hold press conferences, carefully monitored by Defense Department public affairs officials. They make sure a general does not depart from the prepared text and that he does not voice any personal opinions at variance with what has been approved. The Secretary of Defense, in effect, is writing his own fitness reports on the conduct of the war. One four-star man who deviated last summer was forced to go through a humiliating recantation before the press. He had to say that his earlier remarks had been misinterpreted or misunderstood, when in fact they had not been.

It is impossible to escape the impression that the Administration, like the management of a large corporation facing a meeting of the stockholders, is under compulsion to make every decision look like the right one. In this case, the management says we are fighting a war efficiently, with a minimum of wasted manpower, materiel, and money. You get the feeling that the charts are all fed by computers, instead of by men under enemy fire, and that every bullet and every bean is being kept track of even after bombs have hit the supply depot.

But can *any* war be managed this way? Isn't it part of the very nature of war that the enemy confounds and impedes? Where did the word *snafu* come from in the first place? It means that any normal war situation is inherently unmanageable. There is growing evidence, furthermore, that some of our own policies help confound and impede the military effort.

The Army's Chief of Staff, Gen. Harold K. Johnson, was quoted not long ago as saying the Army is doing in Vietnam "what it has always done. That is, it is doing what needs to be done." The General is right. He was not permitted to go on and tell what kind of handicaps are placed in the path of the armed forces or suggest anything that might reduce the snafu factor.

This is not to say that no suggestions are being made. There are many of them; only a few manage to surface in the Washington waters. If you read and listen closely, it does not take long to jot down a list of ideas that sound pretty good. Obviously most of them originate with complaints about the way we are fighting the war.

In September an unidentified USAF pilot wrote a letter to the editor of *Aviation Week & Space Technology* in which he charged that the Vietnamese War "has become a political football, an exercise in glowing reports, outstanding new records, and promises of the 'turning tide.'"

The anonymous correspondent went on to recite his

(Continued on following page)

President Johnson has required that the White House clear all targets.

Secretary McNamara keeps tight rein on officers back from the war.

Above are the Joint Chiefs of Staff; left to right, Adm. David L. McDonald, USN; Gen. John P. McConnell, USAF; Gen. Earle G. Wheeler, USA, Chairman; Gen. Wallace M. Greene, USMC; and Gen. Harold K. Johnson, USA.

observations about the short supply of munitions, failings in the way they are used, and some of the tricks played to make the war's arithmetic look better than it really is. All this evoked a statement from the Pentagon, essentially denying the charges and implying that the USAF pilot was simply ill-informed or uninformed.

About a month later, the subject was brought up on the floor of the House by Rep. William E. Minshall, an Ohio Republican, who accused the Defense Department of obscuring the facts and discrediting fighting men who tried to make them public. He unveiled another letter, this one from a Navy pilot, reporting on his experiences in the South China Sea. The letter agreed with the USAF pilot and added the writer's own complaints about bomb shortages, small bomb loads carried to increase the sortie rate, poor target selection, and low morale.

These two letters are the ones that won wide circulation in Washington, but they are only a sample of what outspoken men in uniform have written. The Pentagon, the White House, and Capitol Hill offices are devoting increasing attention to this kind of mail. The inevitable congressional hearings will start before the winter is over, fed to some extent by dedicated men of all services who have taken pen in hand.

Administration spokesmen already admit that angry pilots, in particular, have become a major problem. And, they do not hesitate to add, these pilots are writing to congressmen, the press, their superior officers, and Defense Department officials about matters that are supposed to be none of their business. One report said that not even the Chiefs of Staff are consulted on many policy areas in which lieutenants, captains, and majors are sounding off. Their letters are described as "troublemaking." They are accused of not understanding that this is not a military war, but a war run by civilians to achieve, in effect, civilian objectives, and not military ones.

In this connection, it is interesting that both the USAF pilot and Congressman Minshall's Navy correspondent claim that they did not speak up for themselves alone. The Air Force man said, "The true professional soldier is dissatisfied with his job," and he included soldiers of all ranks. The Navy pilot complimented him and said he had expressed "the general attitude of nearly every military man with whom I was associated, right on up to the Flag War Room."

With discreet inquiry, it is possible to confirm that opinion. In the November issue of this magazine, J. S. Butz, Jr., our Technical Editor, focused on the rules of engagement for the air war in Vietnam. They are restrictive. And there are few men in the Army, Navy, Air Force, or Marines who agree with the way airpower is being used in Vietnam.

If authoritative military men are questioned further about the way the war is managed, an impressive number of them will do more than agree with the USAF and Navy pilots who are critical of what they see and do in daily operations. Privately, many general officers, particularly of the Air Force and Army, believe that this war, now the third largest in American history, should have a single commander for all forces.

There is no disagreement about who the unified commander should be. It is the Army's Gen. William Westmoreland, highly respected boss of the Military Assistance Command, Vietnam (MACV). General Westmoreland's immediate superior is Adm. U. S. Grant Sharp, Jr., Commander in Chief of American forces in the Pacific (CINCPAC). The Admiral has his headquarters in Honolulu.

The significance of this is easily understood if we try to imagine for a moment that when Gen. Dwight D. Eisenhower was the Supreme Commander in the Channel crossing that led finally to the Nazi defeat, he had had his headquarters in Omaha instead of London. Or that when Gen. Douglas MacArthur led the assault on Japan he had done so from Honolulu.

Even the Korean War, which was waged by the United Nations, had a unified commander.

It is true that General Westmoreland commands all US Army troops and Marine divisions in South Vietnam, as well as the soldiers sent there from South Korea, the Philippines, Australia, and New Zealand. He has control of the tactical air forces supporting these ground troops.

In addition to his MACV responsibility, General Westmoreland wears a second hat as Commanding General, US Army, Vietnam. In that job, he also is responsible to Admiral Sharp, but between the two men

Adm. U. S. Grant Sharp, Commander in Chief of US forces in the Pacific.

Adm. Roy L. Johnson is Commander in Chief of the US Pacific Fleet.

Gen. Dwight E. Beach is the Commander in Chief, US Army, Pacific.

Gen. Hunter Harris is Commander in Chief of the Pacific Air Forces.

Gen. William C. Westmoreland, top US military man in Vietnam.

there is another command. It is the Commander in Chief, U. S. Army, Pacific (CINCUSARPAC), Gen. Dwight E. Beach, USA. General Beach is in Honolulu, not far from the Admiral's office, but still thousands of miles from the scene of battle.

General Westmoreland does not command Navy forces in the South China Sea. Nor does he command the B-52 bombers operating out of Guam. Nor the 300,000 South Vietnamese ground forces fighting alongside his own men. Many officers who have served in Vietnam believe this command setup is inefficient.

"Admiral Sharp's headquarters," one of them said recently, "is too far back. The feel for what is going on in Vietnam just can't be very good in Hawaii. It is not enough that General Westmoreland has assigned to him all the forces actually based in South Vietnam. The airplanes in Thailand, like those of the Seventh Fleet, are under the control of the Admiral. It is true they are operated by the Seventh Air Force under Lt. Gen. William W. Momyer, based in Saigon, but the policies for Thai-based aircraft are dictated by the Admiral.

"The important thing is that General Westmoreland has nothing to say about it. He has, in fact, no responsibility for the war in North Vietnam. After a struggle, he did finally get authority to go after the enemy in areas contiguous to the demilitarized zone (DMZ) and to hammer the infiltration routes leading into the northern provinces of South Vietnam. It was not until this happened that he could use airplanes based in South Vietnam to hit any targets in the DMZ or north of it. It was not his war until the Admiral loosened the restrictions."

Another officer agrees, adding that "if General Westmoreland could get total responsibility for the entire war, in North and South Vietnam, all our resources would be used more effectively. To begin with, he has nothing to say about the carrier operations out of the South China Sea and the Gulf of Tonkin. He can get a carrier to operate off South Vietnam only if Admiral Sharp agrees. When the Navy moved a carrier last summer from Dixie Station to Yankee Station [from the South China Sea to the Gulf of Tonkin, off the coast of North Vietnam], it was done over Westmoreland's objection. He didn't want that carrier to leave, but it went north anyway."

One Air Force officer expressed "tremendous admiration" for General Westmoreland.

"I think he is about as objective as any military man can be," he said. "He is really getting the job done despite a hell of a lot of interservice rivalry. He has violated so-called Army doctrine time and again, to favor the Air Force."

And this man made it clear that the interservice rivalry does not originate in the armed services themselves as much as it does in the Defense Department. He confirms the claim of the USAF and Navy pilots that there is a "numbers game" involving sorties flown, bomb loads delivered, targets destroyed, and planes lost.

The game, he adds quickly, does not result from pressure applied by General Westmoreland or Admiral Sharp or the Joint Chiefs of Staff. The pressure is from the Department of Defense, which plays one service against the other. The queries come direct from the Pentagon, from civilians who bluntly ask the Air Force, or the Navy field commander, to justify their arithmetic.

"They want to know, right away, why the Air Force flew more sorties yesterday than the Navy, or why the Navy lost more planes than the Air Force. When the query comes through, to a carrier at sea or to Seventh Air Force headquarters, it merely says 'a high level wants to know,' and the pressure is the same on both branches of the service."

What motivates the man in DoD who raises such questions?

"He works with statistics. He says the other people have certain resources, and they flew this or that number of sorties. Why haven't you done the same? Or they dropped so many bombs. Why haven't you done the same? And you had more losses than they had. Why? Explain why your loss rate per sortie is higher than the other service."

Did the numbers game have its origin in the Department of Defense?

"Definitely."

There is no guarantee that this kind of interference with field operations would cease if General Westmoreland were granted a unified command over all of

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Southeast Asia. But it would make it possible for the component commanders of the Air Force and Navy, serving under General Westmoreland, to make representations to their immediate superior, knowing he is directly responsible to the Joint Chiefs of Staff.

A somewhat parallel situation existed in 1962 during the Navy blockade of Cuba at the time of the Soviet missile crisis. There was no single commander there either, but a mustering of the armed forces, with the Navy and Air Force most prominent. Civilian officials at the Pentagon were disclosed to be giving orders direct to vessel commanders, circumventing the Chief of Naval Operations.

A few experienced and competent officers feel strongly that another reason why General Westmoreland should be a unified commander—a Commander in Chief for Southeast Asia, or CINCSEA—is that it would enable the Army, Air Force, and Navy to make the best use of their resources. In MACV, it is pointed out, the commander has a scattering of USAF and Navy officers, but neither service can relinquish all its potential to his orders.

American forces in Thailand are almost entirely from the Air Force, provided by the Thirteenth Air Force with headquarters in the Philippines, but under operational control of the Seventh Air Force with headquarters in Saigon. The American military commander in Thailand is an Army officer, Maj. Gen. Richard G. Stilwell. He is responsible, not to General Westmoreland, but to a Navy admiral in Hawaii. If we had set out deliberately to foul up the command structure, according to one veteran from the theater, we couldn't have improved on this.

Another item of major interest to veterans who see a vital need for a unified command is the question of target selection. The subject was discussed by Technical Editor Butz in his November article. The accompanying chart on the table of organization for the war in Vietnam makes it obvious that the target-selection machine in Washington gets a feedback from several sources in the theater. It does not all come from General Westmoreland, but from CINCPACFLT and CINCPACAF as well as State Department representatives not shown on the chart.

One officer complained that his men, as the pilot correspondents to Washington have alleged, are sent out on missions, perhaps to die, trying to hit targets that are not worth the risk.

"Go back to the World War II environment," he suggested. "If the men in charge of target selection in that war had selected targets comparable to those chosen in Vietnam today, they would have been fired on the spot."

All targets are cleared at the White House. As indicated, the suggestion that they be hit or the statement that a hit is required can come from several sources in the theater so long as there is no unified command. Also, the policy of restraint that takes the basic decision away from Vietnam to Washington creates problems, best illustrated by the nature of the North Vietnamese surface-to-air (SAM) missile sites.

"When we started out, initially the first SAM sites were around Hanoi," a former operations officer says. "Of course, we were restricted from hitting them because they were within the 'Hanoi circle,' the announced sanctuary. Then the SAM sites were spread out beyond the circle, and finally we lost a few airplanes.

"Then we were given permission to attack, but on this basis: First we had to go in and make sure the SAM site existed. This meant that a reconnaissance airplane had to take the risk in order to get a picture; the picture had to be processed and then photo-interpreted. Then the picture was flown to the strike pilot, and he took off to hit the target. We figured this took an absolute minimum of twelve hours. And they can move the SAMs from one site to another in four hours, a thing they are almost sure to do after they have seen us take the picture. We were fighting an impossible battle. This went on for a period, and finally we convinced them we could not operate this way. They finally gave us permission to attack SAM sites on an opportunity basis, as we found them. The big trouble is they have a great many SAM sites and move the hardware from one to another on a day-to-day basis. You never really know where they are until they shoot at you."

This man also added his voice to the military demand for action to close the Haiphong harbor. He said he can't understand a targeting system that calls for spotty interdiction in the interior of a country while the supply source remains open. Again, he went back to an earlier war.

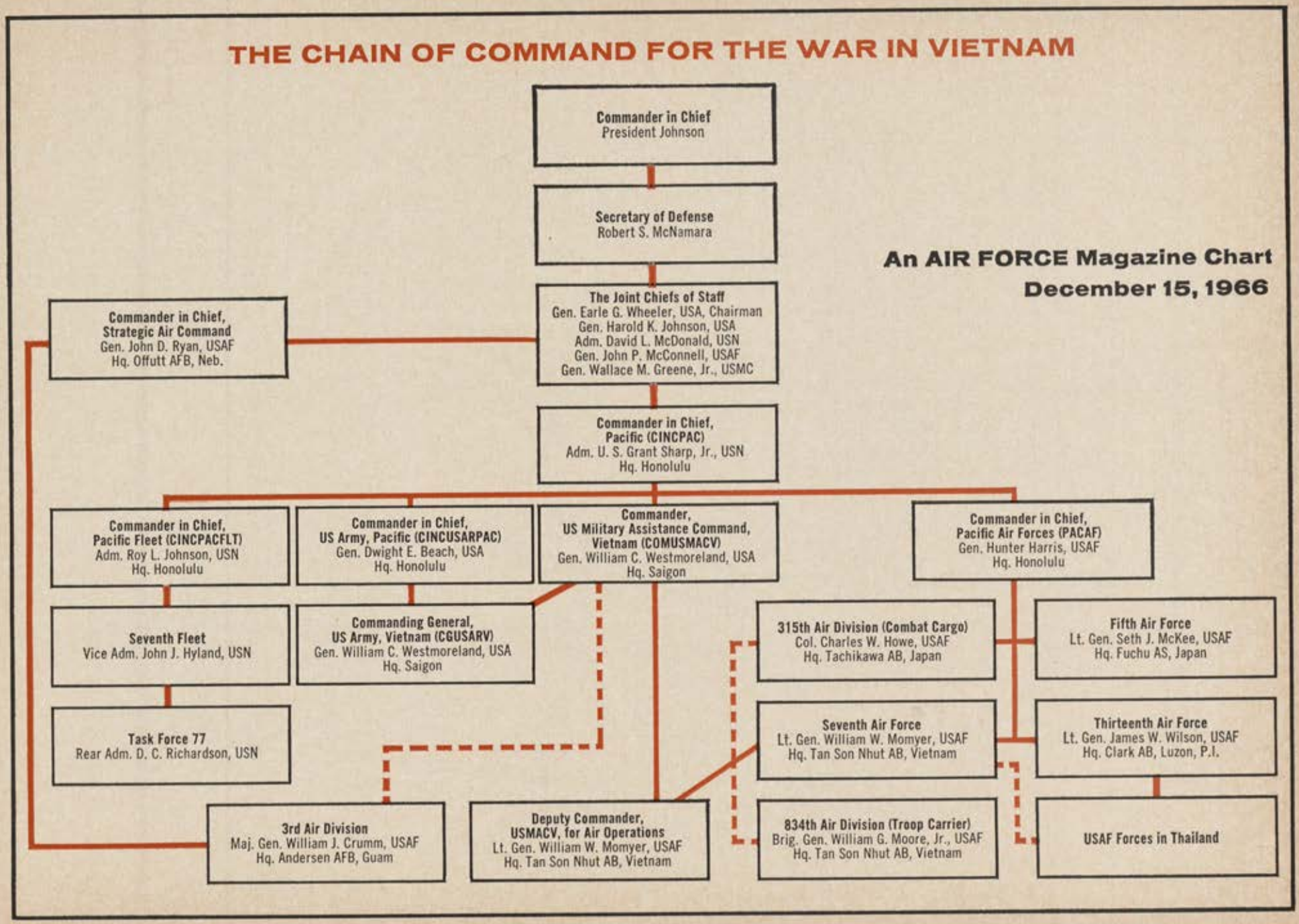
"Nobody," he said, "would have considered cutting the highways and railroads in Japan without hitting the shipping that came into the harbors. The interdiction program never would be effective. Yet, this is exactly what we are trying to do in North Vietnam. You have got to remember that the port of Haiphong is the major source of the war-making potential of North Vietnam. We have proposed that the harbor be closed; it should be destroyed or blockaded. Until we do that, we are wasting a lot of our effort. You just can't stop this stuff once it gets in the country and is spread out over hundreds of miles. When it is all concentrated in one place, any military tactician would say, 'This is the place to go and get it.'"

The origin of the policy of restraint, so far as the use of airpower is concerned, cannot be pinpointed by the field or fleet commander. He knows only that the White House, the Pentagon, and the State Department are involved. There was a time, earlier in the war, when one of our ambassadors to a Southeast Asian country had the bomb fuzes locked in a little building behind his own quarters. They were doled out to the

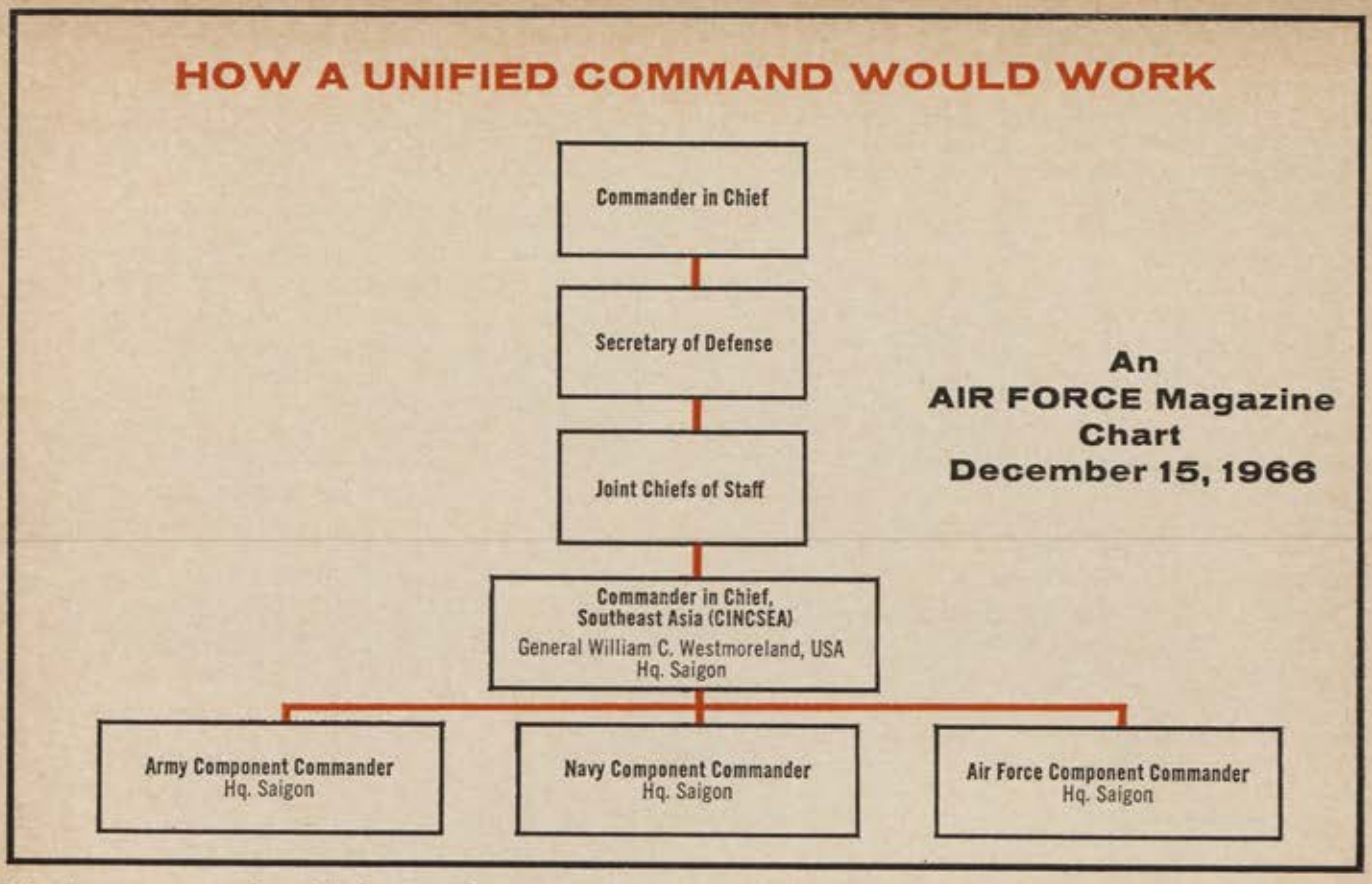
(Continued on page 28)

Chart opposite shows how General Westmoreland, in his main post as COMUSMACV, today relies on support from widely scattered headquarters of all three services. Broken lines indicate his liaison with 3d Air Division, the equipment provided by the 315th to the 834th to be under command of the 7th AF, and the operational control exercised over USAF in Thailand, where the aircraft are provided by the 13th AF. COMUSMACV is responsible for the war in South Vietnam and little else. The war over North Vietnam is directed by CINCPAC, out of Honolulu.

THE CHAIN OF COMMAND FOR THE WAR IN VIETNAM



An AIR FORCE Magazine Chart
December 15, 1966



Here is one concept of a unified command structure. As can be easily seen when the chart above is compared with the present arrangement, as shown in the chart on page 27, the chain of command could be greatly simplified with a CINCSEA.

Air Force day by day, giving the envoy complete control over the number of bombs that could be used on an approved mission.

One officer says he can recall an occasion when his unit was running short of approved targets. When the request for more targets was pressed, the reply came back that the President was busy and could not be bothered at the moment.

Most informants agree it is time to stop beating the issue of a bomb shortage. Some say the shortage has ended. Others are more reserved; the bomb shortage has plagued their operations and they are not confident it will not reappear, depending on the rate at which bombs are used between now and early spring. One officer said he expects the bomb supply will be a factor in planning air missions for USAF and the Navy at least until April.

The Administration, of course, has denied there has been a bomb shortage. Faulty distribution has been acknowledged.

"What they are saying," said one general officer back from a tour in Vietnam, "is that you don't have to use a given bomb for a particular mission. Now, we have spent a great deal of time developing what we call weapon effects analysis. And we have weaponeers on our staff who can look at a target and decide which weapon would be most efficient to destroy it, both as to size and the number of bombs needed.

"In Vietnam, weaponeering has gone completely out the window. If we did not have a variety of weapons available, there was no point in going to the manual. The best we could do was to find out what bombs were in the dump, load them on the airplane, and go. There were two basic problems. There was no choice in the selection of the bomb, and there was a shortage of bombs."

The reason for the shortage was that "everybody kept thinking we were going to win the war with the assets we had." Those were war reserve assets, put aside to meet contingencies in places like Korea and Europe.

Experienced tactical air experts are outspoken in their insistence that targets should not be doled out piecemeal. The proper way is to set up a target system, for example, ordering Navy and Air Force units to take out the enemy's oil supply. The selection of the targets should be made by the military, governed by their knowledge of weaponeering and the tactical situation.

In this way, they would not be confined to two or three oil targets on one day and two or three more later in the week. It would be possible to strike oil targets of opportunity—the ones that are spotted by the alert pilot who is properly armed to take them out—and eventually cripple the entire system with a minimum of risk. The same, of course, holds true for bridges, SAM sites, supply depots, military bases, or anything else worthy of being made into a target system.

Lt. Gen. Ira C. Eaker, a retired USAF veteran who has examined the war in Southeast Asia, says that "all the wars we and our allies have won in this century clearly support the need for unified command and demonstrate that war is not a venture that will ever be a successful, cooperative enterprise managed by committees with divided responsibility in the battle area."

This is illustrated in Vietnam by the contributions

to MACV from the Strategic Air Command and the Military Airlift Command. The B-52s operate out of Andersen AFB in Guam, under the control of SAC. SAC is fully responsive to General Westmoreland's requests for strikes by the big bombers, and there is no complaint from him about the service.

The fact remains, however, that the B-52s are not under control of the air commander in the theater. The air commander is Lt. Gen. William W. Momyer of the Seventh Air Force, who wears a second hat as General Westmoreland's Deputy for Air Operations, which is in itself a misnomer. He really is a deputy for Air Force operations and functions chiefly as a component commander in MACV. The components he commands are those based in South Vietnam, and only those based in South Vietnam, so far as the war in that country is concerned.

The MAC C-130 transports in South Vietnam come from the home base of the 315th Air Division in Tachikawa, Japan. They get their missions from the CINCPAC Western Transportation Office. Like the B-52s, they provide excellent service to General Westmoreland, and he is fully appreciative. But the General has no direct command over them, and neither does his air deputy.

One veteran of Tan Son Nhut AB points out that these aircraft, bombers, and transports are committed "100 percent to the support of Westmoreland." And, he adds, they should be under the operational control of the Seventh Air Force Commander, so that "Westmoreland has one airman to deal with. Right now he has any number of airmen. When he wants bombers, he goes to SAC. When he wants airlift, he goes to MAC. For in-theater airlift that means he has to go to Hawaii.

"If General Westmoreland wants something, he should be able to turn to General Momyer and say do so-and-so. Then Momyer will look at his resources and if he's got 'em, he will do the job." Only a unified command would make this possible.

Another criticism, not unrelated to the publicized charges that the B-52 bombers are being misused from time to time in Vietnam, is the fact that Army officers, including General Westmoreland, make the basic decision when the B-52s are to be used. No Air Force officer is given an opportunity to make a professional determination that the targets are more suitable for the B-52 than they would be for a fighter-bomber, such as the F-105. Presumably in a unified command, the choice would be made by the Air Force component commander, who would be handed the target and told to do the job in the best way. The same would hold if it were determined that naval airpower was most suitable. In that case, the Navy component commander would get the assignment.

Under the present arrangement, the commander of SAC's 3d Air Division, in Guam, responds only to a request from General Westmoreland. He has no way of knowing anything about the nature of the targets and no intelligence from an air commander on the spot who has responsibility for the decision to use B-52s.

It would be erroneous to conclude from conversations with veterans of the operation that there is unanimous support for the concept of a CINCSEA. Most of the anguish over the present setup comes from the men in the cockpits and the men who have to put them there.

Officers with responsibilities higher in the command level, particularly in the Air Force and Navy, argue that the present system works, however clumsy it may appear to the target-seekers. It works because the Army, Navy, and Air Force insist that it must do so, despite imposed handicaps.

At higher levels there also is concern about our over-all capabilities in the Pacific and what would happen to them if a CINCSEA were detached from CINCPAC. Men who point this out emphasize that our resources in the Pacific are not unlimited. If the lion's share were assigned to a new CINCSEA, they suggest, there would be a new requirement for CINCPAC resources.

"The idea of giving General Westmoreland a unified command has much merit," one general officer commented. "And I can understand too well why the operational people think it is urgent. But the possible negative effect it would have on our Pacific capability over-all is one that requires deep study."

Others are skeptical that a change would solve many problems. They point to the strong political component in the management formula and legitimately raise the question: Can a CINCSEA contend with this any better than CINCPAC and its component commands? They do not deny that military frustrations exist; they doubt that any possible management change will dispel the frustrations.

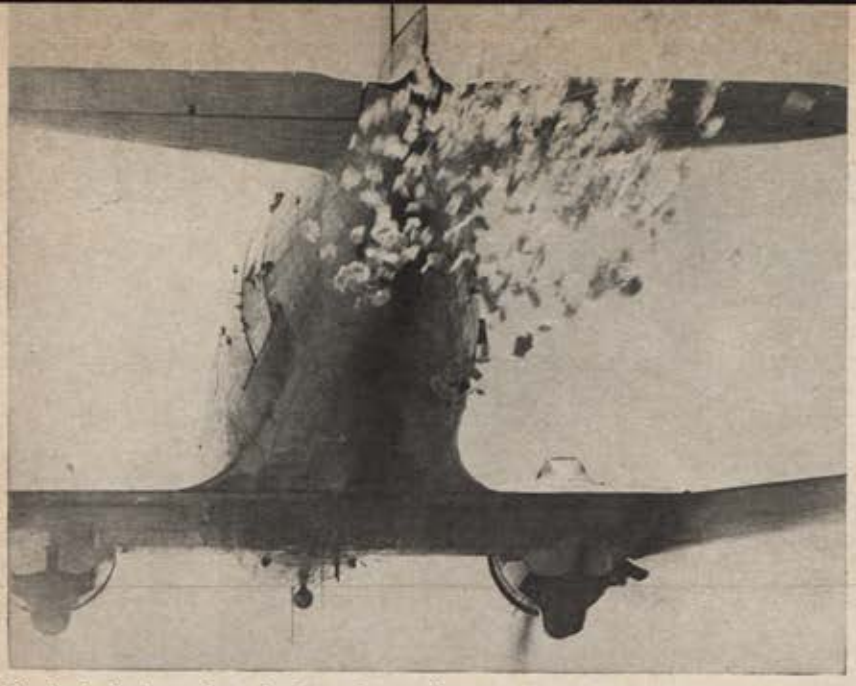
At this writing, Ambassador Henry Cabot Lodge, the State Department representative in Saigon, is scheduled to visit Washington, and the outcome of his discussions will be known before this survey appears in print. There are rumors that some resolution will be reached at least by early 1967 that will clarify the military command setup.

Whether or not there is support in the Army and the Air Force for a unified command, the concept is frowned upon by the highest-ranking Navy personnel. General Westmoreland is believed to have divided sentiments. He knows that prosecution of the war would be more efficient with a unified command. He is reluctant to turn his direct responsibility for ground forces over to an Army component commander and finds even more distasteful the prospect of alienating his Navy confreres.

Of course, any decision will have to be made by President Johnson, who is known to share the wide respect held for General Westmoreland.

Basically, what the White House does, if anything, will be timed and explained to avoid any implication that the Defense Department has deferred too long in revamping its management of the war.

Also, even the adoption of a unified command does not ensure that basic war objectives will be changed. The best we can hope for is that a unified command will help get the message to Hanoi that it cannot win. —END



Psychological warfare leaflets flutter from a leaflet chute newly installed through the floor of a 14th Air Commando Wing C-47 Skytrain. The "Litterbug" can drop more than a million and a half leaflets per mission.

A Tennessee ANG C-97 is guarded after it unloads at Saigon. ANG makes some seventy-five flights a month to Southeast Asia.

THE AIR WAR IN VIETNAM

SMSgt. Elmer E. Pfenning, of Phan Rang AB, holds an orphaned Vietnamese child *(see cover)*. Pfenning's unit originated project to help children of Go Denh orphanage.

Bulldozers push through the sand to a landing ship bringing construction supplies to Tuy Hoa AB, located 235 miles northeast of Saigon. Supplies for the air base, which became operational in November, were brought from sources outside Vietnam.

A USAF C-130 Hercules gives a second C-130, parked behind it, a buddy start by using prop wash to start an engine that could not be started by conventional methods. Aircraft are preparing to take off from Ban Bleh, Republic of Vietnam.

Above, SSgt. Lewis B. Alexander, of Cleveland, Ohio, services the radar set of a supersonic F-4C Phantom II. The radar set on the F-4, most sophisticated and fastest jet fighter in Vietnam, is located in the nose of the aircraft.

A North Vietnamese MIG-17, flame beginning to shoot from its left wing root after being hit by a burst of 20-mm cannon fire from an F-105, rolls out of the gunsight over North Vietnam on December 4. MIG was listed as probable kill.

AN AF/SD PHOTO FEATURE

USAF Maj. H. Lewis Smith, right, of Hammond, La., talks with rescue pilots who brought him out of North Vietnam after his A-1E Skyraider was forced down. A fellow Skyraider pilot rubs fatigue from his eyes. Major Smith's roommate, Capt. Richard Needham, of Mesa, Ariz., center, flew with the rescue force.

Commercial aviation's Achilles' heel is ground congestion—clogged access highways, or inadequate mass transit connections, saturated runways, and not enough gate positions. But new concepts in airport design, linked with other forms of transportation and coordinated on the basis of systems analysis, promise relief at a time of prolific aviation growth. Vital to all planning of tomorrow's aviation systems are technically and economically sound V/STOL aircraft and better utilization of existing facilities with the help of larger conventional transports. Here is a report on how some planners hope to create order out of the present chaotic fragmentation . . .

Planning Tomorrow's Total Air Transportation

By Edgar E. Ulsamer

ASSOCIATE EDITOR, AIR FORCE/SPACE DIGEST

COMMERCIAL aviation's biggest, and paradoxical, problem is its success. Markets are burgeoning and new technology is revolutionizing air commerce in terms of speed, productivity, and economics. The problem is on the ground, where the environment is not too different from that which greeted the first DC-3.

Today's air passenger, in terms of total door-to-door travel, can spend as much time at "zero speed" as he does at 600 miles per hour. He loses so much time in ground transit that many short- and medium-length trips actually take longer than they did thirty years ago.

Domestic air travel is expected to double by the early 1970s and triple by 1980. Air cargo, now only a fraction of all air commerce, will grow at a far faster rate and surpass the passenger traffic in both volume and revenue within the next decade. The result may be what one planner termed "chaos squared" at and near the airport.

Austin J. Tobin, Director of the New York Port Authority, the largest airport complex in the world, remarked recently: "I can only confess frustration and something very close to hopelessness at problems of ground access to and from our airports, both as they exist today and in the future." President Johnson's transportation message to Congress pointed out that our remarkable air transport system is "not good enough when it produces sleek and efficient jet aircraft—yet cannot move passengers to and from the airport in the time it takes those aircraft to fly hundreds of miles."

The hard-core problem is fourfold: ground access to the airport; terminal facilities; the landing area; and the airspace access to the airport. Aggravating the situation is the fact that ten key airports generate about half the total commercial air traffic volume. And the bulk of the traffic is concentrated in "rush hours." Similar problems exist in other parts of the world. Worldwide, the trend toward urbanization is accelerating. In the Northeast megalopolis, forty million Americans are packed into 1.5 percent of the total US land area. Fifteen years from now eighty percent of the population of the US is expected to live on one percent of the land—a frightening prospect.

Ground access to the airport suffers from fragmen-

Airline concern with air cargo and its ground handling is evidenced by new Pan Am $8.5 million cargo terminal at New York's Kennedy International. Completely computerized, the facility can unload a jet freighter in twenty minutes.

Pan Am's JFK cargo terminal is expected to cut handling time for cargo by eighty percent and was designed with jumbo freighters of the 747 variety in mind. Air freight growth is expected to climb at an annual rate of twenty-five percent over the next few years, ultimately requiring special, separate terminals and airports. Pan Am facility can accommodate twenty-two trucks simultaneously at individual loading docks, sufficient for the envisioned ninefold increase in cargo business over the next few years.

tation of the various transportation systems involved and the fact that airports haven't been phased in with other modes of transportation as vigorously as they should have been. The automobile is a key factor. As the automobile has proliferated, other forms of ground transportation, including the much more productive mass transit system, have atrophied. A recent experience at Los Angeles International dramatized the problem. All airport parking lots were filled; the airport-bound traffic, with no place to go, ground to a halt and jammed highways within a radius of several miles from the airport. Continuous warnings by the radio stations and strict traffic control finally unsnarled the paralysis, which lasted for more than twenty-four hours.

The Greatest Challenge Today

Perhaps the greatest challenge faced by the new Department of Transportation lies in the application of systems management techniques to such problems. Its charter states clearly the department's obligation: "To modernize and streamline . . . to bring together our transportation activities . . . to serve the growing demands of this growing nation."

With the US auto population expected to increase from eighty million to 110 million within four years, the aviation community, with limited jurisdictional control, cannot solve the problem of ground access to the airport. The inevitability of traffic jams is seen by aviation planners as a mandate to introduce special commuter and shuttle aircraft.

This, of course, is not to say that other methods won't be pursued, especially mass transit operating from city-center terminals directly to the airports.

The Port of New York Authority is currently experimenting with a hybrid vehicle which, operating alternately on rails or highways, might furnish reasonably fast and reliable transportation between the city's airports and central collection points.

The congestion inside the airport is almost as acute. This, too, is a problem that aviation is neither solely responsible for, nor one that it can solve by itself. With most airports operated by municipal authority, the decisions on designs and expenditures are often made outside of the aviation community. The challenge is enormous. The Federal Aviation Agency predicts that for every 1,000 passengers using commercial aviation airports today there will be 2,000 in 1971. For every 1,000 aircraft operations today there will be 1,600 in 1971 and 2,000 by 1975.

Conservative industry forecasts predict that passenger traffic over the next ten years will increase at least three and a half times and air cargo ten times, a tripling of aircraft departures over present levels.

The Airport Operators Council reports that the principal commercial aviation airports in the country will need to invest a minimum of $2 billion over the next four years just to meet traffic growth. This figure does not include expenditures needed to handle the special requirements of the jumbojets or the SST. Excluded also are funds for setting up terminals for V/STOL aircraft.

At present most large airports have their gates along long fingers extending out from the terminals. In some cases the passenger has to walk half a mile from ticket counter to his aircraft, or a mile or more if he transfers from one airline to another. Moving sidewalks are already being used to ease this burden. The mobile lounges have solved this problem at Dulles Airport, serving Washington, D. C.

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Much thought is being given to changing this finger layout to cluster designs where satellite terminals would be connected by tunnels to increase the number of available gate positions without increasing the actual area. William E. Downes, the City of Chicago's Commissioner of Aviation, says that a cluster system at O'Hare International would increase the number of gate positions from ninety to 115 under a current master plan.

Henry Vicariot, Chief Engineer of the Paris Airport Authority, expects that Paris-Nord, currently under construction and apparently the first airport in the world to be designed with the SST and the jumbojet in mind, will consist of a central bloc connected with satellite clusters by underground tunnels to permit aircraft to taxi from dock to dock. The passengers, baggage, and freight would be shuttled by subway in the tunnels.

Aviation's growing pains also are felt on the runways. There simply aren't enough of them. The president of United Air Lines, George Keck, estimates that in the next five years the United States will need at least 200,000 feet (forty miles) of new runways and 335,000 feet (over sixty miles) of runway extensions. This, he explains, represents about $500 million.

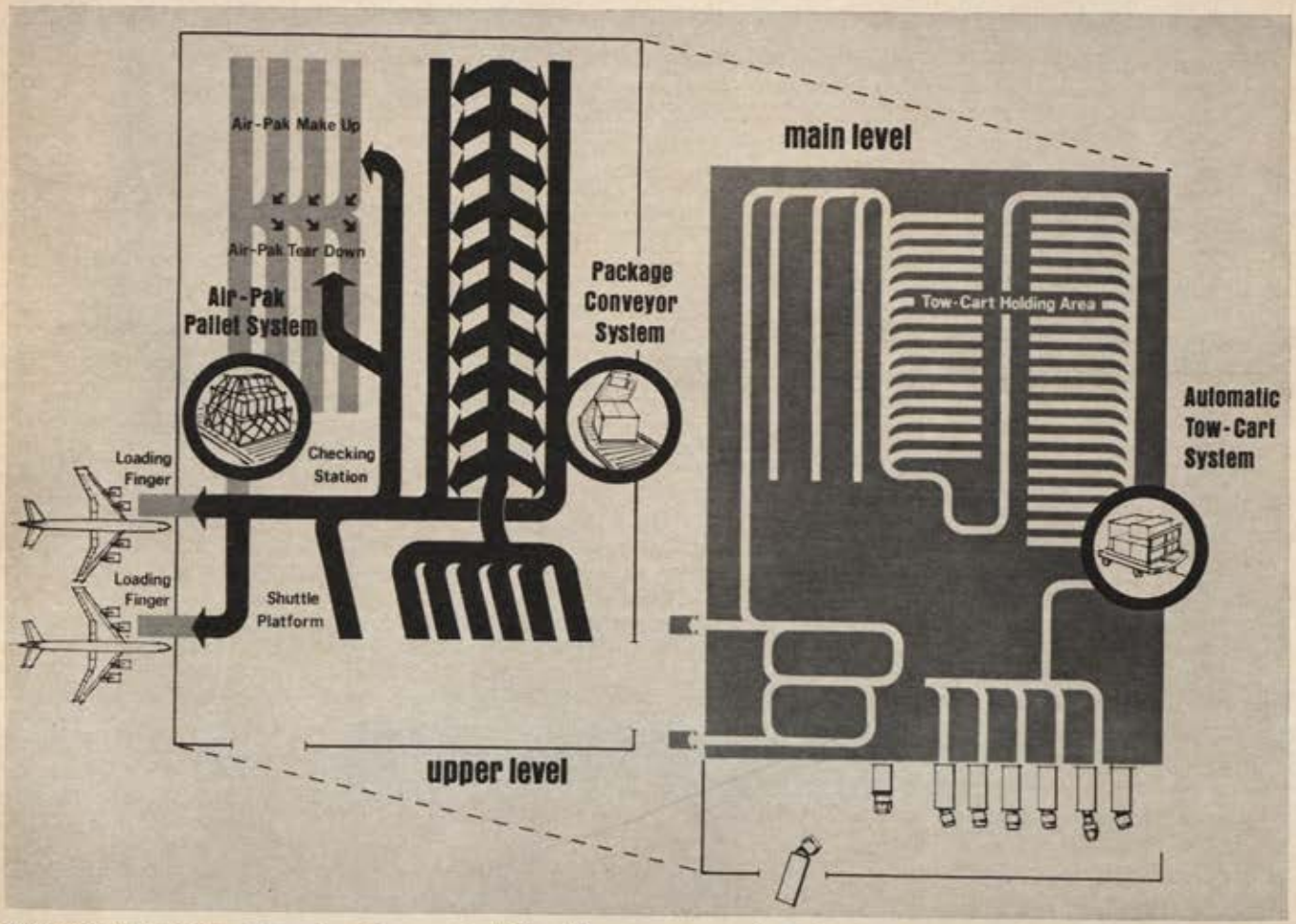
At New York's John F. Kennedy Airport, incoming flights may loiter for an hour or more to get clearance to land—even in good weather. Incoming overseas flights are sometimes diverted to other cities. The Washington, D. C.–New York City shuttle at times runs as much as three hours behind schedule because of clogging of the airways and jammed-up runways near and at La Guardia Airport.

Chicago's O'Hare, the world's busiest airport, often saturates the available gate positions because landings and takeoffs bunch up, upsetting the precariously tight schedule.

The impasse, in many instances, is the slow trickle of federal funds—below $75 million annually—made available on a matching basis, in contrast to the alacrity with which the government pays an average of $8 billion annually for interstate highways.

Airspace Access to the Airport

Another area of federal responsibility is airspace access to the airport as well as airspace control in general. The latter, so far, poses problems only in the high-traffic corridors such as the Eastern seaboard and the North Atlantic. The anticipated steep increase in



Schematic illustration shows how three material-handling systems speed up the flow of air freight through the automated Pan Am cargo facility at John F. Kennedy. The principal elements in the system are a tow-cart network, a package conveyor, and a pallet-handling system. An electronic computer serves to coordinate and synchronize the three subsystems.

Airport planners are "going underground" in order to avoid obstructions on the airfield proper. This concept proposed by Walter Kidde Constructors, Inc., N. Y., shows future SST and jumbojet airport with underground conveyors shuttling passengers to and from distant terminal. System of this kind makes better use of premium acreage than existing facilities.

the number of daily aircraft operations may well change this situation. Access airspace crowding, combined with limited runway space, accounts for the basic congestion at present, and, as growth continues, may lead to stifling saturation.

In 1965, aircraft delays cost more than $63 million, according to FAA figures. By 1975, when the number of jet aircraft will be six times the present level and when 500-passenger jumbojets and 300-passenger SSTs will be in the inventory, such a condition will not be tolerable.

Some relief can be expected from the Federal Aviation Agency's National Airspace System (NAS), slated to be completed in 1975 at a cost of $500 million. Completely computerized, it will enable radar ground controllers to handle a far larger number of planes safely than is possible today. The system relies on stored program alpha numerics (SPAN) and onboard transponders, which feed a constant flow of data on aircraft identity and altitude into ground-based computers. The system also enables the human controller to project visually future aircraft positions, assuming no course change, in order to check on collision danger.

The dilemma of too much demand and not enough supply in terms of aviation ground facilities, according to industry experts, needs to be solved on two levels. Aircraft of higher productivity are needed. And the use of V/STOL aircraft can reduce the need to rely on ground transportation between the airport and the city center or major suburbs.

Most aviation experts expect a new, more systematic approach to commercial and general aviation to evolve within the next two decades. These plans presuppose the introduction of economically and technically sound V/STOL designs.

FAA and industry planners, for instance, envision the development of four different types of airports. The first class would consist of massive aircraft ports, geared to long- and medium-haul operations, located some distance from the city center in either an industrial or parkland environment to insulate the community from high noise levels. General aviation aircraft would be discouraged from using these facilities. This "super airport" would be linked to secondary airports by all-weather V/STOL aircraft over a radius of perhaps 200 or more miles.

The secondary airports would handle short-haul commercial jets and feeder airlines along with business jets.

V/STOL aircraft would operate from rooftop airports in the city center to furnish reliable, fast connection to the first two categories of airports.

Finally, a ring of suburban airports would cater to the growing general aviation field (numbering well over 100,000 aircraft at this time and increasing at a rate of over ten percent annually) as well as to V/STOL feeder operations. An airport system of this type, it is argued, would distribute evenly the loads on the feeder operations between super and short-haul jet airports and downtown and the suburbs. The

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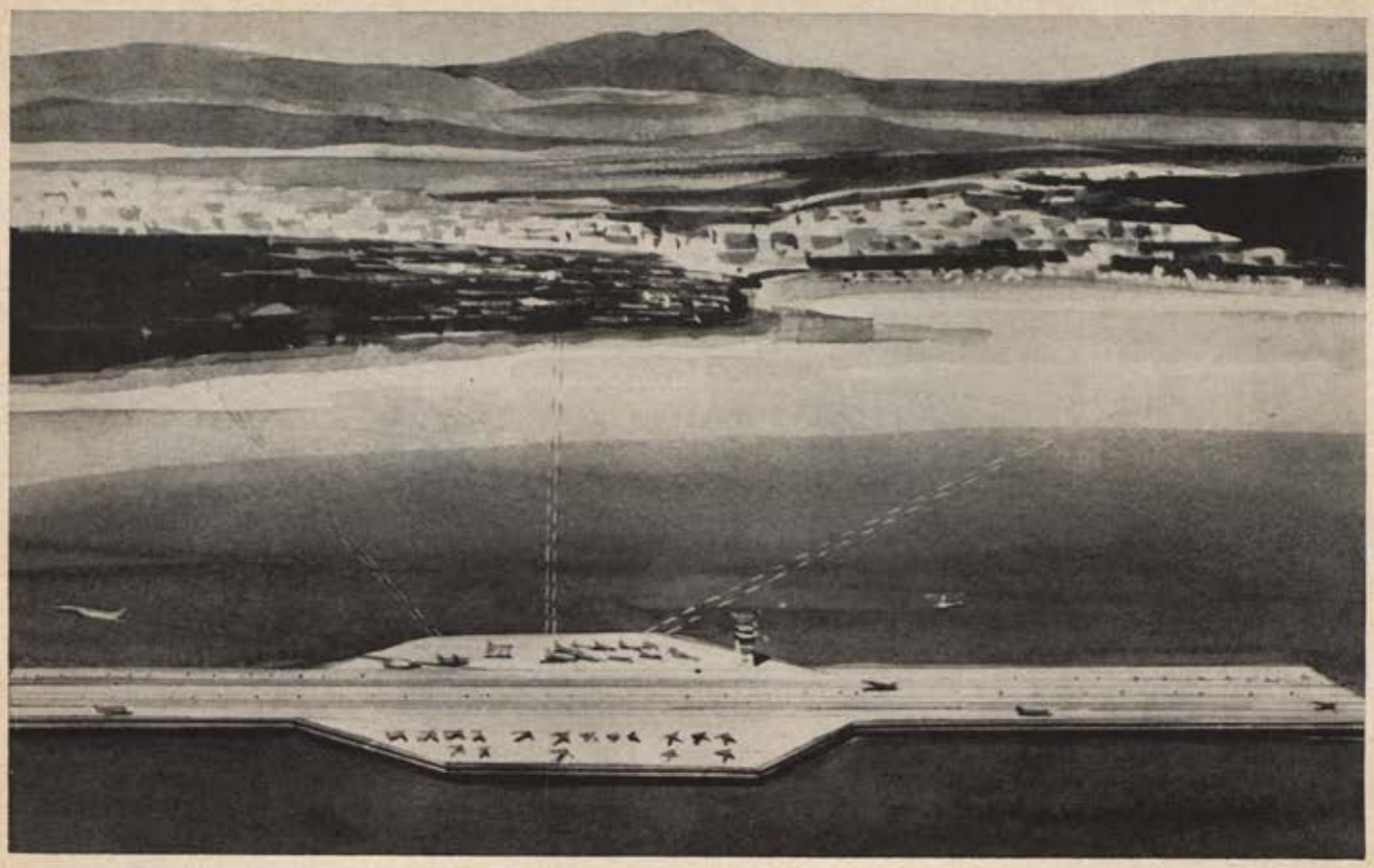


An interesting approach to design of the airport of the future is proposed by Douglas Aircraft Co. with offshore location of supersonic-transport airports to diminish noise and save premium land areas near urban centers. Resembling an oversized aircraft carrier, the sea-airport would be linked to a land-based terminal by underwater tubes and V/STOL aircraft.

critical parking problem would be eased, since, presumably, the large number of suburban airports will be able to absorb the bulk of the auto traffic. The remainder, expected to be only a fraction, could be accommodated at or near the city-center V/STOL airport.

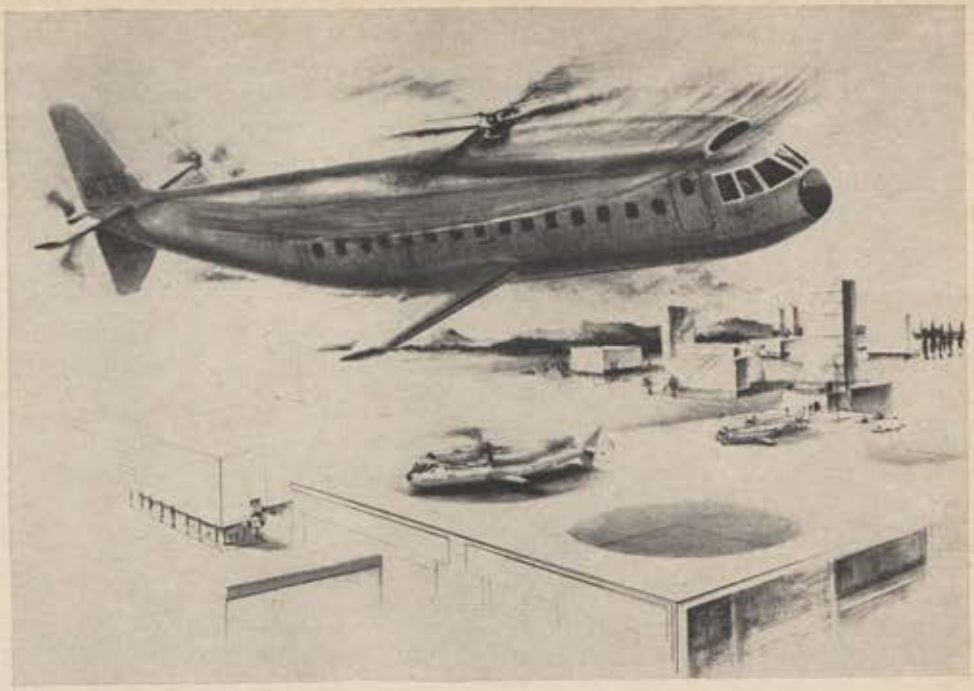
Further, a systems approach of this kind would bring aviation back into the very-short-haul market, a field that many airlines a few years ago were ready to surrender to ground transportation. Now the concept of "total air transportation" is again coming to the fore. A number of airlines recognize now that the short-haul (300 miles or less) field is a rich, untapped market.

V/STOL—A Reality in the Early '70s?

Vertical and short takeoff and landing aircraft, in spite of glowing forecasts by the theoreticians, have yet to prove their productivity as far as commercial aviation is concerned. The helicopter, so brilliantly useful to the military, lacks the range, speed, and ability to operate economically for commercial flight, except in rare and special cases. Even then subsidies have been required.

Over the past fifteen years, industry, government, and the military services have expended considerable effort on V/STOL designs. Five basically promising concepts have evolved: tilt wing, tilt-ducted prop, tilt prop, lift fan, and vectored thrust. A recent study under NASA aegis by Boeing, Ling-Temco-Vought, and Lockheed, in conjunction with the airlines, indicates that an acceptable, safe, and economical STOL or V/STOL transport can be realized through several designs. An integral part of the study was a composite design, which many aviation experts see as the "path

Quick "cardboard" conversion of LTV's triservice XC-142A experimental military tilt-wing V/STOL results in "Downtowner," the company's idea for a forty-four-passenger commercial air commuter, which can function in the VTOL, the STOL, or the conventional mode with equal ease.



Lockheed's Air Commuter proposal is a winged (compound) helicopter, 100 feet in length, and has gross takeoff weight of about 50,000 pounds. It could transport about seventy passengers and their baggage at speeds of about 300 miles per hour over distances up to 250 miles. Vehicles of this type are said to be able to revolutionize air transport and airport systems and could be operational in the early 1970s.

of least resistance," an advanced helicopter embodying features of the conventional helicopter and the conventional airplane. This is the approach being taken by Lockheed-California with its sixty- to seventy-passenger "Air Commuter," designated CL-879.

The Air Commuter

The Lockheed Air Commuter, which the company is discussing "very actively" with the airlines, is a derivative of AAFSS, a compound, hingeless rotor helicopter employing short, stubby wings. In 1965, Lockheed won the US Army's Advanced Aerial Fire Support System (AAFSS) contract and is now building ten test models.

AAFSS is a departure from existing 'copter designs.

Challenging and difficult V/STOL technique known as fan-in-wing is employed by XV-5A research vehicle. Photo shows open louvers underneath the fan at bottom of wing, open butterfly fan covers atop wing, and open pitch fan entry louvers and exit control doors in nose.

Its rigid rotor permits far greater speeds than conventional choppers because of greater stability, better control, and more effective damping. Using a pusher propeller and short wings, AAFSS begins to "unload" its rotor's lift at forward speeds at seventy miles per hour. At 110 mph the wings take over completely, permitting a speed of 250 miles per hour. Airplane-type control surfaces are not needed because the rotor, even when unloaded, provides pitch and roll control.

The proposed Air Commuter would be a larger, more powerful, commercial version of AAFSS. It will be "competitive" with the taxi and the short-haul jet in terms of seat-mile costs, Lockheed claims. Since it does away with the technically difficult stopping, folding, and stowing of the rotor blades, it faces no state-of-the-art hurdle and conceivably could be in airline operation by 1971.

It can serve on flights up to 250 miles in range and has a cruising speed of 287 mph, making it suitable for airport shuttle service, service between major airports and city centers, service between major airports and major suburbs, and short-haul intercity service. Flying lower than conventional aircraft, it will not increase airways congestion, and when used for short hauls could even alleviate it.

The Air Commuter, according to Lockheed, will generate less noise than conventional aircraft of comparable size and should be fully compatible with the stricter noise abatement regulations expected in the coming years.

Powered by three Allison turboshaft engines rated at 5,175 hp each, the Air Commuter is designed to fly safely and maintain full cruising speed of 287 mph with only two engines. Top speed may be as high as 345 mph. This is made possible by slowing the rotor sufficiently to avoid supersonic advancing blade-tip speed. Even with two engines out at the same time

(Continued on following page)

the aircraft is designed to fly safely and land in a routine manner.

Capable of accommodating sixty or seventy passengers and their baggage—a payload of 12,600 pounds—the CL-879 will cost about $2.5 million, or between $500,000 to $700,000 less than small commercial jets. Lockheed officials claim the Air Commuter's direct operating costs (DOC) are competitive and will not require subsidy. The CL-879 is projected to have a DOC of about five cents per available seat-mile for flights of about fifty miles. This figure is said to drop off to about 3.5 cents in the 200-mile-trip range. Conversely, seat-mile DOC shoots up to eight cents for trips under twenty-five miles. Lockheed officials say their calculations—corroborated by airline economists—indicate than an Air Commuter fare of about $10 for a downtown Philadelphia to downtown New York run will be profitable to the operator and financially attractive to the passenger.

Slightly above 100 feet in length, twenty-five feet high, and with a main rotor diameter of eighty-four feet, the Air Commuter should not interfere with conventional aircraft traffic because it takes off and lands from the terminal ramps rather than the runways. Lockheed officials claim that it would be well mated with the jumbojets and the American SST. It could shuttle passengers to their final destination right from the dock position, or deliver them there from a number of collection points.

Route Structure for Air Commuter

Several specific route structures for the Air Commuter have been worked out between Lockheed and interested airlines for high-traffic regions. In the region centering in New York City, the Air Commuter could handle city-center to city-center short-haul operations along radial fingers extending to Boston via Bridgeport, New London, and Providence in the northeast; to Washington, D. C., via Baltimore, Philadelphia, Trenton, and Princeton in the southwest. In airport shuttle service the Air Commuter would link, of course, the four principal airports in the New York City area: JFK International, La Guardia, Newark, and the proposed fourth major airport.

Major suburbs served would include Morristown, N. J.; Suffern, N. Y.; Islip, Long Island; White Plains, N. Y.; Red Bank, N. J.; Paterson, N. J.; and others within a radius of seventy-five miles from the city center. Potentially profitable for short-haul operations also are direct flights to Scranton, Pa.; Allentown/Bethlehem, Pa.; and Albany, N. Y., via Poughkeepsie. Similar networks connected by intermediate stops include Atlanta, Ga., to Miami, Fla. Also the Chicago area and all major California city routes have been found to be profitable, according to Lockheed officials.

A key factor in the efficiency of V/STOL aircraft is the time required for en-route stops and the turnaround time. According to Lockheed projections, "vertistops"—consisting of stopping the rotor, unloading passengers and baggage, boarding new passengers and baggage, and takeoff—will take about four minutes. Turnaround time, which includes engine shutdown, refueling, and cleaning, is expected to take about eleven and a half minutes.

Detailed studies have pinpointed the basic airport and heliport requirements for aircraft of this type. Existing city-center locations are fully suitable—the Plaza Helipark in Los Angeles, the Wall Street Heliport in New York City, and the rooftop heliport on New York City's Pan Am Building. Proposed vertistops would include harbor ports capable of interconnecting with shipping terminals built above freeways, and others designed on top of either bus or railroad depots. General aviation airports in the suburbs would require little, if any, additional construction to be able to accept the Air Commuter.

Lockheed officials report that the company is currently exploring the Air Commuter sales potential overseas, especially in Europe, concurrent with other market studies. If the current interest can be further confirmed, they say, Lockheed is likely to institute the Air Commuter as a full-fledged program by March 1967, and first airline deliveries could be made by 1971.

Other 'Compounds'

Other aerospace companies, of course, are also examining compound or otherwise advanced 'copters for commercial application. Among them are Boeing's Vertol Division, United Aircraft, Bell, and Hughes.

Hughes, for instance, is currently exploring a hot-cycle rotor aircraft employing a combination rotor/wing. Based on such currently flying testbeds as the XV-9A, Hughes' Vice President for Operations, Malcolm S. Harned, predicts that a 500-mile-per-hour 100-passenger "Helibus" appears to be capable of generating seat-miles at a direct operating cost below that of the DC-3 and the F-27, ranging from about four cents for very short flights to 1.5 cents for the 600-mile range.

These concepts appear to require some state-of-the-art advances and, therefore, aren't likely to come into the inventory before late in the 1970s. They also may run into stiff competition from V/STOL designs employing "nonhelicopter" techniques. At the moment the engineering experts are not prepared to say which approach will prove advantageous over the long run.

A recent comprehensive examination of the V/STOL potential, conducted by the Massachusetts Institute of Technology for the Commerce Department, concluded that the development costs for a 450-mph eighty-passenger V/STOL transport would range around $480 million. So far, neither the government nor industry seems to be eager to invest this kind of money.

On the other hand, the study also found that, in the case of the Northeast corridor, a fleet of sixty-five aircraft of this type could be quite profitable by 1980—at fares no higher than those of intercity buses. The study claims that a downtown Manhattan to downtown Boston V/STOL flight could be made in

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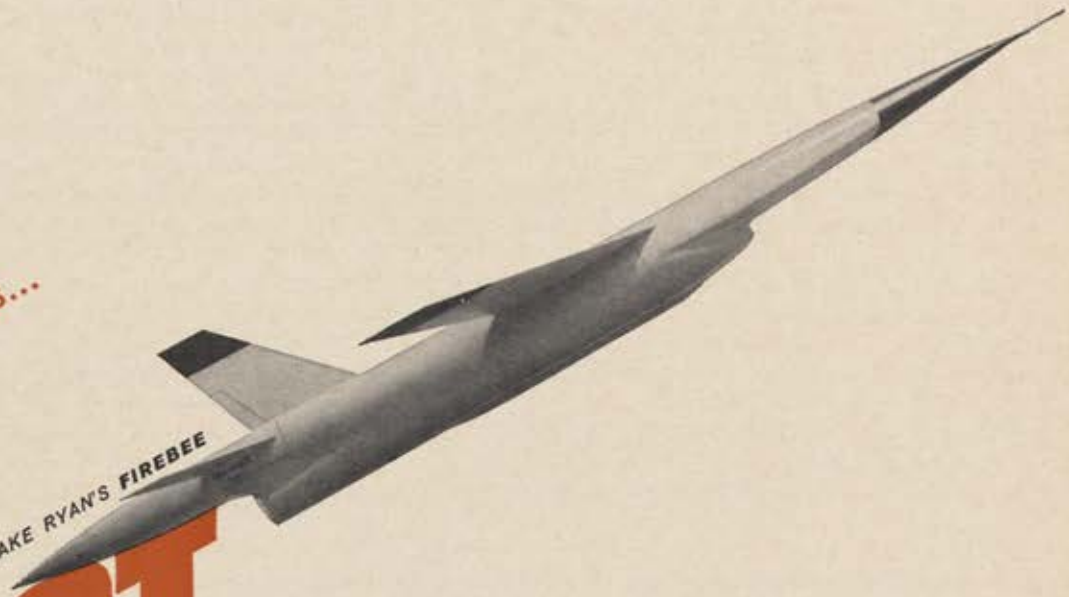
DEVELOPING CONCEPTS...
BUILDING REALITIES



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thirty-two minutes, at a price of about $8.80. Few airlines are likely to go quite that low in price, however. The MIT study describes the relatively low costs connected with providing downtown vertipad facilities as one of the brightest aspects of V/STOL, and one that possibly may balance out the high development costs of the aircraft themselves.

Volume Makes the Difference

In terms of air traffic control, an airplane that can accommodate fifty passengers takes up as much airspace as one that accommodates 400. To a degree, this also holds true for ramp and dock space. In addition, the big plane can operate at seat-mile costs below those of the smaller ones, it can afford a redundancy in safety systems and other equipment which enhances its all-weather capabilities, and it can give its passengers a degree of comfort well above that of the small commercial airplane. This is the rationale behind the jumbojets of the 747 and L-500 type *(see August '66 AF/SD)*. But even more it is the rationale behind a new breed of aircraft—a technologically advanced twin-engine jumbojet in the 250- to 350-passenger range. Nobody in the industry likes to call the new design an airbus, but until a better name comes along, everybody does *(see October issue, pages 32-33)*.

Just who will build the airbus is tied up in the answer to the multibillion dollar question—not answered at this writing—of who will build the American SST. The two SST competitors, Boeing and Lockheed, as well as Douglas, are energetically exploring the airbus concept, as many as 800 of which may be sold by 1980 in the United States and abroad.

E. C. Frost, Lockheed's manager of the 1011 airbus project, says the availability of funds, more than questions of the potential of the design which is already accepted as "very promising," will decide whether or not his company goes ahead with actual development.

In turn this may depend on whether Lockheed will manage to interest a European consortium to join the company in the development and later marketing of the 1011. Boeing and Douglas reportedly have talked to one European country at a time in efforts to establish partnerships. Lockheed prefers to create a broader combination. Boeing is reported to be weighing its 757 airbus project in relation to the just-opened production line for the twin-jet 737, the stretched version of its 727, which will see airbus duty in Europe, and the giant 747. In case Boeing decides to move ahead on the project, it would rely heavily on 747 technology and be able to use structural members of the four-engine, long-haul aircraft alternately with the slightly smaller short- to medium-haul twin. Lockheed, of course, would at least "borrow technology" from its giant USAF C-5A.

Douglas, which has labeled its airbus project the D-966, initially favored the idea of adapting its stretched 250-passenger DC-8-60 series to the airbus requirements by equipping it with two advanced-technology engines. After the first round of talks with the airlines, Douglas concluded that a completely new aircraft was needed and wanted.

While one or more of the three companies is expected to formally launch the airbus project before mid-1967, one major hurdle is the variance in performance that the airlines expect from the aircraft. TWA wants the airbus to have full range of about 2,500 miles for nonstop transcontinental operations. Potential European customers need no more than a 1,000-mile range. Some airlines want to be able to "quick-change" the aircraft from passenger to cargo configuration.

While the advanced engine technology underlying the airbus concept can take these varied requirements in stride, interior layouts and other factors need to be optimized for a specific range. A compromise among the interested airlines will, therefore, have to be achieved.

Another difficulty for the airlines is the determination as to when the airbus is likely to make its real debut. The manufacturers say the airbus could come into the inventory as early as 1972. But if this schedule is delayed and the life expectancy of the aircraft extends over more than one decade, a greater passenger capacity may be required. Growth of this sort is taking shape in the long-haul field. Boeing has already stated that it is contemplating a second-generation 747 with perhaps an 800-passenger capacity. Lockheed is exploring a nuclear-powered jumbojet of similar capacity. A second-generation SST with 500 passengers is also under consideration. Some experts, therefore, believe that in the medium-range field a 400-passenger aircraft may be better suited to the market needs.

No Airport-Airplane Mating Society

Neither the massive jets of the jumbo or airbus variety nor the capacious SST nor compound 'copters of the proposed Lockheed Air Commuter type will by themselves be able to solve the congestion problem and straighten out in the air what's wrong on the ground. Only a total system-planning approach based on sound growth projection and employing the best technologies can gain this objective.

As J. E. Steiner, Boeing's vice president in charge of the 747 program told AFA's "Golden Age of Air Commerce" Seminar in San Francisco (*see also page 76*) recently: "The problems we are facing today were born out of fragmented problem definitions and patchwork solutions. They will not be solved in a like manner."

And, he added, at the heart of the problem was the fact that there "simply is no formal airport-airplane mating society in existence in the United States." Government planners join in this warning by pointing out that the transportation industry of the United States (of which air commerce is a part) is already in a spiraling decline by growing much more slowly than the gross national product. Continued neglect of aviation's weakest link, the ground interconnection, might well bring air commerce to the same "decline."—END

THE SPACE AGE IN PERSPECTIVE

• Technology • Education
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SPACE DIGEST

VOLUME 10, NUMBER 1 • JANUARY 1967

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Speaking of Space

One of the key articles of the proposed space treaty, which the Senate will be urged to approve in the coming session, outlaws deployment of orbital weapons of mass destruction. Yet there is no provision in the treaty for inspection, international or otherwise, of payloads or launch sites.

The Proposed Space Treaty:
Is There Less There Than Meets the Eye?

BY WILLIAM LEAVITT

Senior Editor/Science and Education

THERE is a strong likelihood that the Senate will be pushed hard, in the new session to advise and consent to the proposed space treaty on which the Soviet Union and the US have agreed in principle in discussions at the United Nations.

The proposed international agreement, hailed as historic by President Johnson, outlaws territorial claims in space or on the moon and planets, bars states from putting nuclear or other weapons of mass destruction into orbit or on celestial bodies, and provides for visitation rights, with advance notice, to space installations on the moon or other extraterrestrial bodies.

Such an agreement has great surface appeal. If adhered to strictly by all signatory powers, it would go far to prevent the extension of military and political conflict into space. The model for the treaty has obviously been the Antarctic. Thanks to the location, the climate, and the apparent lack of immediate or near future strategic value, peaceful cooperation—or at least mutual noninterference—has been the rule among the powers that have invested in scientific exploration there, including the Soviet Union and the US. Whether Antarctica will always be so lacking in military significance is, of course, a question no one can answer.

But the validity or invalidity of the Antarctica analogy is not really the point. The question is rather how really useful the proposed treaty is as international insurance against conflict in space.

In this point, there are major loopholes in the language of the draft treaty that the Senate would do well to question. To begin with, Article 4 declares:

"States parties to the treaty undertake not to place in orbit around the earth any object carrying nuclear weapons or any other kinds of weapons of mass destruction, install such weapons on celestial bodies, or station such weapons in outer space in any other manner."

And it continues:

"The moon and other celestial bodies shall be used by all states parties to the treaty exclusively for peaceful purposes. The establishment of military bases, installations, and fortifications; the testing of any type of weapons; and the conduct of military maneuvers on celestial bodies shall be forbidden. The use of military personnel for scientific research or for any other peaceful purposes shall not be prohibited. The use of any equipment or facility necessary for peaceful exploration of the moon and other celestial bodies shall also not be prohibited."

This is a fine sentiment but, unfortunately, not much more than that, since there is no clear provision for the inspection, international or otherwise, of the earth launch sites from which weapons of mass destruction might be sent into orbit. Nor is there any clear provision for such inspection of extraterrestrial sites.

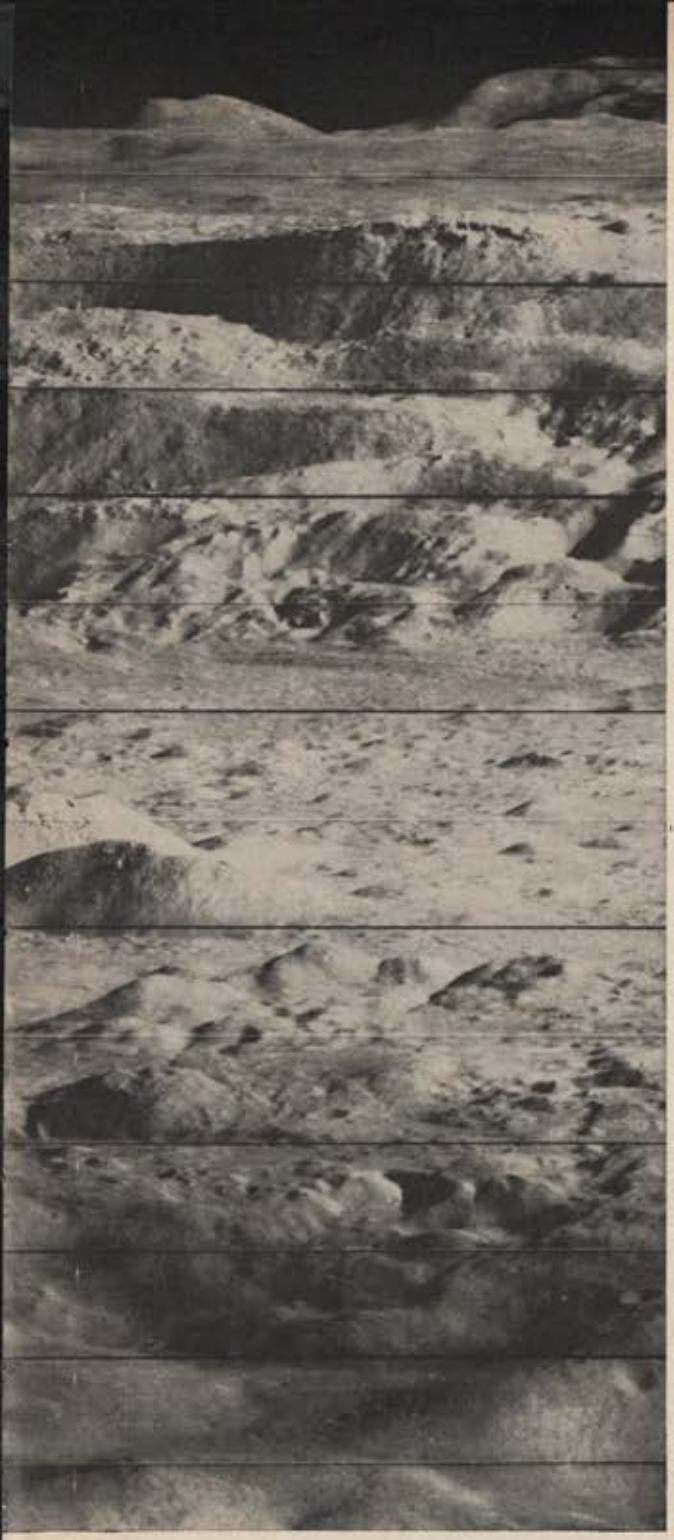
In the first instance, the closest the treaty gets to coming to grips with the earth launch-site inspection problem is a vague declaration in Article 10 that "the states parties to treaty shall consider on a basis of equality any requests by other states parties to the treaty to be afforded an opportunity to observe the flight of space objects launched by those states" and that the "nature of such an opportunity for observation and the conditions under which it could be afforded shall be determined by agreement between the states concerned."

In nondiplomatic language, this amounts to saying that everyone has the right to ask for, and be denied, access to launch sites. Thus, in view of the Soviet Union's historical and consistent passion for secrecy, the treaty simply freezes into diplomatic print a Soviet policy that has already forced the United States to spend a lot of money and talent for hardware to observe from space what the Russians won't let anybody see from the ground. Indeed, the Russian intransigence on inspection has only forced

The moon, shown in remarkable detail in this photo, relayed by Lunar Orbiter-2, of the Copernicus crater area, would not be subject to national territorial claims, under the terms of the proposed international space treaty. Also barred under the treaty are territorial claims to celestial bodies in general as well as any areas of space. The treaty's language establishes the international legal principle of freedom of space, analogous to freedom of the high seas. But despite the assumed value of establishing such principles, there are no provisions for inspection, international or otherwise, to assure compliance with the important article that forbids the deployment of weapons of mass destruction in space in the proposed agreement.

the US to put additional SECRET stamps on its own space effort.

On the second point, inspection of facilities on celestial bodies, Article 12 of the proposed treaty says that "all stations, installations equipment, and space vehicles on the moon and other celestial bodies shall be open to representatives of other states parties to the treaty on a basis of reciprocity. Such representatives shall give reasonable advance notice of a projected visit, in order that appropriate consultations may be held and that maximum precautions may be taken to assure safety and to avoid interference with



[the] normal operations in the facility to be visited."

This seems reasonable enough. Just let us know you are coming. But between notification, acceptance of the proposed visit, and the actual visit, a lot of outlawed military hardware on the moon or anywhere else can be concealed. That makes it pretty difficult for an inspector, if one of his purposes is to make sure that his celestial hosts are engaged in strictly scientific pursuits.

All this is not necessarily to suggest that there should be no treaty. Rather it is to say that in its anxiety to pursue détente with the Soviet Union—and this anxiety is surely mixed up with the probably idle hope that Russia will somehow help settle the Vietnamese War—we have compromised our once-strong insistence on the inspection principle. The Administration says "for background" that it is confident that we could discern a pattern of space-weapon system deployment in enough time to protect national security. But, one may ask, what is enough time in an age of multimegaton multiwarhead bombs?

Some will argue that it is the *fact* of a treaty that is really important and that this is a second major step toward world peace, following less than four years after the nuclear test-ban treaty of 1963. They will urge that this "great opportunity" not be missed, this chance to sign another pact with the Russians.

But is agreement in itself good, when what is agreed on is imperfect and vague, and, more importantly, when it raises false hopes and induces unfounded euphoria? Without claiming total altruism for the United States or assigning totally evil motivations to the Soviet Union, shouldn't a treaty covering a subject of such overriding importance as man's peaceful expansion into space be more meaningful? As the proposed treaty stands—minus firm provisions to guarantee the inspection rights from the ground up that are vital to ensure against spaceborne aggression—it is a pious declaration.

And that, some senators at least may suggest, is not enough.

After Apollo: Why?

THE SCENE: Boston's spectacular Prudential Center skyscraper complex which dominates the gray heavens over the queen city of New England.

THE EVENT: The American Institute of Aeronautics and Astronautics' Third Annual Meeting and Technical Display, November 29 through December 2.

PRESENT: Some 4,200 of the nation's leading aerospace technologists, hearing papers on subjects ranging from manned flights to Mars to the efficient design of integrated ground and air transport networks and the building of systems-engineered "new cities" to accommodate vast increases in the population.

THE SPECIAL FEATURE: A striking display in the Prudential Center's War Memorial Auditorium of the latest advances in aerospace technology ranging from supersonic-transport propulsion to heat-resistant materials designed to survive the thermal stresses of reentry from space.

NOTABLY ABSENT: The public—warned away by a large sign on the marquee of the exhibit hall, big as life, saying quite specifically: "Not Open to the Public."

QUESTIONS: With all due respect to the officers and meeting planners of the American Institute of Aeronautics and Astronautics, which happens to be the nation's largest technical society devoted to aviation and space technology (some 37,000 members), why were the members of AIAA—devoted as they are to the advance of aeronautics and astronautics—talking to themselves during a critical period of increasing legislative and public apathy about the national space

Connecticut Democrat, Rep. Emilio Q. Daddario, who urged the AIAA to take a more active role in the policy dialogue.

effort and a shortage of public understanding of the fantastic revolution in air transport that is nearly upon us?

Talking to themselves, when, with no diminuition of their technical integrity or standing as a scientific society, they should have been informing the public, which pays for and needs to understand the technological advances and projects that are changing the world around us so unnervingly fast.

Walter W. Finke, of Honeywell, Inc., in an accompanying article in this issue *(page 49)*, puts his finger on the problem to which we allude with his assertion that there is a "Semantic Curtain" that separates technologists and the public today. This separation, Mr. Finke suggests, is in large part responsible for the lag between technology and public policy, no matter what the field. He urges technologists and scientists to get involved in the crucial dialogues that must attend scientific advance *and* the application of technology to the solution of public problems.

At the AIAA meeting itself, the same point was made, in different words, by Rep. Emilio Q. Daddario, Democrat of Connecticut, a veteran member of the House space committee and chairman of its Subcommittee on Science, Research, and Development.

One of the highlights of the Boston AIAA meeting was an evening panel on Space and Public Policy. Mr. Daddario was the final speaker of the night, and after listening to an hour or so of the usual discussions of the scientific value of the space program and the spinoff to our economy, the Congressman candidly asked why the AIAA didn't come down to Washington and tell Congress what it believes the country ought to do in space.

There was a flustered response from AVCO's Dr. Arthur Kantrowitz, who is ordinarily one of the most articulate and thoughtful men in the aerospace industry in addition to being one of the nation's leading defense scientists. Dr. Kantrowitz indicated that such an action by AIAA would entail a complete reorganization of the society, that AIAA was a scientific society and that as such it would not take positions.

To this observer—and to others we talked to at the meeting in Boston—this view seems strangely detached. To be sure, AIAA is a scientific society, but we cannot see why that should preclude its speaking out as an organization, at least in general terms, on questions so close to its own purposes.

The hard fact of the matter is that space, like many other publicly financed efforts, cannot presently hope to attain continuing support simply on its own merits. It needs well-informed advocates, and certainly the array of scientists and technologists who belong to AIAA have just these credentials. At the same time, they are members of an "interest group" (practically everyone is, and there is nothing to be ashamed of in being so), and they have the duty *to themselves* to speak out.

In an article in the December 11, 1966, Washington *Post*, Dr. Joshua Lederberg, the distinguished biologist, remarked that "the most disastrous [budgetary] response in space policy would be a sudden cancellation of existing contracts and suspension of programs in midcourse. The economic and employment dislocations of such a rash reaction are a sufficient argument against it. But now that the competing values are so strident, this cannot justify an indefinite absent-minded extrapolation of past approaches."

There is wisdom there for AIAA to ponder.—END

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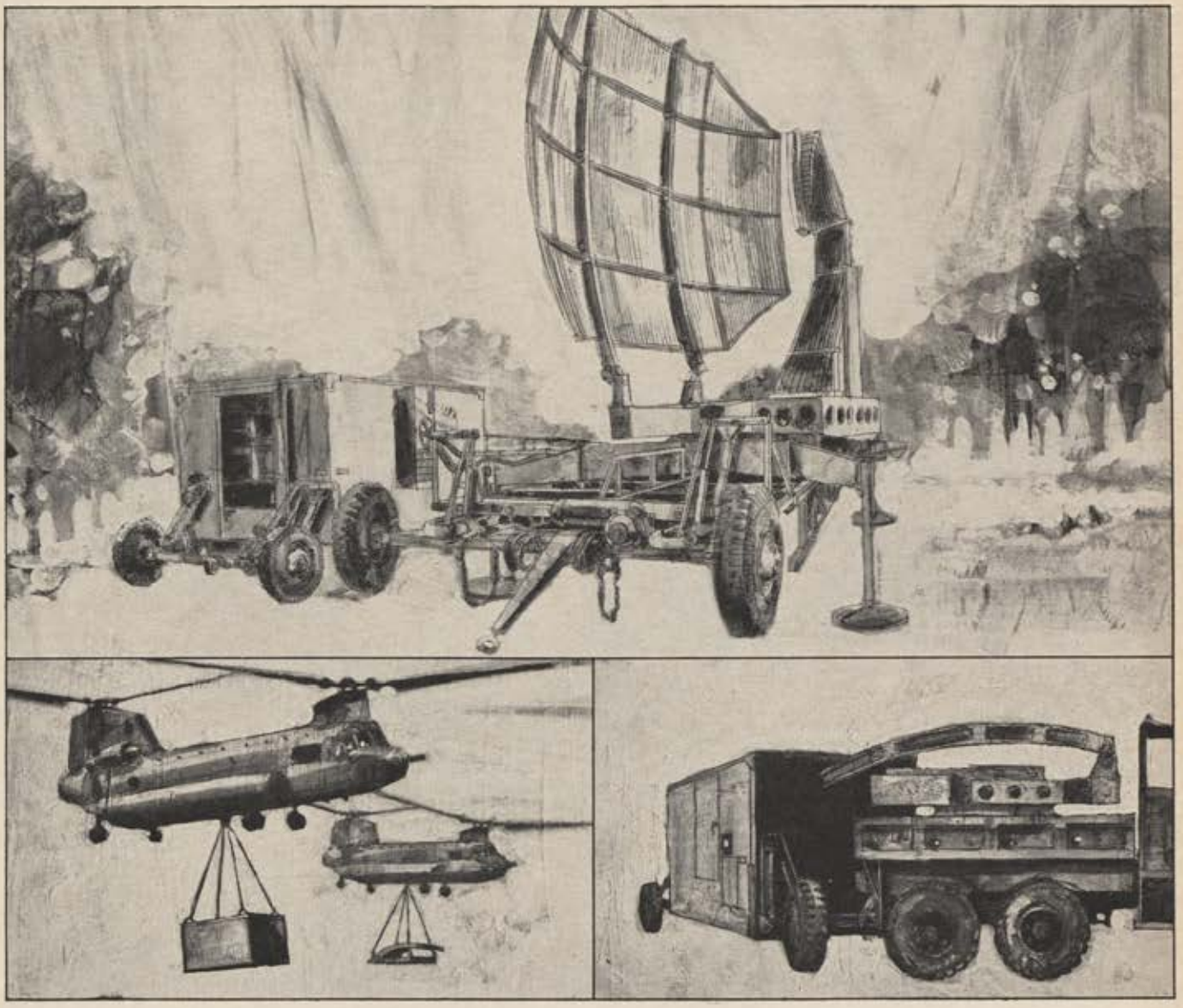

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As societal dilemmas become ever more complex in a world dominated increasingly by technology, technologists must enter the real world of policy to offer their ideas for the intelligent use of technology to improve the lot of mankind. This point was made eloquently in a recent speech by Walter W. Finke, group vice president of Honeywell, Inc.'s Computer Group, to the 1966 Spring Joint Computer Conference, held in Boston, Mass., in April 1966. A condensation of Mr. Finke's speech follows:

Making Technology a Universally Available Tool

BY WALTER W. FINKE

OUR technical profession lives behind a Semantic Curtain, a shroud of its own manufacture through which the outside world, can seldom penetrate; but, even worse, through which the ideals, convictions, and values of our inner world emerge fitfully and only in part—if they emerge at all.

Like other curtains in the world—notably the Iron and Bamboo—this Semantic Curtain provides an effective barrier behind which exists a society apart from society. It contributes pressures, fears, and anxieties at the same time that it contributes its steady stream of new products, processes, and applications.

Behind this curtain reside some of the world's best minds. Behind it are some of its most competent planners and thinkers. Behind it, too, are great ideas, ingenious solutions, sound programs. But by and large this society is preoccupied with its own ponderously constructed orthodoxy. It stands aloof, alone, and limited in shaping its own destiny, for its spokesmen are few, its influence limited. It is a society that operates, as other curtained societies do, without understanding the need for human consent and commitment to its actions. In its own way, it is dictatorial, its people shackled by consuming allegiance to the Scientific Method.

A "language barrier" as real as any that exists in the world today separates this technocratic society from the remainder of society. And the tragedy is that little attempt is made to break down that barrier. No initiative is exercised to take a firmer hand in the direction of human affairs. Laissez faire sums up the attitude of the group. It stands intransigent against demands by society for involvement.

This situation is compounded by other factors, to be sure. For one, technical people have been isolated by a protective cushion set up by the organizations that employ them—industrial, government, research and development groups, and others. Also, their background, training, and job demands often contribute more to introspection than extroversion.

The result of all this is to produce both a sense of security and a sense of frustration. Security, because there is a basic demand for the technologist's skills that will lead interested bidders to great lengths to acquire them . . . [and] frustration, because he senses the limits of his growth despite the enticements offered for his services. He is a person at the mercy of many variables—a canceled defense program, the threat of obsolescence of his skills, the vicissitudes of organization charts.

He has little hope of broadening his range of influence. If he chooses to speak, he often finds no one is listening. If the right audience is there, his presentation—from lack of perspective and experience—is likely to be ineffective. Thus we develop a stereotype that describes many thousands of our technical people today. And thus we arrive at [the requirement]: *The technical community must broaden its sphere of influence and concern.* And in doing so, it might well adopt a few of the techniques of the evangelist. Technologists must learn to become persuasive. They must strive to communicate with greater clarity to broader audiences. Most important, they must become as adept at engineering human consent and commitment as they are at engineering new products and processes.

There is a critical need for the technical community of this country to take a more vocal and active role in social affairs. The factors that create that need are intensifying the pressure to fulfill it. Let us examine some of these factors, especially those related to the information sciences field, that will force technologists from their curtained chambers into the world at large:

- First, the rate of technological change is outpacing society's ability to react to it.

It is clearly apparent that the mechanism for producing technological change is far more efficient than the mechanism to produce commensurate social change. We have clear methods and procedures for introducing new technology, but only the crudest mechanisms for cushioning the impact of that tech-

nology. . . . [For example] computers are superimposed everywhere. They make possible journeys to the stars at the same instant they provide mankind with the most efficient tools for his own destruction. They allow massive increases in the production of automobiles at the same instant they tally record numbers of highway deaths. They open new employment opportunities at the moment they snuff out or change the job content of other positions.

Despite these technological facts of life, there is too little evidence of substantive social adjustment to them. In the vacuum created by sluggish social reaction to rapid technical change there has come into being too large a segment of the population bearing a new name—"automation dropouts."

Our response to these social disruptions has been minimal. Just a few months ago, the National Commission on Technology, Automation, and Economic Progress published a report on the subject that by its inconclusiveness—because of many factors—only served to underscore the currency and severity of the problems.

If this country continues to pursue technology headlong without developing a more sophisticated capacity to adapt society to it, we can safely anticipate more of these same problems on a vastly larger scale. This is not a neo-Luddite philosophy of fear. It is a candid view of a real situation.

As society advances, it inevitably causes shifts in values and emphasis. This leads to the second factor that will require of [technologists] a more vocal and influential role:

• That is, technology's unique stature in society requires greater participation in human affairs.

The challenge we face in this whole matter is largely one of problem definition. What are the root causes of current social problems? Where do they stem from? What do they encompass? It is axiomatic in our business of information processing that the first need is to describe the problem, establish its parameters, and build the system needed to handle it. The effectiveness of the final system is measured by the quality of the initial problem definition more than by any other single factor.

The skills of problem definition, of breaking down a massive and nearly incomprehensible set of factors into component parts that can be attacked prudently and efficiently, are skills [technologists] possess. They are not necessarily the skills of the political leader, of the social action proponent, of the labor boss, or of the top business executive. They are skills of the systems technologist. These skills, guided by the thoughtful involvement of the nation's leadership, can and should be brought to bear on the problems of defining and implementing social mechanism for change.

Surely it is paradoxical that with all our talents for developing weapon control systems, missile systems, industrial process systems, business information systems, and the myriad other systems of our technologies we have done so poorly in providing the data collection and analysis systems needed to abet social change. Are we incapable of devising such systems? I choose to think we are not.

The solutions to them must come from concerted action, not just by political and social leaders, but by technologists as well. The talents of . . . industry must somehow be applied to these problems. . . .

It is true that technologists have held a special and separate place in our social system. The essential reason for this has been that, for the past 100 years, technology has been a vital factor in our social progress. It has been the whiplash of economic growth. But it has also become a victim of its own success, in the sense that by its commonness it has ceased to be a subject that inspires awe. . . .

The fact is that technology's role, rather than contracting, will expand in the future. But the insular nature of its practitioners will undergo radical change. Rather than a society within a society, separated by a Semantic Curtain, the technical community will find itself involved in greater numbers of broad-based activities.

We see this happening in selected instances already. Systems, programming, simulation, and applications experts are finding their ways into wide-vision management positions in government, industry, education, and other fields. Their purely technical outlooks are being forced to adapt to these new responsibilities. This involvement is likely to spread rapidly in coming years into such fields as medicine, law, social sciences, and local and state governments as supporting staffs for information systems evolve and mature.

It is essential then, whether this transition is measured in years or decades, that the technical community develop a generalist's viewpoint to complement its necessary technical outlook. Its characteristic "narrow window on the world" will provide inadequate peripheral vision for the years ahead.

[Technologists] have the option of viewing [their] growing involvement in one of two ways: [They] can resist it and retain, for as long as progress allows, [their] present insularity. Or, [they] can assume a more influential role, and thus become initiators of change and contributors to the destiny of man.

If we accept [the] thesis that the recent era of invention-technology-scientific discovery has served to pave the way for a new era—the era of developing human resources and organization—then I hope that we also can conclude that the technologist's role is indeed changing.

Several years ago . . . Sir Charles Snow expressed one view of this matter by saying—in a statement heard round the world—that he feared that technological progress would eventually lead to a situation in which life-or-death decisions would one day be made by a small scientific elite "who do not quite understand what the depth of the argument is."

That is, he said, "one of the consequences of the lapse or gulf in communications between scientists and nonscientists."

In the headlines that resulted from his statement, the full context of his remarks were lost. [Let me repeat them] now because they serve as appropriate emphasis for the third consideration which must cause [us] to reexamine the importance of broadening [our] roles in the world. And that point is:

• Technology is already creating an environment for greater human understanding.

Despite the doomsday tone of his reported com-

ments, Sir Charles also concluded by saying he was "not in the least pessimistic about our finding our way through these difficulties and dangers." He credited individual human judgment as being the key factor to a viable society, by saying: "There is no substitute for individual human judgment; and the wider it is spread, the healthier and more viable this society is likely to be."

The few years that have elapsed since those statements seem to have borne out Sir Charles's faith. For I think the danger of a scientific elite, if there ever was one, has largely subsided. The irresistible march of time has brought man to a point at which his social relationships are becoming larger and more complex. As human accomplishment moves closer to human aspiration, man is invariably called upon to make greater and more complex adjustments in his thought and action patterns.

Technology has come along to help in this matter. And rather than serving the few, it will serve all humanity in making these adjustments. It is a catalyst that can soften the harshness of rapid change, because it will allow us to become more thoughtful and to spend more time seeking for the intelligent answers which future progress demands.

Today we see change everywhere. New modes of transportation. Improved products at home, on the job, and during growing leisure-time activities. Expanded means of communication. An outpouring of services. But these represent only the superficial levels of change.

Beneath them lie the fundamental levels of changing attitudes, opinions, feelings, ideals, and convictions that accompany any social evolution. Never before has the rate of change at either level been so precipitous, and never before has so much technology been mustered to meet it. Because of its diversity and capacity to meet these changes, I believe technology will go down in history more for its role as an agent of understanding in the world of tomorrow than for its impressive productive capacity in the world of today.

Technology in general frees man from his centuries-old preoccupation with working by the sweat of his brow. It subverts manual labor and substitutes more thoughtful activities. Information technology in particular brings new dimensions of useful and timely information. Thus technology opens new opportunities for man to understand and be understood by his fellow man. It will bring new broadness to viewpoints at the same time it destroys the clay idols of prejudice, parochialism, and apathy.

As that occurs, every segment of our society will be affected. For the scope of technology has no single master, no tight elite which it will serve to the exclusion of others. It is the servant of all society, and as such will broaden the scope and depth of the "individual human judgment" which Sir Charles considers so necessary to viable social relationships.

This is happening on broad fronts in the world today. While the incidence of political and prejudiced resistance remains substantial in many areas, it is nevertheless diminishing under the inexorable pressures of greater knowledge and understanding.

On religious fronts, for example, there is growing unity among like faiths as well as greater understanding, tolerance, and communications among those with fundamentally different beliefs.

The barriers once erected by national origins have been torn down. A man's heritage used to be the controlling factor of his chance for success. Today this notion has been dissipated, and we seek the knowledge of all capable individuals, regardless of race, color, or creed.

On political fronts, Attila, Alexander, Caesar, Napoleon, and more recently Hitler—to name just a few—interpreted power as military expansion and control over new territories, peoples, and resources. The notion of coexistence, which has as its implicit hope peaceful solutions to political problems, never occurred to them. But today it exists as a fundamental policy of virtually every world power. Expansion of power is now the province of the cold war rather than the hot war. The battle is waged for man's mind more than for his body.

Technology in its many forms has contributed to each of these evolving world situations. Sophisticated communications, transportation, and weaponry have all played a role. In this context, where will technology eventually lead—except to continued evolution of man's understanding of man?

Furthermore, technology must be a universally available tool. History has taught us that human invention is never long the exclusive domain of a specific individual or group or nation. This is eminently so of current technology.

While this country may lead in the abundance, quality, and sophistication of technical capability, that lead is likely to diminish for several reasons:

First, the very openness of our society helps contribute to the world's fund of knowledge. Second, our economic base is no longer national, but international in dimension; products and processes developed here are shortly put to use around the globe. And third, one of the goals of our specific discipline —information sciences—is to increase the efficiency with which information is interchanged. We all know just how efficient that interchange is likely to become. . . .

When we stop to consider that twenty-five percent of all the people who have ever lived are alive today, the urgency of the need to broaden the world's technological capacity becomes clear. For only by equitable distribution of technology can we provide an equitable basis for mutual understanding.

I have discussed these three points . . . because to me they emphasize the need for involving the technical community in the affairs of humanity to a greater extent than ever before. I recognize there are no simple solutions to the extremely complex problems that confront all society today. I recognize that no one group's voice can bring complete deliverance or resolve dilemmas. But it is the recognition of both of these truths which leads me . . . to call upon [technologists to exercise] a greater place in world affairs.

For there is another truth of equal urgency—and that is that, while no one group can solve all these problems, neither can any one group afford to be absent from the world court that is discussing them. As technologists, [we] have largely been absent.—END

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Having mounted our initial technological and scientific assault on space, it is imperative, in the view of one of the prime scientific movers of the space age, that more advanced space programs be planned. No nation can be great, he says, "if it abdicates the great technologies to others." The following is excerpted from an address given October 7, 1966, at a NASA ceremony in Washington, D. C., by Lloyd V. Berkner, Chairman of the Board of the Graduate Research Center of the Southwest, Dallas, Tex. Dr. Berkner was one of the planners of the International Geophysical Year that led to Sputnik and the start of the US space effort.

Space Now—Only the Beginning

BY LLOYD V. BERKNER

HOW FAR have we come [in space]? Certainly the basic strategic goal of scientific manned exploration of the moon is still ahead—but achievement of that goal is now clearly in sight, and, as nearly as we can predict, on schedule. Already complex technological tactics, that contained serious unknowns in 1961, have been mastered, until today teams of men move into and in space with relative ease and safety. We have successfully orbited the moon, and soft-landed instruments on it, to photograph and examine its surface with a precision inconceivable a decade past. We have conducted the preliminary exploration of our neighboring planets, Venus and Mars, thereby advancing our knowledge enormously—answering age-old questions, and raising new and more precise ones. We have created a new communications technology that multiplies man's opportunity for long-range communications by a thousand, and will cut its costs enormously. We are tracking hurricanes and providing powerful new means of watching and predicting our weather. We are providing new and more precise navigation systems.

We are conducting complex scientific experiments in space that give us a new order of understanding of the astronomical system of which we are a part, the sun, the stars in their creation and death, the complexities of the solar wind that encompasses us, the sheath of the protective magnetosphere surrounding the earth, and of the earth's changing radiation belts. At this moment, Pioneer VI and Pioneer VII are carrying into the far reaches of space instruments designed by the scientists of my own Graduate Research Center at Dallas, Tex. Daily, Pioneer VI, at 100,000,000 miles—further away than the sun—is faithfully reporting the ever-changing qualities of space to our scientists from more than one astronomical unit away. In time Pioneer VII will do the same from the outer reaches of our planetary system.

We could go on to list these achievements almost without end. But I believe our real accomplishment in space from the point of view of the average citizen takes two forms:

First, as Dr. Jerome B. Wiesner, former Science Adviser to the President, has pointed out, "Invention today depends not only upon a sophisticated body of [scientific] information, but also upon a sophisticated technology." By setting our space goals at the limits of our capability, we have created standards of technological perfection that challenge an equal technological perfection by every industry in our land. These new technological standards are being felt by every man in the new levels of productivity, the new products and services that are making possible our ever-more-affluent technological society.

Second, our spirit will allow no nation to surpass us technologically. Our greatness as a nation rests unambiguously on our willingness and our capability to master any technology that is scientifically within reach. Indeed, no nation can be really great if it abdicates the great technologies to others, and our people demand that our space capability be second to none. As a people, we have no intention of letting others command space, and with it command us, while we sit on the ground.

What of the future? We have already said that our initial goals are now well within reach. In the foreseeable future we will land men on the moon for its scientific exploration. Those men and their equipment are now being readied for their task.

But those strategic goals were set in 1961—nine or ten years before their achievement. For a successful and efficient future space technology we must have equal lead time to follow orderly technological planning and development.

The most costly, inefficient, and dangerous course would be a series of late, last-minute crash programs —to try to equal in performance the well-planned program of another nation. The very success of our present orderly technological course in space would dictate that we now *should not* fall back on a policy of expediency.

We now have a powerful machinery for the command of space—trained specialists, mighty rockets, a technological dexterity that is unsurpassed. But to keep this capability, we must have new strategic objectives. And that there are many worthwhile and compelling objectives [for us in space] there can be no doubt.

There is the manned exploration of Mars and perhaps even of Venus. But before this can be done, a thorough unmanned and intimate preliminary survey of these planets and their atmospheres is imperative. Such precedent surveys are required for safety, for the orderly acquisition of basic data before our neighboring planets are contaminated, and for efficient ultimate conduct of manned scientific studies at the most rewarding locations. So the strategy of manned landing on Mars and perhaps Venus is a long one—of the order of two decades—with many essential intervening and precedent steps. The scientific rewards of such exploration are great. As our own planet earth becomes overcrowded it becomes critical to all mankind to know how stable our own environment really is. Here detailed knowledge of other planets will permit more general and vitally needed comprehension of our own atmosphere, our own terrestrial resources.

But aside from planetary exploration, other rewarding ventures are within reach—the geophysical exploration of the moon with a later decision on establishing a base there, preparation for advanced manned exploration of spaceflights beyond the moon, versatile scientific manned orbital laboratories around the earth, rescue and inspection missions in space.

I will not debate here which strategy or combination of strategies will be most rewarding or what schedules are most reasonable and within our means. A great deal of thought and study of these strategies is available and sensible strategic decisions can be made—decisions which will ensure a balanced program to maintain flexibility while sustaining our leadership in science, technology, and international affairs.

But I would assert that it is now imperative that most advanced space strategies be adopted—and quickly—if our space program is to remain efficient and effective. And I would suggest that whatever this further strategy, it employ and advance our full capability in science, men, mechanisms, and skill. —END

Can Technology Replace 'Social Engineering'?

BY DR. ALVIN M. WEINBERG

Although technology cannot offer perfect solutions to pressing public social and environmental problems, it can offer important "quick fixes" that buy us time for the social and policy changes seen vital by reformers. Dr. Alvin M. Weinberg, Director of the Oak Ridge National Laboratory, Oak Ridge, Tenn., a distinguished pioneer in nuclear reactor technology, and a frequent commentator on science and public policy, writes provocatively on this theme in the article that follows, which is reprinted here, in condensed form, with permission, from the* University of Chicago Magazine, *October 1966 issue.

IN THE past few years there has been a major change in focus of much of our federal research. Instead of being preoccupied with technology, our government is now mobilizing around problems that are largely social. We are beginning to ask what we can do about world population, about the deterioration of our environment, about our educational system, our decaying cities, race relations, poverty. . . .

Social problems are much more complex than are technological problems. It is much harder to identify a social problem than a technological problem: How do we know when our cities need renewing, or when our population is too big, or when our modes of transportation have broken down? The problems are, in a way, harder to identify just because their solutions are never clear-cut: How do we know when our cities are renewed, or our air clean enough, or our transportation convenient enough? By contrast, the availability of a crisp and beautiful technological solution often helps focus on the problem to which

the new technology is the solution. I doubt that we would have been nearly as concerned with an eventual shortage of energy as we now are if we had not had a neat solution—nuclear energy—available to eliminate the shortage.

There is a more basic sense in which social problems are much more difficult than are technological problems. A social problem exists because many people behave, individually, in a socially unacceptable way. To solve a social problem one must induce social change—one must persuade many people to behave differently than they have behaved in the past. One must persuade many people to have fewer babies, or to drive more carefully, or to refrain from disliking Negroes. By contrast, resolution of a technological problem involves many fewer individual decisions. Once President Roosevelt decided to go after atomic energy, it was by comparison a relatively simple task to mobilize the Manhattan Project.

The resolution of social problems by the traditional methods—by motivating or forcing people to behave more rationally—is a frustrating business. People don't behave rationally; it is a long, hard business to persuade individuals to forego immediate personal gain or pleasure (as seen by the individual) in favor of longer-term social gain. And indeed, the aim of social engineering is to invent the social devices—usually legal, but also moral and educational and organizational—that will change each person's motivation and redirect his activities along ways that are more acceptable to the society.

The technologist is appalled by the difficulties faced by the social engineer; to engineer even a small social change by inducing individuals to behave differently is always hard even when the change is rather neutral or even beneficial. For example, some rice eaters in India are reported to prefer starvation to eating wheat which we send to them. How much harder it is to change motivations where the individual is insecure and feels threatened if he acts differently, as illustrated by the poor white's reluctance to accept the Negro as an equal. By contrast, technological engineering is simple: The rocket, the reactor, and the desalinization plants are devices that are expensive to develop, to be sure, but their feasibility is relatively easy to assess; and their success relatively easy to achieve once one understands the scientific principles that underlie them.

It is, therefore, tempting to raise the following question: In view of the simplicity of technological engineering, and the complexity of social engineering, to what extent can social problems be circumvented by reducing them to technological problems? Can we identify Quick Technological Fixes for profound and almost infinitely complicated social problems, "fixes" that are within the grasp of modern technology, and which would either eliminate the original social problem without requiring a change in the individual's social attitudes, or would so alter the problem as to make its resolution more feasible? To paraphrase Ralph Nader, to what extent can technological *remedies* be found for social problems without first having to remove the *causes* of the problem? It is in this sense that I ask, "Can technology replace social engineering?"

Past Fixes

To better explain what I have in mind, I shall describe how two of our profoundest social problems —poverty and war—have in some limited degree been solved by the Technological Fix, rather than by the methods of social engineering. Let me begin with poverty.

The traditional Marxian view of poverty regarded our economic ills as being primarily a question of maldistribution of goods. The Marxist recipe for elimination of poverty, therefore, was to eliminate profit, in the erroneous belief that it was the loss of this relatively small increment from the worker's paycheck that kept him poverty-stricken. The Marxist dogma is typical of the approach of the social engineer: One tries to convince or coerce many people to forego their short-term profits in what is presumed to be the long-term interest of the society as a whole.

The Marxian view seems archaic in this age of mass production and automation, not only to us but apparently to many Eastern Bloc economists. For the brilliant advances in the technology of energy, of mass production, and of automation, have created the affluent society. Technology has expanded our productive capacity so greatly that even though our distribution is still inefficient, and unfair by Marxian precepts, there is more than enough to go around. Technology has provided a "fix"—greatly expanded production of goods—which enables our capitalist society to achieve many of the aims of the Marxist social engineer without going through the social revolution Marx viewed as inevitable. Technology has converted the seemingly intractable social problem of widespread poverty into a relatively tractable one.

My second example is war. The traditional Christian position views war as primarily a moral issue: If men become good, and model themselves after the Prince of Peace, they will live in peace. This doctrine is so deeply ingrained in the spirit of all civilized men that I suppose it is blasphemy to point out that it has never worked very well—that men have not been good, and that they are not paragons of virtue or even of reasonableness.

Though I realize it is a terribly presumptuous claim, I believe that Edward Teller may have supplied the nearest thing to a Quick Technological Fix to the problem of war. The hydrogen bomb greatly increases the provocation necessary to lead to large-scale war—and not because men's motivations have been changed, not because men have become more tolerant and understanding, but rather because the appeal to the primitive instinct of self-preservation has been intensified far beyond anything we could have imagined before the H-bomb was invented. To point out these things today, with the United States involved in a shooting war, must sound hollow and unconvincing; yet the desperate and partial peace we have now is much better than a full-fledged exchange of thermonuclear weapons.

One can't deny that the Soviet leaders now recognize the force of H-bombs, and that this has surely contributed to the less militant attitude of the USSR. And one can only hope that the Chinese leadership, as it acquires familiarity with H-bombs, will also

become less militant. If I were to be asked who has given the world a more effective means of achieving peace—our great religious leaders who urge men to love their neighbors and thus avoid fights, or our weapons technologists who simply present men with no rational alternative to peace—I would vote for the weapons technologists. That the peace we get is at best terribly fragile I cannot deny; yet, as I shall explain, I think technology can help stabilize our imperfect and precarious peace.

Future Fixes

Are there other Technological Fixes on the horizon, other technologies that can reduce immensely complicated social questions to a matter of "engineering"? Are there new technologies that offer society ways of circumventing social problems and at the same time do *not* require individuals to renounce short-term advantage for long-term gain?

Probably the most important new Technological Fix is the Intra-Uterine Device for birth control. Before the IUD was invented, birth control demanded very strong motivation of countless individuals. Even with the pill, the individual's motivation had to be sustained day in and day out; should it flag even temporarily, the strong motivation of the previous month might go for naught. But the IUD, being a one-shot method, greatly reduces the individual motivation required to induce a social change. . . .

Let me turn now to problems which have from the beginning had both technical and social components —broadly those concerned with conservation of our resources: our environment, our water, and our raw materials for production of the means of subsistence. The social issue here arises because many people by their individual acts cause shortages and thus create economic, and ultimately social, imbalance. For example, people use water wastefully, or they insist on moving to California because of its climate, and so we have water shortages; or too many people drive cars in Los Angeles with its curious meteorology, and, as a result, Los Angeles suffocates from smog.

The water resources issue is a particularly good example of a complicated problem with strong social and technological connotations. Our management of water resources in the past has been based largely on the ancient Roman device, the aqueduct: Every water shortage was to be relieved by stealing water from someone else who at the moment didn't need the water or was too poor or too weak to prevent the theft. Southern California would steal from Northern California, New York City from upstate New York, the farmer who could afford a cloud seeder from the farmer who could not afford a cloud seeder. The social engineer insists that such shortsighted expedients have got us into serious trouble; we have no water resources policy, we waste water disgracefully, and, perhaps, in denying the ethic of thriftiness in using water we have generally undermined our moral fiber. The social engineer, therefore, views such technological shenanigans as being shortsighted, if not downright immoral. Instead, he says, we should persuade or force people to use less water, or to stay in the cold Middle West, where water is plentiful, instead of migrating to California, where water is scarce.

The water technologist, on the other hand, views the social engineer's approach as rather impractical. To persuade people to use less water, to get along with expensive water, is difficult, time consuming, and uncertain in the extreme. Moreover, say the technologists, what right does the water resources expert have to insist that people use water less wastefully? . . .

Here we have a sharp confrontation of the two ways of dealing with a complex social issue: the social engineering way, which asks people to behave more "reasonably," and the technologists' way, which tries to avoid changing people's habits or motivations. Even though I am a technologist, I have sympathy for the social engineer. I think we must use our water as efficiently as possible, that we ought to improve people's attitudes toward the use of water, and that everything that can be done to rationalize our water policy should be welcome. Yet, as a technologist, I believe I see ways of providing more water more cheaply than the social engineers may concede is possible.

I refer to the possibility of nuclear desalination. The social engineer dismisses the technologist's simple-minded idea of solving a water shortage by transporting more water primarily because in so doing the water user steals water from someone else—possibly foreclosing the possibility of ultimately utilizing land now only sparsely settled. But surely water drawn from the sea deprives no one of his share of water. The whole issue is then a technological one: Can fresh water be drawn from the sea cheaply enough to have a major impact on our chronically water-short areas like Southern California, Arizona, and the Eastern Seaboard?

I believe the answer is yes, though much hard technical work remains to be done. A large program to develop cheap methods of nuclear desalting has been undertaken by the United States, and I have little doubt that within the next ten to twenty years we shall see huge dual-purpose desalting plants springing up on many parched seacoasts of the world. At first these plants will produce water at municipal prices. But I believe, on the basis of research now in progress at Oak Ridge National Laboratory and elsewhere, that water from the sea at a cost acceptable for agriculture—less than ten cents per thousand gallons—is eventually in the cards. In short, that for areas close to the seacoasts, technology can provide water without requiring a great and difficult-to-accomplish change in attitudes toward the utilization of water.

The Technological Fix for water is based on the availability of extremely cheap energy from very large nuclear reactors. What other social consequences can one foresee flowing from really cheap energy eventually available to every country regardless of its endowment of conventional resources? Though we now see only vaguely the outlines of the possibilities, it does seem likely that from very cheap nuclear energy we shall get hydrogen by electrolysis of water, and thence the all-important ammonia fertilizer necessary to help feed the hungry of the world;

we shall reduce metals without requiring coking coal; we shall even power automobiles with electricity, via fuel cells or storage batteries, thus reducing our world's dependence on crude oil, as well as eliminating our air pollution insofar as it is caused by automobile exhaust or by the burning of fossil fuels. In short, the widespread availability of very cheap energy everywhere in the world ought to lead to an energy [self-sufficiency] in every country of the world; and eventually to a [self-sufficiency] in the many staples of life that should flow from really cheap energy.

I hope these examples suggest how social problems can be circumvented or at least reduced to less formidable proportions by the application of the Technological Fix. The examples I have given do not strike me as being fanciful, nor are they at all exhaustive. I have not touched, for example, upon the extent to which really cheap computers and improved technology of communication can help improve elementary teaching without having first to improve our elementary teachers. . . . Nor have I invoked some really fanciful Technological Fixes: like providing air conditioners and free electricity to operate them for every Negro family in Watts on the assumption . . . that race rioting is correlated with hot, humid weather; or the ultimate Technological Fix, Aldous Huxley's Soma Pills that eliminate human unhappiness without improving human relations in the usual sense.

My examples illustrate both the strength and the weakness of the Technological Fix for social problems. The Technological Fix accepts man's intrinsic shortcomings and circumvents them or capitalizes on them for socially useful ends. The Fix is therefore eminently practical and in the short term relatively effective. One doesn't wait around trying to change people's minds: If people want more water, one gets them more water rather than requiring them to reduce their use of water; if people insist on driving autos while they are drunk, one provides safer autos that prevent injuries even in a severe accident.

But the technological solutions to social problems tend to be incomplete . . . to replace one social problem with another. Perhaps the best example of this instability is the peace imposed upon us by the H-bomb. Evidently the *pax hydrogenium* is [instable] in two senses: In the short term, because the aggressor still enjoys such an advantage; in the long term, because the discrepancy between have and have-not nations must eventually be resolved if we are to have permanent peace. Yet, for these particular shortcomings, technology has something to offer. To the imbalance between offense and defense, technology says let us devise passive defense which redresses the balance. A world with H-bombs and adequate civil defense is less likely to lapse into thermonuclear war than a world with H-bombs alone, at least if one concedes that the danger of thermonuclear war mainly lies in the acts of irresponsible leaders. Anything that deters the irresponsible leader is a force for peace: A technologically sound civil defense would therefore stabilize the balance of terror.

To the discrepancy between haves and have-nots, technology offers the nuclear-energy revolution, with its possibility of [self-sufficiency] for haves and have-nots alike. How this might work to stabilize our . . . thermonuclear peace is suggested by the possible political effect of the recently proposed Israeli desalting plant: The Arab states, I should think, would be much less concerned with destroying the Jordan River Project if the Israelis had a desalination plant in reserve that would nullify the effect of such action. In this connection, I think countries like ours can contribute very much. Our country will soon have to decide whether to continue to spend $5.5 billion per year for space exploration after our lunar landing. Is it too outrageous to suggest that some of this money be devoted to building huge nuclear desalting complexes in the arid ocean rims of the troubled world? If the plants are powered with breeder reactors, the out-of-pocket costs, once the plants are built, should be low enough to make large-scale agriculture feasible in these areas. I estimate that for $4 billion per year we could build enough desalting capacity to feed more than ten million new mouths per year (provided we use agricultural methods that husband water), and we would thereby help stabilize the metastable, bomb-imposed balance of terror.

Yet I am afraid we technologists shall not satisfy our social engineers, who tell us that our Technological Fixes do not get to the heart of the problem; they are at best temporary expedients; they create new problems as they solve old ones; to put a Technological Fix into effect requires a positive social action. Eventually, social engineering, like the Supreme Court decision on desegregation, must be invoked to solve social problems. And of course our social engineers are right. Technology will never *replace* social engineering. But technology has provided and will continue to provide to the social engineer broader options, to make intractable social problems less intractable; perhaps, most of all, technology will buy time, that precious commodity that converts violent social revolution into acceptable social evolution.

Our country now recognizes and is mobilizing around the great social problems that corrupt and disfigure our human existence. It is natural that in this mobilization we should look first to the social engineer. But unfortunately the apparatus most readily available to the government, like the great federal laboratories, is technologically oriented, not socially oriented. I believe we have a great opportunity here: For many of our seemingly social problems do admit of partial technological solutions. Our already deployed technological apparatus can contribute to the resolution of social questions. I plead, therefore, first for our government to deploy its laboratories, its hardware contractors, and its engineering universities around social problems. And I plead secondly for understanding and cooperation between technologist and social engineer. Even with all the help he can get from the technologist, the social engineer's problems are never really solved. It is only by cooperation between technologist and social engineer that we can hope to achieve what is the aim of all technologists and social engineers—a better society, and thereby a better life, for all of us.—END

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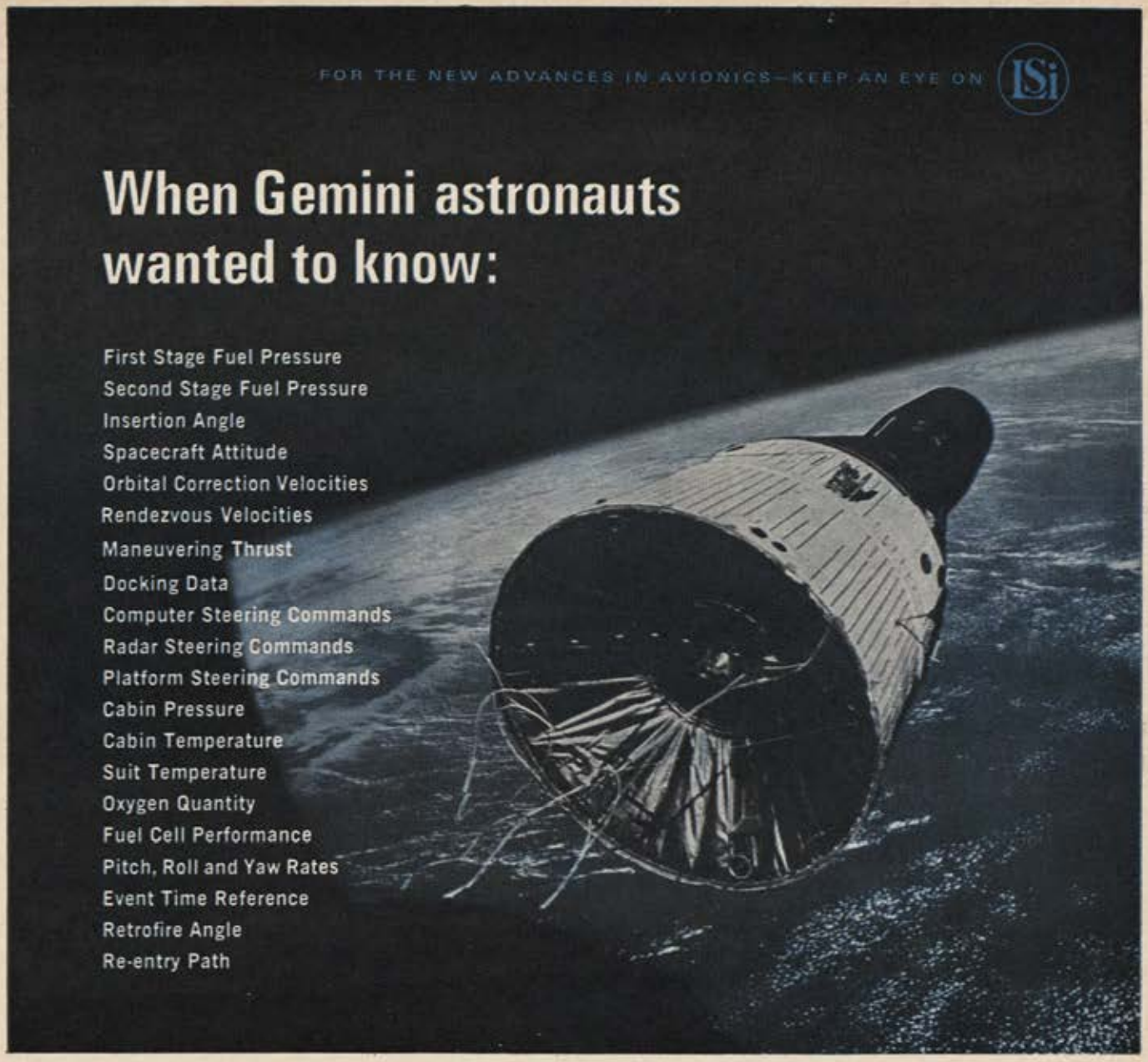

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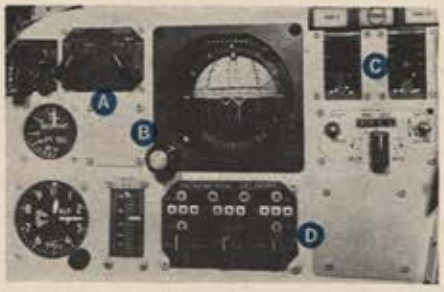

In view at left: **A.** *Flight Director Controller,* **B.** *Attitude Director Indicator,* **C.** *Pressure Indicators (1st and 2nd stages) and* **D.** *Incremental Velocity Indicator. Other LSI instruments monitored Gemini's power system, cabin temperature and pressure, and oxygen supply.*

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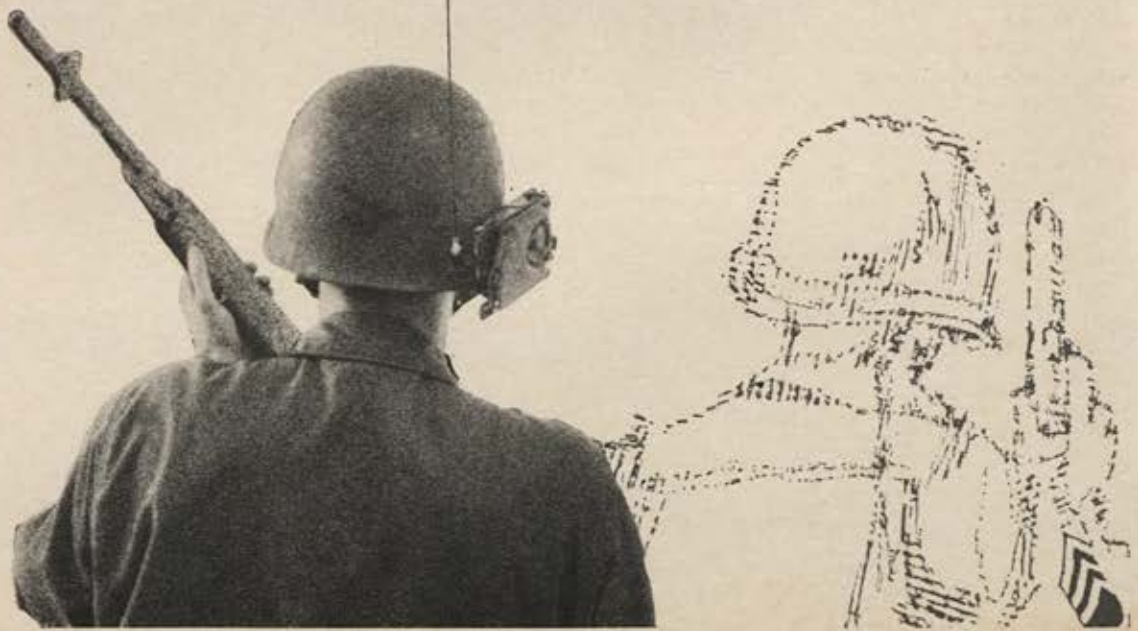

AIR FORCE
JANUARY, 1967

Britain's Royal Air Force will be the world's first combat air arm to be equipped with an operational vertical takeoff fighter when the P.1127 enters its inventory beginning in 1968. Operating from small clearings alongside forward units, it will be able to provide immediate close air support to ground forces. Some logistics and command-control problems are still to be resolved, but an important first chapter in military V/STOL history is destined to be written by . . .

The RAF's New Jump-Jet

By Stefan Geisenheyner
AIR FORCE/SPACE DIGEST EDITOR FOR EUROPE

HS P.1127 FGA (RAF)—these cryptic clusters stand for a significant achievement in modern military aviation. Fully spelled out, they say: Hawker Siddeley, Project 1127, Fighter, Ground Attack (Royal Air Force variant).

The capabilities of the aircraft cannot be deduced, however, from its official designation. The P.1127 can take off and land vertically, can fly sideways or even backward, and it reaches supersonic speeds at altitude and high subsonic speeds at sea level. It enables the RAF to revise its tactical concepts when the aircraft becomes available in numbers over the next two years. All problems surrounding the tactical employment of the V/STOL fighter have not been completely solved. But the technical concept of the P.1127 has proven feasible and reliable, opening a way for continued development of this particular variety of V/STOL technology.

From aviation's beginning, vertical or direct lift was a desired feature. Some serious work on it was carried out by early designers. But it proved so much easier to achieve flight by starting with a short ground run that the effort died away. This was understandable. The wing loadings of early aircraft were very low and the takeoff run, therefore, comparatively short—sixty to 200 yards of ground roll. Even the Hurricane of World War II fame, with a wing loading of 25.6 lb/sq ft. needed no more than 780 feet of ground roll.

In comparison, a Boeing 707/320B has a wing loading of 113.0 lb/sq ft. and needs about 6,750 feet before liftoff. Certainly ground roll could be shortened by installing larger powerplants or by using thrust-increasing devices or catapults. But the airframe would have to be strengthened, adding weight, and the question remains as to where to land the aircraft after it has finished its mission. Lower wing loadings could also be achieved by enlarging the wing, but this creates drag problems at higher speeds. An attractive way to shorten the takeoff run is to be able to vector the engine thrust downward and so augment wing lift with jet lift, thus leading to the straightforward V/STOL aircraft.

The elimination of the runway is especially desirable for ground-support aircraft so they can be stationed close to the front lines and be on hand on very short notice. Runways are not portable. They are susceptible to both air and ground attack.

One solution to the problem is offered by the V/STOL fighter-bomber, which can go anywhere, land practically everywhere, and is easily maintainable. The HS P.1127 can claim to fill all three requirements. True, there are other V/STOL aircraft flying

(Continued on following page)

Principal advantage of a V/STOL fighter is that it can be stationed close to front lines, available on short notice to support ground units. Weapons payload of P.1127, shown here in hovering flight, is relatively small, but this is largely offset by its proximity to the battlefield.

today or under development which are faster, more powerful, and can, therefore, carry a heavier combat load, but there is none that is simpler to operate and maintain than the Hawker Siddeley design. Such is the judgment of the Royal Air Force, which some time ago confirmed its requirement for a substantial number of P.1127s for the close-support role. On November 16, 1966, the British government finally gave the go-ahead for mass production.

The HS P.1127 was started in 1957 as a private venture by Hawker Aircraft (now Hawker Siddeley Aviation), and Bristol Aero-Engines Ltd. (now Rolls-Royce-Bristol Siddeley). The heart of the aircraft is the BS.53 Pegasus turbofan. It is the brainchild of chief designer Dr. Stanley Hooker. The Pegasus is basically a Bristol Siddeley Orpheus turbojet driving in addition a three-stage ducted fan, which has its origin in the Olympus series of the same company. This turbofan engine discharges fan air through two cascaded nozzles located on either side of the engine casing. About sixty percent of the fan air is thus diverted and the rest is passed on to the high-pressure compressor of the turbojet. The jet exhaust is guided through a bifurcated pipe to two rear nozzles, which are located in the same line on the engine as the cold-air front nozzles. The fan and the compressor counter-rotate to eliminate gyroscopic effects, which would disturb the equilibrium of the engine while running and thereby seriously impair the hover stability of the V/STOL aircraft it powers.

The dominating feature of the Pegasus is the system of nozzles which are rotatable through an arc of 100 degrees, from ten degrees forward and downward to ninety degrees backward. All four nozzles are mechanically linked, thus permitting all the installed thrust to be vectored in the desired direction. In this way the varying thrust vector demands of V/STOL at one end of the scale and climb acceleration and level speed at the other end can be met with stepless adjustment. This thrust vector principle allows the aircraft designer to employ a simple conventional jet fighter cockpit to which is added only one extra control in the form of the nozzle-direction lever.

This highly interesting engine design stimulated the chief designer of Hawker, the late Sir Sidney Camm, to conceive a V/STOL aircraft which was to be tailored around the Pegasus. Thus, the P.1127 prototype was born.

This small clearing makes an adequate airstrip for the P.1127, big enough for a short takeoff roll as well as vertical launch. With plane's easy maintainability, this location could readily hide essential ground equipment.

A preliminary design study of engine and aircraft was first prepared in August 1957. According to this paper, the P.1127 was designed primarily for tactical strike and reconnaissance duties independent of normal airfields. The design would emphasize robustness and simplicity so that it could operate away from base for extended periods in remote forward areas.

After the publication of this proposal, which was made known to NATO and the USA, many discussions were held with the MWDP (Mutual Weapons Development Pact), NATO headquarters in Paris, and the British Defence Ministry. In January 1958, a substan-

Successful carrier trials were performed by the P.1127 on the British commando carrier *Bulwark*, shown here, and the USS *Independence*. Big carriers don't need V/STOL fighters, but jump-jets would be valuable aboard small helicopter carriers to protect them against air attack and to serve as armed escort for assault helicopters.

tial amount of US funding was promised for the Bristol Siddeley engine, and it also appeared that the general interest of NATO in the V/STOL fighter was growing steadily. In March 1958, Dr. Hooker of Bristol Siddeley announced details of his latest proposal for the Pegasus which promised thrust levels up to 14,000 pounds. After extensive testing of a variety of 1127 designs, including free-flight models flown at NASA's Langley Research Center, the actual construction of the first prototype began in May 1959 as a private venture of Hawker.

A little smaller than the Northrop F-5, the original P.1127 had a swept-leading-edge anhedral wing mounted above the engine. Dominant features included large air intakes and a center-line landing gear fitted with low-pressure tires for soft-field capability and wheeled retractable outriggers at the wingtips for ground stability. The empennage was of conventional design. Though the engine thrust through the center of gravity of the aircraft provided basic stability, special reaction control valves or nozzles were fitted at nose, tail, and wingtips.

In the hover mode bleed air from the high-pressure compressor was exhausted through these nozzles to stabilize the aircraft under any wind conditions. The airflow from these valves was regulated by the movements of stick and rudder bar which operated the control surfaces in a conventional manner at the same time. The aircraft could, therefore, be flown in the hover mode as well as in the high-speed regime by conventional movements of the control column and the rudder bar. The only new feature was—as already mentioned—the Pegasus nozzle-control lever used during the V/STOL mode.

By June 1960 the British Ministry of Aviation awarded a contract covering two prototype and four development P.1127s. The first prototype P.1127 began its tethered hovering test in October 1960. A free-flight hover followed on November 19. Shortly afterward, the aircraft was joined by the second prototype. In September 1961, the first transition from vertical flight to level flight and vice versa was accomplished. By 1963 the four development aircraft had joined the program, each aircraft introducing a number of new design developments.

From the beginning, the Ministry of Aviation had sought to interest other NATO nations. After the first successful transition flight, in the fall of 1961, the position of the negotiators was greatly strengthened and, while Hawker Siddeley talked with foreign aircraft manufacturers about possible licensed production, talks on the government level in the spring of 1962 resulted in the excellent decision to form a Tripartite Field Evaluation Squadron. Britain, the US, and the Federal Republic of Germany jointly ordered nine P.1127 aircraft for this squadron, which was to be staffed by servicemen of the three nations.

The three nations together contributed about $104 million in roughly equal shares to cover the development cost of the aircraft and the engine, as well as the entire cost of the evaluation. Since the actual formation of the squadron was set to take place in the fall of 1964, Hawker Siddeley could continue developing the aircraft. The six P.1127s ordered by the Ministry of Aviation represented a step-by-step development of the original prototype. The following nine aircraft were to be a preproduction series, incorporating all the necessary improvements needed for operational use. Indeed, several improvements were mandatory. For instance, the Pegasus then had a life-span of only a few hours, and endurance, therefore, had to be counted in minutes.

US and West Germany joined with Britain in tripartite squadron to test P.1127. All three services were represented in US complement. Squadron has ended its work, but six of its nine planes are undergoing more tests in US.

The first of the tripartite models flew in March 1964 with several new design features. This new aircraft, subsequently designated Kestrel F(GA) Mk.1, had a fully swept wing with reduced span as compared to the early versions, a longer front fuselage to house military reconnaissance equipment, and provisions for attaching pylons on which to hang outboard stores, either fuel or armament. The aircraft in this form proved an outstanding success. Engine power had been uprated to 15,500 pounds, endurance was good enough for the close-support role, payload was sufficient, and certain refinements in the cockpit instrumentation necessary for military use were incorporated.

On October 15, 1964, the three-nation squadron became operational. The official purpose of the evaluation trials was to investigate the various aspects of military V/STOL operations, their control and logistics, including the VTOL, rolling VTOL, and STOL modes. Operational techniques and procedures in various flight conditions covering both night and instrument flying were also investigated.

One of the first tasks was the pilot's conversion training, from straightforward jets to a V/STOL aircraft. This was accomplished in minimum time at the Hawker Siddeley establishment at Dunsfold. One RAF pilot completed conversion training in the record time of forty-three minutes total flying time, including sixteen minutes of hovering and one twenty-five-

(Continued on page 65)

SPERRY

DIVISION OF SPERRY RAND CORPORATION

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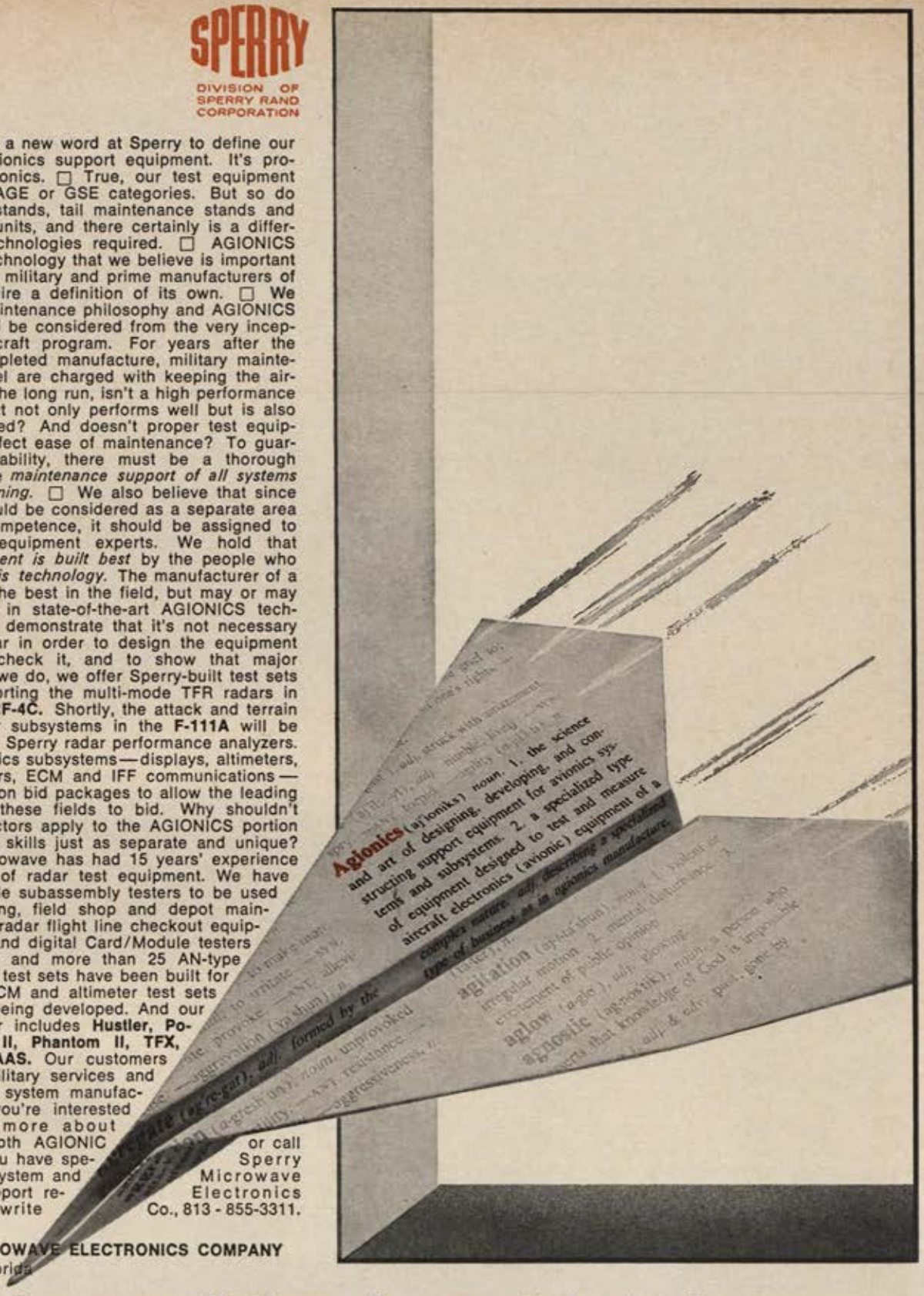


What do you call the science of designing, developing, and constructing support equipment for avionics systems and subsystems?

The experts named it Agionics.

minute conventional flight. The average conversion time necessary was found to be between two and three hours for the well-trained military jet pilot. This was proof of how easy it was to fly the Kestrel.

The Tripartite Squadron was disbanded on November 30, 1965, and the nine aircraft divided among the participants. Three Kestrels stayed in the UK, and six went to the US for further evaluation, flying under the designation XV-6A. Germany had decided to go another route in the V/STOL field and had, therefore, loaned its three aircraft to the US.

The evaluation of the V/STOL concept had vindicated its supporters. The increased flexibility of the V/STOL aircraft enabled the Kestrels to be deployed at sites requiring minimum preparation, to change sites quickly using mobile support facilities, and, most important, to disperse singly or in small numbers.

The actual flying from dispersed sites did not present any serious problem, but some complex questions of logistic support and increased difficulty of command and control became apparent. A radio net had to be set up to cover all the outlying sites. Furthermore, nearly all the ground-support equipment—bomb loaders, oxygen carts, generators, etc.—proved unsuitable for the terrain from which the aircraft could or must operate. All these vehicles eventually will have to have cross-country capability, or else large helicopters equipped as mobile bases will have to be developed.

In view of these difficulties, the evaluation squadron formulated two main tactical concepts, one of which requires only minimal logistic support at the dispersal site. In each case a primary site is set up, housing unit headquarters, maintenance elements, and communications centers, located close to an existing airfield or a road strip suitable for takeoff and landing of medium conventional transports. Subsites at varying distances from the primary site were established, on which the fighter-bombers were dispersed. These sites could either have no logistic support at all or could have full rearming and refueling capabilities if the road conditions permitted.

The first technique, which would require little or no support, would be to use the subsite only for hiding and dispersal. Refueling and rearming would be performed at the primary site. Where fully dispersed operations are required, however, logistic support becomes necessary at the subsite. This problem has not yet been solved. A US Army Bell UH-1B helicopter attached to the evaluation squadron proved to be of great help in the latter mode of operations. To sum up, dispersed V/STOL fighter bases cannot be maintained without V/STOL support.

In February 1965, the British government gave Hawker Siddeley Aviation a contract to develop the P.1127 as a replacement aircraft for the Hunter, which presently serves in the close-support role. The final green light for mass production was given by the Ministry of Defence on November 16, 1966. The exact number of aircraft ordered is classified, but estimates run between sixty and 100.

The P.1127 built for the RAF has a more powerful

Flying from dispersed sites has presented no serious problems, but questions of logistic support and command and control have not been fully resolved. Ground support vehicles must be able to move cross-country or be airlifted.

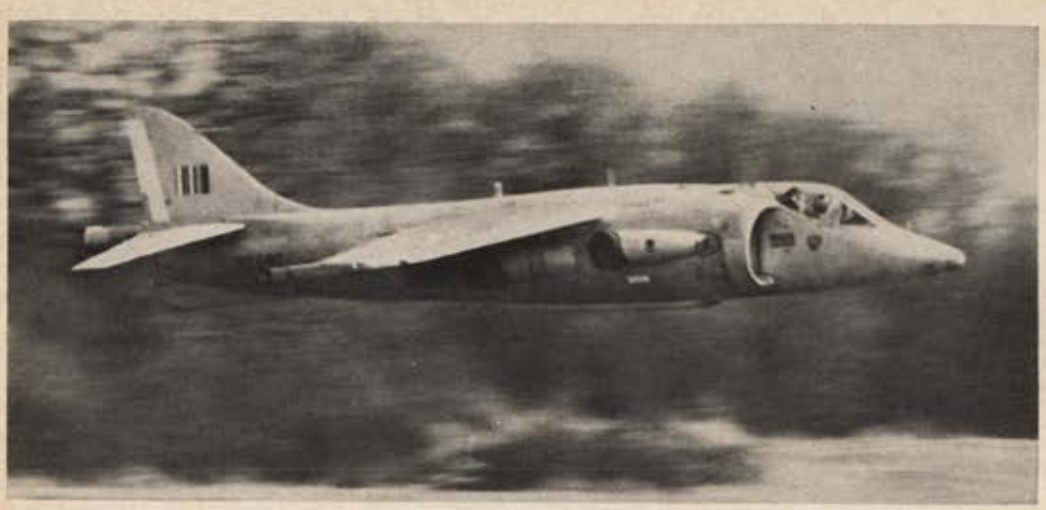
engine than the Evaluation Squadron aircraft, with thrust reportedly in the 18,000- to 19,000-pound range. The span has been slightly enlarged, the internal fuel capacity is somewhat greater than the original 600 Imperial gallons, and weapon stations have been incorporated in the airframe. The first model of the RAF development P.1127 was demonstrated in flight during the Farnborough Show in September 1966.

It is interesting to review the RAF's reasons for choosing the P.1127 design. During the last few years two main methods of achieving V/STOL flight have been employed. One is the single-engine vectored-thrust arrangement (VT), as used in the P.1127. The other uses a composite powerplant with a combination of lift and thrust engines (CP).

The following comparison of VT- and CP-powered aircraft is abstracted from a paper published by Air Marshal Sir Reginald Emson, Deputy Chief of the Air Staff, RAF:

> By taking into account the practical experience of V/STOL to date and relating it to the main military parameters involved in their operational employment as tactical fighters, the following points are of primary importance:
>
> • **Performance:** In over-all performance there is little to choose between the two concepts. For the same gross weight and a given fuel load, the CP aircraft would have a slightly better radius of action in certain circumstances than the VT design because the thrust engine can be optimized for cruising conditions. In VT aircraft, however, the thrust-to-weight ratio greater than unity may be used at all times. This leads to high maneuverability in the turn and very rapid acceleration and deceleration.
>
> • **Dispersability:** Dispersability in the V/STOL concept is the ability to perform tactical operations from dispersed and hastily prepared sites.

(Continued on following page)



To evade enemy antiaircraft defenses, P.1127 achieves high subsonic speed in low-level flight. No one is yet prepared to say what the future holds for V/STOL combat aircraft, but the RAF's P.1127 is destined to write an important chapter.

Neither of the two types can perform true VTOL from loose or sandy soil. The VT aircraft, however, can achieve a very short rolling takeoff which need not be longer than one or two aircraft lengths. It is doubtful, however, if the CP aircraft could operate at all on loose soil because the thrust of the lift jets is always, even when idling, directly downward, raising unacceptable dust clouds, producing ground erosion, and thereby causing re-ingestion problems for the engines.

- **Simplicity:** The VT system enjoys the benefit of a single simple engine control system, a single fuel system, and a direct linkage to the rotating nozzles. Just one lever and two gauges, in addition to the controls and instruments found in a normal single-engine fighter, become necessary. The CP aircraft involves two different types of engine, and, since at least four lift engines are needed, a multitude of engine controls and instruments have to be installed. The introduction of automatics will lessen the demands on the pilot but increase the complexity of the aircraft.
- **Safety and Reliability:** The CP system is generally held to give a greater degree of flight safety in that in the event of a thrust engine failure it should be possible to carry out an emergency landing on the lift engines alone. The complexity of the hydraulic and electric systems, however, in itself lowers the reliability of the aircraft and raises the demands put on the maintenance. Duplication or triplication of the critical systems are, under the present state of the art, not acceptable for field use. The slightly lower flight safety of the VT aircraft is easily offset by the lesser maintenance requirements.
- **Logistic Support:** The multiengined CP aircraft will require more base maintenance support in terms of both men and equipment than its single-engine VT counterpart.
- **Demands on Pilot Skill:** The pilot of a tactical fighter must be proficient in all types of air-to-ground combat. It is therefore essential that minimum additional demands should be made when adding V/STOL techniques to his already extensive repertoire. The VT aircraft demands few extra skills whereas the CP design needs extensive special training and drills.

The foregoing makes clear the RAF's case for the P.1127. Ease of maintenance, inherent simplicity, and, last but not least, the ready availability of the aircraft, had greater weight in the decision than did the original requirements for supersonic performance at all altitudes, long range, and substantial payload. In any event, the P.1127 is the first truly operational V/STOL fighter and an excellent tool to gather operational military experience within this wide and novel field. Nor have the possibilities for the P.1127 been exhausted. Trials on board US and British aircraft carriers as well as on smaller ships were quite successful, and it may well be that in the future even a simple ship can carry its own fighter protection or fast, long-distance, reconnaissance, and strike capability.

Apart from the ability to disperse in sophisticated wars, there is also the ability to operate from sites close to forward troops in limited wars. The essence of close support in operations such as Vietnam is "immediate reaction." The P.1127 concept provides a reaction time faster than anything other than a "cabstand" type of operation, which is extremely expensive, highly vulnerable, and almost impossible to achieve wherever the main airfields are several hundreds of miles behind the front line, or on aircraft carriers at sea. Each outpost could have its own air strike capability on hand, as long as the aircraft does not need complicated maintenance procedures. Night and bad weather takeoffs and landings have been performed regularly in the field and present no serious problem.

Still, no one can say for certain what the future holds for military V/STOL. An aircraft's ability to operate from unprepared positions clearly gives it major tactical advantages, but forward strike aircraft will require logistic support and local security for effective operational use. If its history thus far is any indication, the Hawker Siddeley P.1127, as the first military operational V/STOL fighter, will successfully blaze the way for more advanced designs which are on the drawing boards today.—END

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*United States/Federal Republic of Germa

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Republic and Entwicklungsring-Sud (EWR/Sud) of Munich have been selected to design this advanced fighter-bomber, working closely together under direction of American and German program officers.

Republic's fighter-bomber credentials for the US/FRG program include: more than 1,000,000 engineering man-hours of "V" design experience . . . completion of a concept formulation study establishing US/FRG program parameters . . . and total cognizance of the maintenance logistics of dispersed V/STOL aircraft. Plus the will to build a worthy successor to those three fighter-bombers sharing these pages.

FAIRCHILD HILLER

REPUBLIC AVIATION DIVISION

THE BULLETIN BOARD

News and Comment about Air Force People . . .

By Jackson V. Rambeau
AFA DIRECTOR OF MILITARY RELATIONS

An All-Volunteer Reserve

The Reserve Forces will be made up entirely of volunteers if Congress enacts a revised Reserve Bill of Rights to be introduced soon after Congress convenes.

This is the decision reached in a meeting of Senator Richard Russell (D.-Ga.) and Rep. L. Mendel Rivers (D.-S. C.), Chairmen of the Senate and House Armed Services Committees, and Rep. F. Edward Hébert (D.-La.) of Congressman Rivers' committee who wrote last year's bill.

This means that no one who has completed two years or more on active duty will be assigned without his consent to a Reserve unit.

A Reserve Forces reenlistment bonus will be the key element of the new legislation, payable to anyone who enlists in the Reserve Forces after two or more years of active duty or reenlists upon completing his obligated military service in the Reserve Forces.

The size of the reenlistment bonus had not been disclosed as this was written, but the congressional armed services leaders indicated it would be "adequate" to attract volunteers. Presumably it will vary depending on the individual's length of service, grade, and perhaps his career field, with added incentives to those in critical specialties.

In our visits to Reserve Forces units, it has been all too evident that the enlisted ranks are made up almost entirely of two categories of personnel—fifty to seventy percent non-prior servicemen with limited experience, and the remainder veterans with fifteen years' service or more. Reenlistment rates of those completing their obligated service are as low as three percent in both the Air Guard and Reserve. Thus there is almost no "middle" group to move up into senior noncom slots as older men retire.

AFA has strongly supported a reenlistment bonus for the Reserve Forces comparable to that provided in the active establishment. We hope Congress will enact, and the President sign, this legislation so essential to assuring adequate trained manpower for the Reserve Forces.

Federal Employees Bill of Rights

A second "Bill of Rights," this one for federal civilian employees, will also be resubmitted to Congress in January. Members of AFA's Civilian Personnel Council, under its chairman, Lyle Garlock, were given a full briefing on it during their meeting in Washington early in December.

Drafted by Senator Sam J. Ervin, Jr. (D.-N. C.), Chairman of the Subcommittee on Constitutional Rights of the Senate Judiciary Committee, it was cosponsored by thirty-four other senators when it was introduced late in the last session. We have never known a Senate bill to have this much sponsorship among members of varying political hues. Yet the bill is opposed by the Administration. The Civilian Personnel Council endorsed its objectives, but not its methods.

In discussing his reasons for preparing the bill, Senator Ervin has said:

"I have expressed my concern to the President about the complaints of unwarranted privacy invasion which the Subcommittee on Constitutional Rights is receiving. I cannot believe that he has sanctioned the wholesale application of such practices as psychiatric interviews, psychological testing, probing interrogations about religious, family, and sexual matters, coercion to buy bonds and to support political parties, to fill out race and national origin forms, to disclose personal finances and creditors of employees and their relatives, to attend lectures, to participate in community functions having nothing to do with their jobs, and to conform their personal activities, behavior, and associations outside the office to agency rules and a supervisor's whim."

First presentation of the Eugene M. Zuckert management award was made by Air Force Secretary Harold Brown in mid-November to Lt. Gen. Jack G. Merrell, USAF Comptroller, for outstanding management contributions in the past year.

His bill would make it unlawful for any supervisor to require, or to intimidate, an employee to do any of the things quoted above. The bill stipulates that violators "shall be guilty of a misdemeanor, and upon conviction shall be punished by a fine not exceeding $500, or by imprisonment not exceeding six months, or by both. . . ."

Parts of the bill would not apply to US intelligence agencies—CIA, DIA, or National Security Agency.

The Council decided that, while the bill's purposes are good in curtailing overzealous supervisors, its punitive provisions are too strong—particularly the criminal aspects of its enforcement.

The fact that any employee, or prospective employee, could bring suit against a supervisor in any US District Court, the Council felt, would hamstring supervisors in exercising their legitimate responsibilities. The Council proposed instead, as a first step, a congressional resolution

embodying the bill's major provisions and calling upon the Civil Service Commission to strengthen its enforcement procedures against improper actions by supervisors. If the Executive Department then failed to keep faith with the intent of Congress, a strong bill could follow.

The Council was told that Senator Ervin had called on the Chairman of the Civil Service Commission for substitute language to meet the Administration's objections to his bill, but that CSC has not as yet done so. It expressed the hope that CSC would submit its recommendations, suggesting that the rational course lies somewhere between Senator Ervin's legislation and no bill at all.

The Search for Executive Talent

The Civil Service Commission's plans for a new executive assignment system which would encourage interagency transfers of personnel in supergrades (GS-16, 17, 18) to broaden their experience and improve government administration were described to the Council by Seymour Berlin, Chief of CSC's Bureau of Executive Manpower.

Mr. Berlin quoted President Johnson's statement in establishing the system:

"We need, in the upper echelons of government, all the talent, all the dedication, and all the experience we can find. It was in recognition of this that I promised in my State of the Union address last January to 'restructure our Civil Service in the top grades so that men and women can easily be assigned to jobs where they are most needed, and ability will be both required as well as rewarded.'"

The Council unanimously endorsed the system as a "fresh approach" to more effective use and development of executive talent in the federal government. Such emphasis is long overdue, it said, noting reports that a chief executive in private industry devotes almost half his time to identifying and selecting the right men for top management posts while the average government department head spends only four percent of his time on such matters.

In other actions, the Council:

- Selected the top three Air Force civilians to be honored at AFA's 1967 National Convention in San Francisco, March 14-17, from nominations submitted by the major commands, the Air Staff, and the Office of the Secretary. Names are being withheld, pending notification to the individuals selected and their major commanders. The extremely high quality of all nominees made the task very difficult.

For exceptional support of Air Reserve Forces, General Dynamics' Ft. Worth Division, represented by its president, Frank W. Davis, received award from Lt. Gen. K. K. Compton, USAF's DCS/Plans and Operations. At right is Col. Stanley Rush, Commander, 4th Air Reserve Region.

Trustees of the Air Force Village Foundation have approved this plan as the home for widows and female relatives of Air Force officers and warrant officers at San Antonio, Tex. Bids for the $5 million residence will be sought in April, with groundbreaking set for this fall.

- Recommended an increase in CONUS per-diem rates above the present $16 maximum, because of sharply increased costs of food and lodging;
- Urged that US government civilian personnel stationed in Vietnam be given the same income tax allowances now provided for military personnel;
- Called for elimination of all restrictions on dual compensation for military retirees, especially in view of today's tight manpower market;
- Reconfirmed AFA's stand on maintaining pay levels comparable with industry for military and civil service personnel; and
- Suggested that, when the Civil Service Commission approves an employee's retirement for physical disability, it permit the agency to hire a replacement immediately rather than require it, as is now the case, to keep the job open until expiration of the retired employee's accumulated leave.

Reserve Airlift Extensions

As we went to press, DoD had tentatively approved retention for another year of five of the eight Air Force Reserve C-119 groups that were to have been inactivated by October 1967. The choice of which five are to be kept is apparently up to USAF.

The eight units are the 906th Troop Carrier Group, Clinton County, Ohio; 910th, Youngstown, Ohio; 924th and 925th, Ellington AFB, Tex.; 927th, Selfridge AFB, Mich.; 930th and 931st, Bakalar AFB, Ind.; and 944th March AFB, Calif.

The choice might be easier if there were a weak unit in this lineup, but there isn't. On the basis of operational readiness, it's impossible to make an intelligent selection of which ones should go. In fact, two of the more vulnerable units are those at Bakalar, which have literally rewritten the book on C-119 tactical operations. In a series of tests under direction of Brig. Gen. John W. Hoff, 434th TC Wing Commander, the Bakalar units raised the payload limits of the C-119. They also made valuable improvements in the "slingshot" method of cargo delivery, not only improving accuracy of airdrops but expelling 20,000 pounds of cargo within six seconds. But Bakalar is one of the bases DoD has decreed must be closed.

The third group apparently earmarked to go is the 944th at March, on the assumption that other Reserve Forces units nearby could absorb the 944th's personnel. Moreover, Gen. Howell Estes, MAC Commander, wants to try out his "Associate Group" concept by setting up a test unit at Norton AFB, Calif., possibly using the 944th

(Continued on following page)

personnel as a nucleus. An Associate Group, as we have noted in previous issues, would supplement an active MAC unit, flying and helping to maintain its C-141 transports.

As for the three Air Guard transport groups in Pittsburgh, White Plains, N. Y., and Van Nuys, Calif., now scheduled for elimination June 30, DoD has authorized the Air Force to keep two—one C-97 and one C-121 unit—another three months, to September 30. The group not included in this bountiful gift from DoD is probably one of the two presently based at Van Nuys, Calif. We've tried hard to figure out the logic of this mere three-month extension. Perhaps someone in DoD thinks these Guard units are made up of school kids who can spend the summer flying missions to Southeast Asia.

AFA's position on all these units is unchanged. The US needs all the airlift it can get as long as the war goes on, and AFA will continue to push for retention of all Reserve Forces troop carrier and transport groups. We hope Congress will once again write into the Fiscal Year 1968 appropriations bill specific language and funds to support all these units indefinitely.

J. William Doolittle has been appointed General Counsel of the Air Force. The thirty-seven-year-old native of Wheaton, Ill., a graduate of Harvard Law School, succeeds Stephen N. Shulman, now Chairman of the government's Equal Employment Opportunity Commission.

20/10 Out for Duration

An indefinite suspension of the 20/10 program for Reserve officers was decreed by the Air Force in November because "the continuing national effort in Southeast Asia has imposed additional requirements for experienced officers for the duration of the conflict."

Each officer who applies and is accepted will be extended for a period commencing on his current date of separation and terminating when the Secretary of the Air Force decides the Southeast Asia effort no longer requires his services. Extensions will be for not less than a year, and the individual will be given at least six months' notice before separation. The offer applies also to captains who have twice been passed over for promotion.

In a corollary action, USAF improved promotion opportunities for Reservists by making them eligible for temporary boosts until ninety days before their separation date, instead of two years previously.

Air Guard Council Notes

A strong recommendation that Air National Guard commanders give more attention to the career education of junior and lower field-grade officers was made by AFA's Air Guard Council at its fall meeting in Washington.

The Council, headed by Brig. Gen. George Edmonds of the California ANG, emphasized that now is the time to encourage such officers to attend Air University courses, because AU's enrollment of active duty-officers has been cut to thirty percent of normal quotas to meet Southeast Asia officer requirements.

In a formal resolution it asked that the Air Reserve Forces "expedite the implementation of a Professional Educational Program designed to enhance the military leadership skills" of Reserve and Guard officers, and that USAF "react to this requirement by providing for expanded professional education opportunities" for Guardsmen and Reservists in the Air University and Joint Staff colleges.

The Council further recommended that indoctrination on the roles, missions, and capabilities of the Air Reserve Forces be included in the curriculum of AU courses.

The National Guard Bureau is seeking Air Force approval to allow Guard officers who cannot take time to attend the Air War College to participate in AWC seminar courses at nearby Air Force bases, Maj. Richard Simpson, chief of NGB's school branch, told the Council.

Col. Waldo E. Timm, Assistant for ANG matters in USAF's Directorate of Plans, reported on procedures employed in a RAND Corporation study of Air Reserve Forces roles and missions, scheduled for completion in March. Complementing his remarks, Dr. Theodore C. Marrs, Deputy for Reserve and ROTC Affairs in the office of the Air Force Secretary, discussed current and future Air Reserve Forces programs and concepts.

° ° °

Parting Shots—An increase of 536 spaces in Air Force **pilot training** has been approved by DoD, providing USAF can fit it into existing training bases. **Randolph AFB,** Tex., is expected to get the assignment. The increased input must wait, however, until more **Cessna T-37s** and **Northrop T-38s** can be ordered, which means at least a year's delay in getting started. DoD didn't change the Air Guard quota, which remains at 145 per year, but gave none to AF Reserve. . . . The furor which in the past has surrounded **selection of Reserve general officers** has at last been brought under control by Air Force leaders. The board met in December and selected **four for major general** and **eight for one-star rank.** Nominations will be submitted to the Senate by the White House.

° ° °

SENIOR STAFF CHANGES . . . B/G John A. Des Portes, from Cmdr., 14th Strategic Aerospace Div., SAC, Beale AFB, Calif., to Cmdr., 47th Air Div., SAC, Castle AFB, Calif., replacing B/G James F. Kirkendall . . . **J. William Doolittle,** to General Counsel of the Air Force, succeeding Stephen N. Shulman . . . **B/G Dudley E. Faver,** from Dep. Director, Personnel Training and Education, to Dep. Director, Personnel Planning, DCS/P, Hq. USAF . . . **M/G Lloyd P. Hopwood,** from C/S, Allied AF Southern Europe, Naples (SHAPE AF South), to patient, Wilford Hall USAF Hospital, AFSC, Lackland AFB, Tex. . . . **B/G James F. Kirkendall,** from Cmdr., 47th Air Div., SAC, Castle AFB, Calif., to Asst. DCS/O for Requirements, Hq. TAC, Langley AFB, Va. . . . **B/G John M. Talbot,** from Special Asst. to Surgeon General for Medical Research, Hq. USAF, to Asst. Surgeon General for Staffing and Education, Military Personnel Center, Randolph AFB, Tex. . . . **B/G Ralph G. Taylor, Jr.,** from Cmdr., 4520th Combat Crew Tng. Wg., TAC, Nellis AFB, Nev., to Cmdr., Tactical Fighter Weapons Center, TAC, Nellis AFB, Nev.

PROMOTIONS . . . To **Brigadier General:** Dewitt S. **Spain.**

RETIRED . . . M/G Gordon H. **Austin,** M/G John D. **Stevenson.**—END

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MOTOROLA *Government Electronics Division*

Future technology, markets, financing, and systems management of ground facilities for commercial aviation were among the subjects discussed at AFA's recent San Francisco seminar. Eleven distinguished speakers gave the audience a preview of . . .

The Golden Age of Air Commerce

COMMERCIAL aviation's future in terms of technology, markets, financing, and systems management of ground facilities and interconnections with other forms of transportation was examined at an AFA seminar in San Francisco on November 1. Entitled "The Golden Age of Air Commerce," the event was cosponsored by the Greater San Francisco Chamber of Commerce and AFA's San Francisco Chapter and chaired and initiated by Thos. F. Stack, an AFA National Director and Past President.

An audience of 531 bankers, airline and aerospace industry executives, and government aviation officials heard and saw a preview of tomorrow's fast-growing air commerce, shaped and stimulated by such new aircraft as the SST, the passenger and cargo jumbojets, the airbus, and V/STOL commuters. While the eleven speakers presented a bright growth picture, several cautioned that the mounting congestion at all major ground terminals hampers aviation's full development.

Clifton F. von Kann, the Air Transport Association's vice president for operations and engineering, called for a "systems approach" to cope with the quadrupling in air commerce expected over the next fourteen years.

Dr. W. M. Duke, President of Whittaker Corp., shifted the focus to advanced materials technology, which is expected to make possible more productive and more efficient aircraft in the decade ahead.

The field of massive aircraft and their ability to generate new markets by lowering fares was covered by Boeing Vice President Jack Steiner, who described the 747; by Lockheed Vice President T. R. May, who reported on plans for a commercial version of the C-5A with a payload of 330,000 pounds; and by Douglas Vice President John C. Brizendine, who revealed details on his company's study of an advanced technology medium-range twin jet in the 300-passenger range.

The SST and its impact on the Pacific Basin, whose vast distances require ultrafast aircraft, was dealt with by Lockheed Vice President and SST Program Director Robert A. Bailey and Boeing's Government Relations Manager Heber Badger.

V/STOL and STOL aircraft and their potential for relieving congestion and shortening over-all trip times were described by Malcolm S. Harned, Hughes vice president for operations, and Robert E. Hage, McDonnell vice president for advanced product planning.

Ways and means to obtain better utilization of airports and the airways were discussed by Joseph H. Tippets, FAA's Western Region director, and by Boeing's Jack Steiner.

Luncheon speaker was James P. Mitchell, vice president of Chase Manhattan Bank and one of the world's ranking experts on aerospace financing, who pinpointed the role of aviation in the national economy.

Press and television coverage of the event, on a national and local level, was extensive and helped direct public attention to the importance of a thriving air commerce to the national interest.

—EDGAR ULSAMER

Dr. W. M. Duke, President of Whittaker Corp., left, spoke on advanced materials technology. Clifton F. von Kann, Air Transport Association VP, urged better ground facilities.

Douglas VP John C. Brizendine, left, described the Douglas airbus; Lockheed Vice President T. R. May, center, the L-500; and Boeing Vice President Jack Steiner, the 747.

Boeing's Government Relations Manager Heber Badger, left, and Lockheed Vice President and SST Program Director Robert A. Bailey discussed the SST and its ramifications.

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a precision microelectronic autonavigator
that meets advanced requirements
for aircraft avionics,
and provides fast reaction capability,
reliability,
and accuracy
under severe operating conditions?

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North American Aviation Autonetics Division

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American Airlines

AFA NEWS

CHAPTER OF THE MONTH

The San Francisco, Calif., Chapter, cited for extremely effective support of the AFA mission through cosponsorship of "The Golden Age of Air Commerce" (see page 74).

At the recent Charter Night Dinner Meeting of the Daytona Beach, Fla., Chapter, Chapter President Don Sessions, left, accepts the AFA Charter from Florida State AFA President Herman Hauck, right. Also shown is James H. Straubel, AFA's Executive Director.

AFA's **Florida State Organization** held its recent Convention in the Patrick AFB Officers' Club. The Convention's stimulating business session opened with an address of welcome from **Col. Joseph B. Williams,** Commander of Patrick AFB.

During the business session, **Lester Curl,** Col., USAF (Ret.), of Melbourne Beach was elected to succeed **Herman Hauck,** Col., USAF (Ret.), of Cocoa Beach as State President. Other officers elected at the session were: Vice Presidents **Thomas M. Davis** of Cocoa Beach and **Hal Mason** of Fort Lauderdale; Recording Secretary **John V. Murphy** of Titusville; Corresponding Secretary **Gerald C. Frewer** of Satellite Beach; and Treasurer **Leonard T. Geyer** of Indian Harbor Beach.

More than 150 members and guests attended the Convention luncheon at which **Dr. John L. Hummer,** director of the University of Florida's Graduate Engineering Education System (GENESYS), made the principal address on "The Role of AFA in Florida Education." In his presentation, Dr. Hummer made frequent references to the November issue of AIR FORCE/SPACE DIGEST and said that in his classes this particular issue would be "required" reading.

During the luncheon program, citations were presented to **Jay Staley, Maj. L. E. Millstad,** and **Don Sessions** for their efforts during the past year in organizing, respectively, the **Broward County, Panama City,** and **Daytona Beach Chapters. George J. Burrus,** retiring Vice President of the Florida State Organization, served as Toastmaster for the luncheon program.

Following the luncheon, a very effective regional meeting was conducted by AFA's Southeast Regional Vice President **Martin H. Harris** of Winter Park. **Margaret Iverson,** Secretary of the **Middle Georgia Chapter,** represented the Georgia Chapters at the meeting. Delegates and ladies not involved in the regional meeting received a tour of the Kennedy Space Center.

* * *

Two new Chapters were chartered in Florida during the week following the State Convention. The first, the **Panama City Chapter,** received its charter from State President **Herm Hauck** at a Charter Night Dinner held at the Tyndall AFB Officers' Club.

Maj. Gen. Walter B. Putnam, Commander of the Southern NORAD Region and the Fourteenth Air Force, was the featured speaker. **William Mabile,** Chapter President while the Chapter was being organized, served as Toastmaster. **Col. T. D. deJarnette,** Commander, 4756th Air Defense Wing, welcomed the Chapter to the base and expressed the best wishes of the base personnel for the Chapter's success.

Chapter officers elected during the business portion of the meeting were: President **Frank Parker,** Vice President **A. C. Carlson,** Secretary **James Maxwell,** Treasurer **Glenn Medley.**

Members of the **Panama City Chamber of Commerce** Military Affairs Committee were among the more than 200 who attended the meeting. During the evening, sixty-seven new AFA members were signed up.

* * *

The following evening, the **Daytona Beach Chapter** held its Charter Night Dinner at the Oceanside Country Club in Ormond Beach.

AFA's Executive Director **James H. Straubel** made the principal address

(Continued on page 80)

Among those attending the recent Massachusetts Air Force Association Convention were, from left, Ronald Largesse, newly elected State Senior Vice President; outgoing State President Leeman Hipson; Worcester Mayor George Wells, guest speaker at the banquet; and AFA President Jess Larson. Other newly elected State Officers not shown are: President Hugh Simms, Jr., Vice President Andrew Trushaw, Treasurer Doris Stone, Executive Secretary Peggy Simmons, and Recording Secretary Norma James. AFA National Director Joseph Assaf and New England Regional Vice President Joe Lusk also attended the Convention.

ADVANCE
AFA's 21st
SAN FRANCISCO

A good way to see much of San Francisco is aboard a cable car. The city, a 46-square-mile fingertip between the white-capped Pacific Ocean and San Francisco Bay, is linked on the north by the fabled Golden Gate Bridge to the Sausalito-Belvedere-Tiburon Peninsula; and on the east to Oakland via the Bay Bridge. All of AFA's Convention Hotels are concentrated in a relatively small area of San Francisco, making travel—whether for business or pleasure—fast and simple.

RESERVATION FORM / 1967 AIR FORCE ASSOCIATION CONVENTION SAN FRANCISCO, CALIFORNIA • MARCH 14-17

Name _____ Firm/Organization _____
(Include Rank, if Military)

Mailing Address _____

City & State _____ Zip _____

Hotel _____ _____ _____ _____
1st Choice 2nd Choice 3rd Choice Desired Rate

Type Room: _____
(Be specific, Double, Twin, Single) (Full name of others sharing room)

Arrival Date & Hour: _____ Departure Date: _____

MAIL TO:

AFA HOUSING OFFICE
260 Fox Plaza
San Francisco,
California 94103

List first, second, and third choice of hotels, and arrival DATE and TIME. If room is not available at rate requested, next nearest available rate will be assigned.
For arrivals after 6:00 p.m. (PST) a deposit or written guarantee is required.

California Masonic Memorial Temple, where 1967 Air Force Honors Night Program will be staged.

REGISTRATION NOW OPEN FOR ANNUAL NATIONAL CONVENTION MARCH 14-17, 1967

TENTATIVE PROGRAM

TUESDAY, MARCH 14

9:00 AM	Registration Desk Open
2:00 PM	Board of Directors Meeting

WEDNESDAY, MARCH 15

9:00 AM	Opening Ceremonies
10:00 AM	AFA Business Session
2:00 PM	AFA Business Session
2:30 PM	Ladies' Program

THURSDAY, MARCH 16

9:00 AM	Air Force Symposium
12:00 N	Luncheon for USAF Chief of Staff
2:30 PM	Air Force Symposium
2:30 PM	Ladies' Program
6:30 PM	Membership Awards Program

FRIDAY, MARCH 17

8:30 AM	USAF Memorial Service
9:30 AM	Air Force Symposium
12:00 N	Luncheon for Air Force Secretary
2:30 PM	Reserve Forces Seminar
2:30 PM	Ladies' Program
6:00 PM	Reunion Reception*
7:30 PM	Air Force Honors Night*
9:30 PM	Reunion Dinner-Dance*

* Black Tie

Advance Registration for AFA's National Convention is always to your advantage, since it eliminates waiting in line to accomplish this at the Convention when hundreds of others are doing the same thing. This year there is an added bonus, for you'll save $10.00 through advance registration (before March 1). If you have not already registered for the year's biggest aerospace event, we urge you to fill out the form below and mail it, with your check, to AFA at 1750 Pennsylvania Avenue, N.W., Washington, D. C. 20006.

ADVANCE REGISTRATION FORM

Type or Print

NAME _____

RANK, IF MILITARY _____

TITLE _____

AFFILIATION _____

ADDRESS _____

_____

CITY & STATE _____ ZIP _____

NOTE: Advance Registration Closes March 1, 1967

( ) **ADVANCE REGISTRATION** **$50.00**

(Registration at Convention: $60.00)

Covers credentials for attendance at all regular Convention events, including the Opening Ceremonies, Symposia, AF Chief of Staff's Luncheon, AF Secretary's Luncheon, Reunion Reception, Reunion Dinner-Dance, and Air Force Honors Night program.

( ) **ADDITIONAL HONORS NIGHT TICKETS** **$25.00**

Single ticket covers Reunion Reception, Reunion Dinner-Dance, and Honors Night program.

Among those attending the Awards Banquet at the recent California State AFA Convention in Sacramento were, from left, State President-elect Will Bergstrom; Brig. Gen. Del Smith, Assistant Adjutant General for Air, California; Sacramento Mayor Walter Christensen; and Maj. Gen. Chester Cecil, Commander, SMAMA, McClellan AFB. General Cecil was main speaker.

and Chapter President **Don Sessions** served as Toastmaster. Southeast Regional Vice President **Martin Harris** presented the Charter to Chapter President Sessions, and State President **Herm Hauck** installed the Chapter officers including, President Sessions, Vice President **Joseph Armijo**, Secretary **Frank Hoffman**, and Treasurer **Earnest Lowe. Bill France**, President of NASCAR and the Daytona International Speedway, and **Jack Hunt**, President of Embry-Riddle Aeronautical Institute and a member of the Aerospace Education Foundation's Board of Trustees, assisted President Sessions in forming the Chapter.

Among the more than 100 attending the dinner were State President-elect **Les Curl** and **Ralph Platt**, assistant managing editor of the Daytona Beach *News Journal*, a long-time friend and supporter of AFA.

* * *

AFA's newest State Organization was recently established in Georgia. Members of the **North Georgia** and **Middle Georgia Chapters** elected **George O. Cornish** of Warner Robins to be the first President of the new State Organization. **Troup Miller**, Lt. Gen., USAF (Ret.), was selected to serve as Vice President of the Organization. State officers were installed by Southeast Regional Vice President **Martin H. Harris** at ceremonies at Warner Robins.

* * *

At its Annual State Convention in Burley, AFA's **Idaho State Organization** elected a new slate of officers headed by **Patrick McHenry** of Pocatello as President. The following were elected Vice Presidents of the State Organization: **Neil C. Weir** of Rupert; **John Gochenor** of Pocatello; **Charlie Barnes** of Boise; **Darren Venters** of Pocatello; and **Jay Nichols** of Burley. Other officers elected, all of whom are from Pocatello, are: **Barney Strachan**, Secretary; **Arthur Hamilton**, Treasurer; **Jack Stoltz**, Military Relations Director; and **J. Robert Sterling**, Organization Director.

An evening social hour followed by an Awards Banquet completed an effective and enjoyable Convention program. During the Awards Banquet, retiring State President **George Forschler** paid recognition to the men and women who contributed so much in time and effort to the two very successful Aerospace Day of Idaho programs. (The State Organization's recognition as "**AFA's Unit of the Year**" at the 1966 National Convention in Dallas was due in great part to its 1965 Aerospace Day of Idaho Program.) Following presentation of the awards, Mr. Forschler made the principal address of the evening.

Among those attending the Convention were **Congressman George Hansen** (R.-Idaho); **Col. Thomas Owens**, Mountain Home AFB Commander; AFA's Northwest Regional Vice President **Warren Murphy**; and President **Tucker Simpson** and Past President **Ray Yates** of the Utah State Organization.

* * *

The **Pennsylvania State AFA Convention** opened with an informal reception and "Dutch Treat" dinner at the Penn Harris Motor Inn, Camp Hill.

A "Past Wing Commanders and Past Presidents Breakfast" opened the next day's program. Two effective business sessions concluded with the election of officers to head the State Organization during the coming year. **Richard J. Boyd** of Harrisburg was elected to succeed the retiring State President, **Judge John Brosky** of Pittsburgh. Other officers elected are: Vice President **George Crosby** of Erie, Secretary **Robert Green** of Harrisburg, Treasurer **Robert Walker** of Harrisburg, and Organizational Director **John Brosky.**

AFA National Treasurer **Jack Gross** of Harrisburg was Toastmaster for the Convention Luncheon, at which AFA National Director **Carl Long** of Pittsburgh presented the State's scholarship awards to outstanding science fair winners **William P. Neidringhas**, 17, of Pittsburgh, and **Frank R. Rudy**, 17, of Harrisburg.

Dr. John Furbay, director of Air World Education for Trans World Airlines, Inc., and **Dr. Edwin McArthur**, conductor of the Harrisburg Symphony Orchestra and former USO director and entertainment director for the Fifth Air Force in the South Pacific during World War II, shared speaking honors at the evening Awards Banquet. Dr. Furbay spoke on "**The Sky's the Limit**," and Dr. McArthur added to the Convention's nostalgic note as he related "**Tales from the South Pacific.**"

Toastmaster for the Awards Banquet, **William T. Lunsford, Jr.**, also served as Convention Chairman and was assisted in that job by **Robert Green, Jack Gross, Col. Thomas E. Gurnett, Col. Millard Haskin, Gregory Huntingdon, Charles Heimback, Richard Boyd, and Robert Cox.**

During the Banquet, awards were presented to **Congressman John C. Kunkel** (R.-Pa.); **James R. Doran**, editor of the Sunday *Patriot-News;* **Frank N. Piasecki**, president of Piasecki Aircraft Corp.; **Martin M. Decker**, president of Decker Corp.; and **Frederic H. Miller**, Maj. Gen., USAF (Ret.).

The following morning, Northeast Regional Vice President **James Wright** conducted a Regional Breakfast Meeting. Among the out-of-staters who attended were President **Charles Alexander** and Vice President **Irene Keith** of AFA's New York State Organization; President **Sal Capriglione** and Secretary **Lloyd Nelson** of AFA's New Jersey State Organization; and **Joan Capriglione, Betty Cilento**, and **Mamie Kinsley** of the Garden State, N. J., Chapter.

—DON STEELE

Carl J. Long, far left, AFA National Director and Pennsylvania AFA Scholarship Chairman, and Judge John G. Brosky, far right, outgoing Pennsylvania AFA President, congratulate Frank R. Rudy, left, and William P. Neidringhas, right, recipients of the State Organization's Scholarship Awards at its recent Convention at Camp Hill, Pa.

This Is AFA

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

Objectives

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

Membership

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—$7 per year.

Service Members (non-voting, non-officeholding): US citizens on extended active duty with any branch of the United States armed forces—$7 per year.

Cadet Members (non-voting, non-officeholding): US citizens enrolled as Air Force ROTC Cadets, Civil Air Patrol Cadets, or Cadets of the United States Air Force Academy—$3.50 per year.

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State Contacts

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

ALABAMA: Edmund J. Packowski, 4604 Oak Ridge Road, Mobile, phone 342-0468. **BIRMINGHAM, HUNTSVILLE, MOBILE, MONTGOMERY, SELMA.**

ALASKA: Chuck W. Burnette, P. O. Box 3535 ECB, Anchorage, phone 272-3537. **ANCHORAGE, NOME, PALMER.**

ARIZONA: Donald S. Clark, Jr., P. O. Box 2871, Tucson, phone 623-7771. **PHOENIX, TUCSON.**

ARKANSAS: Alexander Harris, 182 Alabama, Jacksonville, phone 988-1469. **JACKSONVILLE, LITTLE ROCK.**

CALIFORNIA: Will H. Bergstrom, P. O. Box 4920, Arden Branch, Sacramento. **BURBANK, CHICO, EDWARDS, EL SEGUNDO, FAIRFIELD, FRESNO, HARBOR CITY, LONG BEACH, LOS ANGELES, MONTEREY, NEWPORT BEACH, NORWALK, NOVATO, PASADENA, RIVERSIDE, SACRAMENTO, SAN BERNARDINO, SAN DIEGO, SAN FRANCISCO, SANTA BARBARA, SANTA MONICA, TAHOE CITY, VANDENBERG AFB, VAN NUYS, VENTURA.**

COLORADO: George M. Douglas, 1st National Bank Bldg., Room 408, Colorado Springs, phone 636-4285. **COLORADO SPRINGS, DENVER, PUEBLO.**

CONNECTICUT: Joseph C. Horne, Yankee Pedlar Inn, Torrington, phone HU. 2-6312. **TORRINGTON.**

DELAWARE: Albert A. Poppiti, Greater Wilmington Airport, Bldg. 1504, Wilmington, phone 654-5161. **WILMINGTON.**

FLORIDA: Lester Curl, 217 Surf Rd., Box 265, Melbourne Beach, phone 723-8709. **BARTOW, CLEARWATER, DAYTONA BEACH, FORT LAUDERDALE, MIAMI, ORLANDO, PANAMA CITY, PATRICK AFB.**

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HAWAII: John King, Jr., 1441 Kapiolani Boulevard, Honolulu, phone 995-974. **HONOLULU.**

IDAHO: Patrick M. McHenry, Box 4477, Pocatello. **BOISE, BURLEY, POCATELLO, RUPERT, TWIN FALLS.**

ILLINOIS: Al Stein, 410 N. Orchard Dr., Park Forest, phone 747-0796. **CHAMPAIGN, CHICAGO, ELMHURST, LA GRANGE, PARK FOREST, PEORIA.**

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IOWA: Robert R. Collins, 5130 Grand Avenue, Des Moines, phone CR. 9-1221. **ALGONA, CEDAR RAPIDS, DES MOINES.**

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NEW YORK: Charles Alexander, 104-07 Union Turnpike, Forest Hills, phone 594-9074. **BINGHAMTON, BUFFALO, ELMIRA, FOREST HILLS, FREEPORT, ITHACA, KEW GARDENS, LAKEWOOD, NEWBURGH, NEW YORK CITY, PATCHOGUE, PLATTSBURGH, ROCHESTER, ROME, STATEN ISLAND, SUNNYSIDE, SYRACUSE, WHITE PLAINS.**

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OKLAHOMA: Arthur de la Garza, 2421 S. W. 79th Street, Oklahoma City, phone MU. 5-3644. **ALTUS, ENID, OKLAHOMA CITY, TULSA.**

OREGON: M. W. Fillmore, 3730 SE Cooper Street, Portland. **PORTLAND.**

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RHODE ISLAND: William V. Dube, T. F. Green Airport, Warwick, phone 781-8254. **WARWICK.**

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SOUTH DAKOTA: John S. Davies, 392 S. Lake Drive, Watertown. **BROOKINGS, RAPID CITY, SIOUX FALLS, WATERTOWN.**

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TEXAS: Sam E. Keith, Jr., P. O. Box 5068, Fort Worth, phone PErshing 8-0321. **ABILENE, AMARILLO, AUSTIN, BIG SPRING, CORPUS CHRISTI, DALLAS, EL PASO, FORT WORTH, HOUSTON, LUBBOCK, SAN ANGELO, SAN ANTONIO, SHERMAN, WACO, WICHITA FALLS.**

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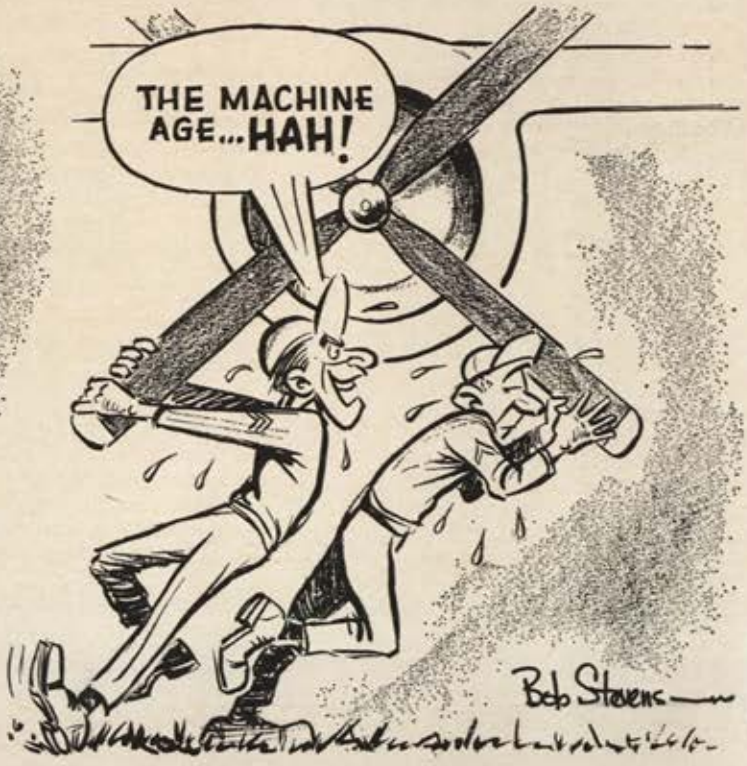
Bob Stevens'

"There I was..."

Were any of us really satisfied with things as they were? Of course not. By applying a little thought and effort, we could invariably make them worse.

THE STORM FRONT PENETRATION-



GOT A PERSONAL "THERE I WAS..."? (ANECDOTES, PHOTOS, SKETCHES ARE O.K.) WE'LL PAY 10 BUCKS FOR IDEAS USED. SEND TO AF/SD c/o "THERE I WAS."

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AiResearch's system is a closed Brayton cycle power package which uses an inert working fluid expanding through a turbine to drive an alternator and a compressor. It utilizes gas bearings throughout. It is engineered to operate continuously for a minimum of 10,000 hours.

The entire system – including turbomachinery, heat exchangers, and space radiator – is designed and produced by AiResearch.

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The Missile That Found A Better Way To Fly

MAW (Medium Anti-Tank/Assault Weapon) is the first Army guided missile system light enough to be carried and fired by one man, yet with a warhead large enough to knock out most armor, tanks, and other assault targets encountered by the Infantry.

A totally new missile design concept was necessary to improve on conventional missile accuracy and dependability. McDonnell engineers use tiny fixed rockets which exhaust around the sides of the missile to provide directional control as well as forward propulsion. The result is a simplified lightweight missile with range, accuracy, and hit-probability superior to Army weapons such as the 90mm recoilless rifle it will replace.

While the soldier holds his sight on the target, the attached "tracker" senses the missile's position relative to the line-of-sight and sends guidance commands to keep it on that line until it strikes the target.

In the early 1960's, "Anticipation Engineers" at McDonnell began work on the concepts and designs that led to successful flight demonstrations of this unusual Army missile. The MAW missile is now being engineered for production to meet the requirements of the Army in the Seventies.

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