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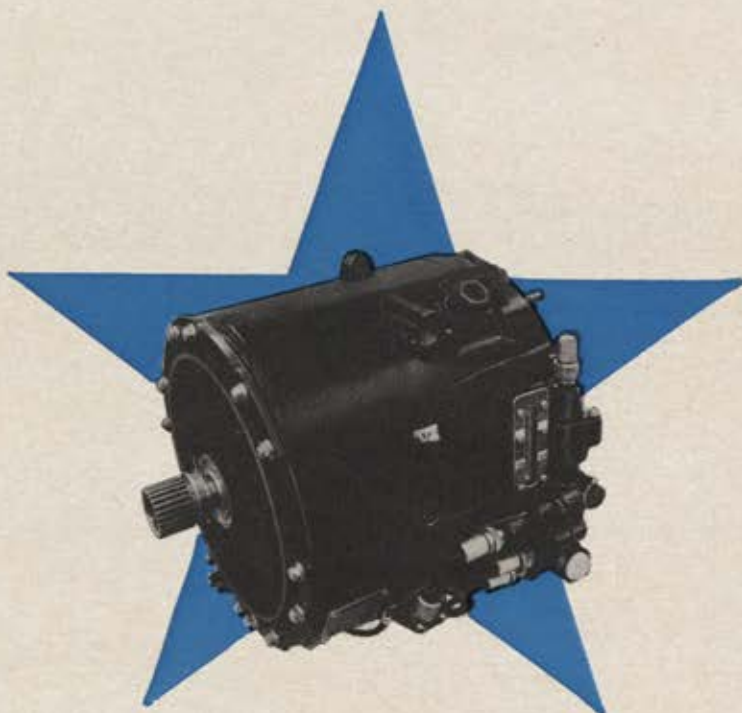
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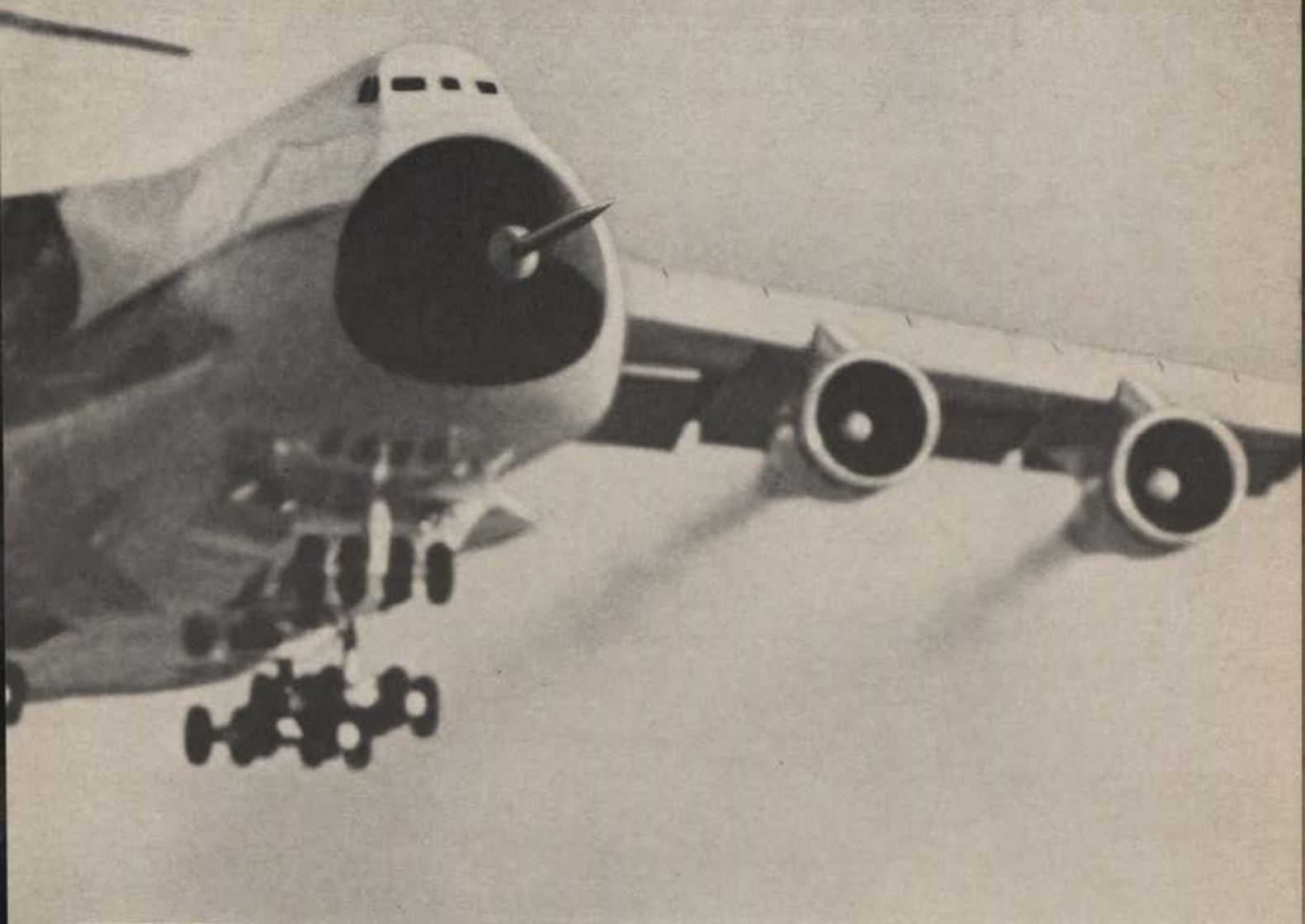
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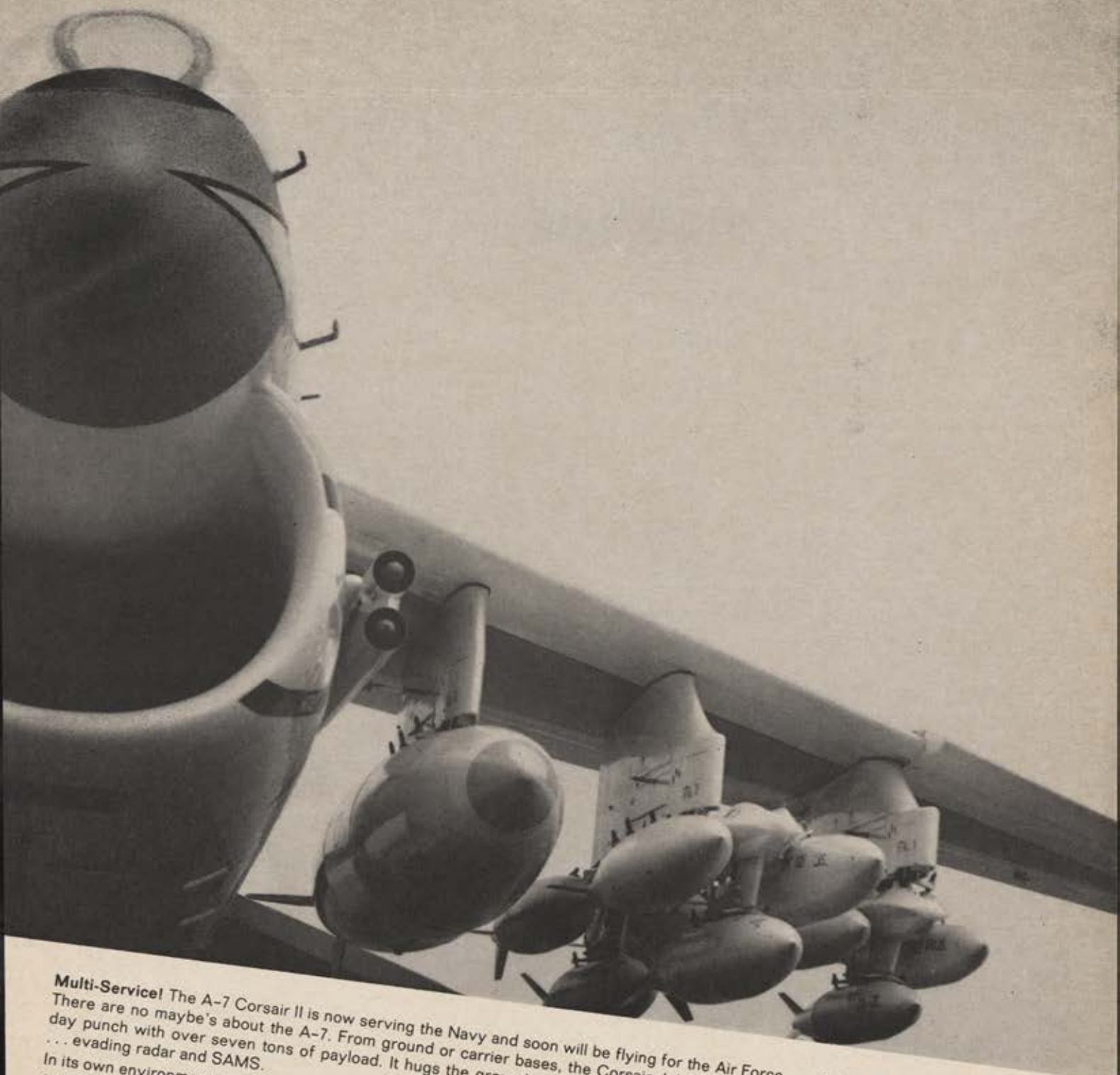
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'Thank You, Mr. Secretary'

By John F. Loosbrock

EDITOR, AIR FORCE/SPACE DIGEST

NOT long ago a retired USAF four-star general was asked an interesting question to which he gave an equally interesting answer. The general has been out of the blue suit for a considerable period of time, but he has an active mind and keeps in touch with what is going on in the world. He held high and important combat command positions in both World War II and Korea. And he had long and intimate experience in the research and development activity of the Air Force at the decision-making level.

The question was this:

"Come January we will have a new political administration in this country. If asked by the new President, whom would you recommend for the job of Secretary of Defense?"

The answer came quickly and without qualification: "Clark Clifford."

The next natural question, for obvious reasons, was "Why?"

"Because," said the general, "of all the men in public life today, he has had the most intimate and lengthy association with national security problems, including our military interface with other nations, both the friendly ones and the unfriendly ones. He played an important role in writing the National Security Act of 1947 and knows more about what it was intended to do than anyone else, including Mr. McNamara. He has been a member of the inner circle in three Administrations—Truman, Kennedy, and Johnson—and there are almost no important decisions of those years in which he did not have an important voice. I consider him the best qualified man for the job."

With this valued opinion in our mind, we viewed with much interest Mr. Clifford's responses to a number of questions at his most recent (July 11) press conference. And while we might quarrel with the general's use of the unqualified superlative, we found a good deal of supporting evidence for his conclusion. Perhaps it is the contrast with Mr. Clifford's predecessor.

For example, in a compilation of McNamara quotations from speeches, press conferences, and congressional testimony from January 1963 through December 1965, he repeatedly described his position on the war in Vietnam as one of "cautious optimism." This cautiously optimistic position was maintained throughout an escalatory process which saw the US involvement rise from a few thousand "advisers" and a few hundred millions of dollars a year to full-scale US management of the war, involving 500,000 American troops and some \$30 billion of US resources annually.

In the process, the side effects of the treatment have

been as bad or worse than the disease. There are few ills that beset America today that cannot be traced, directly or indirectly, to the Vietnam War, including social strife, an overheated and unstable domestic economy, an unfavorable balance of payments, and a long list of important projects, both technological and economic, which have been shelved, stretched out, or shortchanged for the duration.

It is a sad and ironical fact that the prophet of management and cost-effectiveness, as applied to national defense, failed miserably on both counts. The Vietnam War, longest in our national history, has been the worst managed and least cost-effective as well.

It has been left to Mr. Clifford to pick up the pieces, and it is encouraging to note that cautious optimism, which has served the country so badly, has been replaced with what could be fairly termed a note of cautious pessimism.

No predictions, for example, as to withdrawal of American troops from Vietnam. Instead:

"I believe we must proceed on the assumption that, if the enemy chooses to fight, we must remain there. . . . I do not see this as taking a short period of time, but a rather lengthy period of time. . . . I am unable to predict at this time the possibility of the withdrawal of American troops in 1969, absent some development in the negotiations in Paris."

No feeling that we cannot maintain meaningful strategic nuclear superiority over the Soviet Union. Instead:

"I believe that it is part of our responsibility in the Department of Defense to maintain superiority in this field."

No worry about provoking the Soviets by maintaining our defenses. Instead:

"I do not believe that there is any relationship between good faith [with the Soviets] and our deployment of an ABM system. We have not reached any agreement with the Soviet Union. I hope fervently that we will. Until we do . . . it would be my wish to proceed in those areas [where] I think it's necessary for us to proceed to effect the national security of this country."

"I personally believe that it is advantageous to us to proceed in this area [ABM development]. I believe if we were to advise the Russians that we were going to halt our ABM system, that we were going to disarm unilaterally with reference to our Minuteman III or with reference to our Poseidon missile, I believe there would be no incentive left for the Soviet Union to sit down and negotiate with us."

It is refreshing to have a Secretary of Defense who sees his main job as defense.—END

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but only enough space to say that although our gyros have gone a long way, they're going to go even further in the future. For further information write Kearfott Systems Division, General Precision Systems Inc., Kearfott Group, 1150 McBride Avenue, Little Falls, N.J. 07424 Dept. 1450.

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America's Patriots

Gentlemen: I simply must take time out to compliment you—and also Col. Daniel "Chappie" James, Jr.—for the excellent coverage you gave this fine officer and combat fighter pilot in a feature article in your June 1968 issue of *AIR FORCE/SPACE DIGEST*. (See also *AF/SD*, April '68, p. 178, "Freedom—My Heritage, My Responsibility.")

While I will admit that no one man can speak for each and every member of a particular group, I am willing to bet that Colonel James's sentiments reflect exactly those of every black American who has been privileged to serve his country, even if he did not rise as high as the Colonel. He is a dedicated, "motivated" to use one of SAC's favorite words, patriotic officer and American first. He believes in law and order. He has had the priceless opportunity to serve in foreign countries and to compare them at first-hand with these United States. And to be honest about it, no country comes close to us. (Maybe Germany and Holland are clean and industrious but in the sum total America stands first.) As I said, I can't swear that every colored American feels like Colonel James, but I certainly do. I know that practically all the officers do and right on down the line.

While I am at it, let me say that I deplore the looting and burning but just as strongly, or even more so, the violence that strikes down our dedicated national leaders.

I consider your magazine a fair, unbiased one that will give credit wherever it is due, regardless of racial background. Although I personally am retired, let me say: Whenever possible help, support, and uplift your black servicemen, for they are among your most patriotic and loyal Americans—whether on active duty or not.

Keep up the good work.

MAJ. JOHN P. RICE, JR., USAF
(RET.)

Kincheloe AFB, Mich.

Almanac

Gentlemen: I have just been looking over the Ninth [Missile and Space] Almanac [June] issue of *AIR FORCE/SPACE DIGEST* and think it the best yet.

I would like to compliment you

and your staff for the compilation of fine articles as well as the reports of the Atlanta Convention.

GEN. J. P. MCCONNELL
Chief of Staff, USAF
Washington, D. C.

The Last Hero

Gentlemen: I am writing to you about C. B. Allen's review of my book *The Last Hero: Charles A. Lindbergh*, in your May issue.

It is pertinent that when I was researching the book I got in touch with many people who might have information about Mr. Lindbergh, including Mr. C. B. Allen. Mr. Allen was then kind enough to say he would be available to answer some questions and referred me to his 1940 *Saturday Evening Post* article "The Facts About Lindbergh," a defense of Mr. Lindbergh's prewar activities and ideas.

When *The Last Hero* was in proof Mr. Allen was given a chance to read it before publication, but said he didn't have the time. Five people who are expert in aviation matters and who know Mr. Lindbergh did read proofs and offered comments and corrections. It is interesting that Mr. Allen has found time to read the book after publication and to write a review.

This sequence of events and the hostility with which Mr. Allen has attacked the book make his review seem more like an ambush than a balanced evaluation. This impression is borne out by the review itself, which, although long, avoids treating the substance of the book while casting aspersions on it from the opening sentence. Mr. Allen chooses to devote the bulk of his "critical look" to four supposed "slips" in the aviation background of the book—and then attempts to use them to discredit the biography of Mr. Lindbergh without refuting any of the facts. All of Mr. Allen's supposed "slips" are at best moot, and at worst Mr. Allen's mistakes, not mine. (I mean he made the mistakes in his review; he is not responsible for any material in the book except what is attributed to his article in the *Post*.) But in any case, such items as the true train-plane schedule of TAT in 1929, the number of engines in the Stout 2-AT, or what the committee headed by von Neumann should be

called, are at best peripheral in a book which is not an aviation history but is devoted almost entirely to the life of Mr. Charles A. Lindbergh and his family background. The fact that Mr. Allen offers not a single factual criticism of the biographical material, which is what *The Last Hero* is about, indicates that his review is a slanted attempt to devalue something he couldn't really fault.

Mr. Allen generates a good deal of heat over the fact that I deliberately concealed the names of my interviewees; but he neglects to say that I pointed out to the reader why this had to be done: to protect them from Mr. Lindbergh's well-known antipathy toward any personal revelations not made by himself, and the fact that he considers such revelations unfriendly acts. All reporters are supposed to protect their sources; Mr. Allen did not reveal his sources in his *Post* article; shouldn't I have the same privilege?

He also makes much of the fact that I have consulted many printed sources, and uses one of his many pejorative phrases ("hearsay history") to describe this. But, using his definition, all written history is to some degree "hearsay," including Mr. Allen's book *The Wonder Book of the Air* (coauthor, L. D. Lyman) and even Mr. Lindbergh's autobiography, *The Spirit of St. Louis*. The only question involving the use of other sources is not whether they are used, but how—are they good sources, and does the author tell the reader what they are? *The Last Hero* does this last scrupulously in about 600 reference notes, and an index. Even Mr. Allen says that my book is "documented to an amazing extent."

I tell the reader quite clearly that *The Last Hero* is "not an authorized biography," but Mr. Allen seems to try to say that I attempted to make it an authorized biography. He is clearly in error. I did not seek an interview with Mr. Lindbergh, or ask his help. On the contrary, I told the publishers, Harper & Row, that my work would be unauthorized from the beginning—as in my opinion this is the only honest format for a biography.

In short, Mr. Allen's critique of *The Last Hero* is inaccurate and misleading. He ought to find more cogent

reasons for attacking it than the ones he has presented, or revise his opinion.

WALTER S. ROSS
New York, N. Y.

Gentlemen: The book by Mr. Ross about Lindbergh and his family background, like my review of *The Last Hero*, speaks for itself. So does his letter criticizing that review.

All the blunders in aviation historical fact, which his book committed and I criticized, are still historically documentable errors despite his contention that they "are at best moot, and at worst Mr. Allen's mistakes, not mine." The reasoning by which he arrives at this strange conclusion makes me wonder if he ever checked the dictionary meaning of the word "moot." After all, he wrote (and quoted from other writers and sources) everything that appeared in the book; my only function was to review it. Furthermore, Mr. Ross seems to think there would have been nothing unethical in my collaborating with him by reading the galley proofs and then reviewing his book for this or any other publication. I happen to subscribe to a different code of ethics.

It also seems to me that Mr. Ross is somewhat less than strictly honest in saying he "did not seek an interview with Mr. Lindbergh, or ask his help." I am reasonably certain he could document the nonfactuality (or at best half-truth) of this bold assertion if he maintains his own correspondence files and cares to consult them. Additionally, since he makes such a point of the necessity to protect from Lindbergh's displeasure the unnamed sources for much of the material in his book, I think it only fair to observe that:

Several of Lindbergh's friends are reliably reported to have asked him whether he has read *The Last Hero*. All get the same answer; he has not and does not intend to, but that, if it is like the *Esquire* article Mr. Ross wrote about him some years ago, it is undoubtedly full of fiction, rumor, and triviality—mixed in with some facts. And, as Mr. Ross indicated in his foreword to *The Last Hero*, this article actually was the genesis of his Lindbergh biography.

C. B. ALLEN
Moorefield, W. Va.

Looking for Old Buddies

Gentlemen: I would like to find out something about the 422d Bomb Squadron, 305th Bomb Group, Eighth Air Force, World War II, and hear from members. Has this outfit held, or is it going to hold a reunion?

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collage 44

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AC ELECTRONICS





By Claude Witze

SENIOR EDITOR, AIR FORCE/SPACE DIGEST

Standing Still Can Be Fatal

WASHINGTON, D. C., JULY 9

In congressional testimony released three days ago, Gen. Earle G. Wheeler, Chairman of the Joint Chiefs of Staff, says, "The most dangerous threat to the United States is posed by the growing Soviet strategic nuclear forces." He continued:

"As the Soviets improve the capability of their strategic forces, and particularly their ABM deployments, they may become increasingly confident about their ability to undertake military or diplomatic ventures inimical to our interests.

"If the Soviets believe that their growing strategic capabilities will deter the United States, they may be more prone to take advantage of opportunities to intervene in local conflicts and, once involved, may be less willing to withdraw.

"Certainly, an increased strategic capability will enhance their prestige and improve their ability to influence events in other countries. The Soviets now have the capability to conduct large-scale nuclear or conventional attack against Eurasia, and they might, at some point in time, consider this posture 'exploitable.'"

General Wheeler issued his warning to the Senate Preparedness Investigating Subcommittee in late April. Under questioning, he said he is apprehensive about this nation's defense policies of recent years and fears they may menace our survival. He also suggested a shift in the trend of our military pattern:

"There is no question but what the Soviets . . . have improved their military capabilities vis-à-vis the United States over the past several years. As a matter of fact, in the nuclear field, they have been doing so steadily since they exploded the first hydrogen bomb some years ago. . . .

"But [we] do not have to stand still. We have it within our power, both brainwise and technologywise; we have the economics, the broad industrial base, and certainly I hope we have it in the area of will and determination of the American people, to maintain ourselves as the leading world power, which is a position I think that is beneficial . . . to the world as a whole."

The subcommittee, chaired by Senator John Stennis of

Mississippi, took special interest in General Wheeler's listing of proposals from the Joint Chiefs of Staff that have not won approval from the Defense Department.

Included were recommendations for more air-to-ground SRAM missiles for the B-52 fleet, contract definition for the AMSA advanced bomber and an advanced ICBM, a bigger Poseidon nuclear-sub fleet, and the finest possible defense against Russian-launched ICBMs.

In later sessions, with Dr. John S. Foster, Jr., Director of Defense Research and Engineering, and Dr. Alain C. Enthoven, Assistant Secretary of Defense for Systems Analysis, the committee pursued these JCS recommendations. Why and how were they eliminated? The Foster and Enthoven replies, while long and detailed, added up to an essentially simple answer. The Defense Department has studied all requests and disagrees with the JCS on the requirements.

There is no better example than the entire subject of air defense. General Wheeler testified that he believes USAF's Aerospace Defense Command needs the high-performance Lockheed F-12 interceptor. He anticipates that the Russians will have high-performance bombers and "we are going to need the F-12 in order to get the coverage and to have the speed of reaction that they would demand."

He went on to point out that the enemy can easily be armed with more than a free drop bomb. The standoff air-to-surface missile is a reality. The General did not mention the Russian Blinder bomber, capable of supersonic dash, that is in production. And he did not mention the Russian SST that could be converted to a bomber.

When Dr. Foster was on the stand there was an exchange that was ominous, even after the Pentagon's Security Review office had deleted the essential arithmetic. Senator Howard W. Cannon of Nevada raised a question about the efficiency of our air defense against manned bombers. He cited a tabulation in the Foster statement and determined that the figures had been agreed upon by ADC and Dr. Foster.

"In other words," said Senator Cannon, "the [Aerospace] Defense Command agrees that if the Soviets sent over (X number) of heavy bombers now, we could only knock down (Y number) out of the (X number)."

(Continued on following page)

Continued Russian development of supersonic bombers is indicated by the appearance of Blinder, a medium bomber that carries a huge air-to-surface missile under its belly. The aircraft is known to be in production and flying missions in formation.





Lockheed F-12, Mach 3 interceptor, is favored by the Aerospace Defense Command to ensure capability to meet and turn back any Russian supersonic threat. USAF witnesses say that Soviet Foxbat, also capable of Mach 3, is being readied and that only the F-12 will be able to match it.

"I cannot speak for ADC, sir; but I am not the least bit surprised," Dr. Foster replied.

Senator Cannon said he was "shocked."

Senator Stuart Symington said, "Incredible."

Dr. Foster then explained that if the Soviet bombers came in at a high altitude, the effectiveness of ADC would be much better. But he is assuming, in his estimate, that they will come in low and fast. And we do not have today an interceptor with a radar capable of looking down at the ground and identifying a moving target. This is a new radar development, only recently made available.

When Dr. Enthoven was on the stand he offered a strong defense for the Defense Department decision to push the F-12 aside and update the ADC system by going ahead with the Airborne Warning and Control System (AWACS) and modernizing the old General Dynamics F-106 interceptor into the F-106X.

Here is how he explained it:

"We would like a system that would be effective if the Soviets come in at low altitude, which is an assumption that was not made earlier, and we would like a system that will be effective if they shoot their ICBMs at our air defense control centers. The AWACS and the F-106X would give us an air defense system that would be more effective under a broader range of conditions. . . .

"We want to discourage Soviet bomber aspirations," he said a moment later. "This requires a good research and development program so the Soviets can see that, if they were to build a large new bomber force, we would be able to respond. . . . The purpose of the F-106X and the AWACS is not only to buy a more economical continental air defense program, but also to get a significantly more effective one under realistic assumptions."

A still later presentation to the subcommittee was drawn up by USAF Headquarters. The first acknowledgement was that both the enemy and USAF, in improving their offensive systems, are turning to low-altitude attack and the standoff missile. There are disadvantages. The low-altitude approach reduces the range of the bomber. The missiles are heavy and must be carried externally, as illustrated in the picture of the Soviet medium bomber, Blinder, on page 13.

ADC's primary deficiency is its present inability to detect and kill low-altitude aircraft. Then, there is the vulnerability of a ground-based command and control system to an attack by missiles. Also, it is known that Soviet technology is good enough to come up with other threats that can degrade our defense against the manned bomber.

There are many clues to Soviet intentions in this area. Public discussion has been skimpy, and Washington is known to discourage speculation about the fast-growing reconnaissance program of the Soviet Air Force.

In an address last April, Gen. Raymond J. Reeves, head of the North American Air Defense Command, said that "during the past few months we have seen increased activity by aircraft of the Soviet long-range air force."

"This activity, as reported in the public press, has taken the form of flights into our Air Defense Identification Zones (ADIZ). We have detected these flights on our radar, and fighter-interceptors have been directed against them. These incidents, off the Labrador-Newfoundland area and in the Alaskan NORAD region, are evidence that the Soviet is engaged in long-range bomber training flights, possibly testing our defenses and their ability to penetrate them."

"Continued Soviet interest in upgrading the performance of their long-range Air Force comes as no surprise to us. We feel it is logical to assume that an aggressor would employ the manned bomber as part of a mixed weapons delivery system that would include the ICBM and submarine-launched ballistic missiles."

The pace of these Soviet bomber intrusions has been consistent, and it is stepping up. While the United States, currently enchanted with the prospect of improved détente with Russia, has kept silent, our Canadian neighbors are less reticent.

Most recently, on June 28, the Canadians issued a statement in Halifax saying that on June 26 a flight of seven Bear bombers flew south over Iceland and to within fifty miles of the east coast of Newfoundland before turning away to the east.

The Bears, the Canadians said in a release that was all but ignored by the American press, were intercepted and observed during the flight by "United States jet fighters from Iceland and Canadian CF-101 aircraft based at Chatham, New Brunswick."

The Baltimore Sun, one of the few newspapers to note the Canadian announcement, said that there have been about three dozen such flights this year, involving more than eighty-five Russian bombers. The paper said this is six times the scale of operations conducted in the last half of 1967.

This suggests that the Bear reconnaissance flights have become as routine as the flyovers of Russian planes that are experienced by American aircraft carriers in the Atlantic, the Western Pacific, and the Sea of Japan. The beginning of this program was not disclosed by the Defense Department until the Soviets happened to buzz a carrier that was at sea with a party of US newspapermen. They saw what happened from the deck, and by the time they disembarked at Norfolk, Va., the Pentagon had disclosed the Russian activity for the first time.



Russian Bear bomber, equipped for reconnaissance and test of US air defense network, penetrates North American ADIZ and is monitored on flight by F-106. Both ADC and RCAF interceptors take part in such now-routine exercises with Reds.

In the face of this activity, it was announced this week that plans to trim our air defense effort have been accelerated. Two F-101 fighter-interceptor squadrons are being deactivated a year earlier than previously scheduled.

Earlier, on May 13, the Defense Department announced a realignment of NORAD facilities. Essentially, it will result in the shutdown of radar and interceptor stations in much of the interior of the United States and concentration of what is left on the perimeter of the nation. The shakeup, to be completed by July of next year, will result in the elimination of 4,719 military and 1,219 civilian positions.

In hearings before the House Defense Appropriations Subcommittee in late February, Gen. John P. McConnell, USAF Chief of Staff, said it "is the consensus" of the Defense Department that the Russians have little interest in the manned bomber. He also indicated that the Air Force, which has the air defense mission, has a different view.

USAF Secretary Harold Brown told the committee that Russia has had ten years to develop a follow-on bomber, and he has seen no evidence of one, adding: "The Air Force view is at least as much a view that 'they ought to have one' as it is 'they will have one.'"

He was asked if this is not "parochial"? The reply:

"I wouldn't describe it that way. I think it is influenced by our knowledge of the tradeoffs between missiles and bombers. We think it is cost-effective to have a bomber. We think it is cost-effective at a certain size force to have a new bomber like the AMSA, and we therefore think you do have to be somewhat concerned about the Soviets coming to the same conclusion and building one. I must say I see no evidence that they have."

General McConnell also responded to the committee, but the Defense Department has deleted his opinion from the published transcript.

General Wheeler's opinion that Soviet strategic forces

offer the most dangerous threat to the United States and the JCS recommendation that we press on with the AMSA effort as well as a defense against ballistic missiles, all appear ignored by the Defense Department.

On top of this, there has been no public discussion of the fact that NORAD's mission has been redefined. The command's 1966 definition of its mission says that NORAD "has progressed rapidly from the early requirements for defense against the manned bomber threat to its present mission—the aerospace defense of the North American continent."

That was in 1966. But in 1967 the NORAD Fact Sheet was rewritten, and the mission now is expressed as only the "air defense of North America."

Other 1966 references to space and NORAD's capability to intercept and destroy armed satellites, as well as the "possible space threat" itself, all have been removed from the expressed interests of the command.

The reason for this is that Canada so far has refused to have anything to do with the proposed American ABM system. Sentinel radars and nuclear-armed missiles are not welcome in Canada. So far, there has been no final decision on who will control and shoot the Sentinel system if and when it becomes operational. The understanding in Canada, according to Toronto newspapers, is that it will not come under NORAD, but under a different command, NORAD being, of necessity, a joint government effort.

In view of these facts, there are serious questions to be answered about NORAD's future, if the political Administration persists in discounting the manned bomber threat and curtailing ADC's competence to meet that threat.

The continuing Russian effort to probe our air defense system, the constant feeling for weaknesses that would aid penetration by manned systems, lends urgency to the USAF requirement. General Wheeler says we do not have to stand still. We must not.—END



AEROSPACE WORLD

By Allan R. Scholin

ASSOCIATE EDITOR, AIR FORCE/SPACE DIGEST

WASHINGTON, D. C., JULY 12

A series of progressively longer, faster, and higher test hops are scheduled for the Lockheed C-5 Galaxy at Dobbins AFB, Ga., following the successful first flight of the world's largest aircraft on June 30, making good on a schedule set thirty-two months ago.

Lockheed and USAF had set their sights on a first test flight in June, but it was a close call. After three days of taxi tests, the flight was to have been made June 29 but had to be held over to the 30th, a Sunday, because of minor problems.

Chief test pilot Leo Sullivan of Lockheed-Georgia, who had also taken the C-141 StarLifter aloft on its first test, said he felt "the aircraft did a phenomenally beautiful job on the first flight." The only significant problem, apparently, was the failure of part of the main twenty-four-wheel landing gear to retract fully. Sullivan left all the wheels down throughout the ninety-four-minute flight, limiting its top speed to 200 knots, far below normal 480-knot cruising speed.

Other crew members on the initial test were Lt. Col. Joe Schiele, USAF's chief C-5 test pilot; Walter E. Hensleigh, Lockheed C-5 project pilot; and Jerry Edwards and E. Mittendorf, Lockheed flight engineers.

By February of next year, the first C-5 will enter on combined contractor and USAF flight characteristics missions at Edwards AFB, Calif. The second Galaxy goes to Edwards about midyear 1969 for performance tests, No. 3 will follow for support area

operations, and No. 4 is destined for Ft. Bragg, N. C., to work with the Army on aerial delivery tests.



Losses of US fixed-wing aircraft to enemy action over North Vietnam have declined in 1968 to a level less than half that of two years ago, but they are increasing slightly in South Vietnam, according to figures released by the Defense Department.

So far in 1968, losses over North Vietnam are averaging 5.2 per 1,000 missions. DoD added in a footnote that, though it reports missions, rather than sorties, over North Vietnam, a mission in 1967 averaged about 4.5 sorties. In 1966 the rate was 11.9 per 1,000 missions, and in 1967 it was 8.6.

The loss rate was declining even before President Johnson announced on March 31 that the US would halt bombing above the 20th parallel. Reconnaissance missions are still being flown above that line. The total number of planes lost over North Vietnam in 1968 was sixty-seven, through May 21, the cutoff date for DoD's figures.

In South Vietnam, losses of fixed-wing aircraft rose from 0.4 per 1,000 sorties in 1967 to 0.6 so far in 1968. However, the number of sorties through April 1968 was twenty percent higher than the average for all of 1967. Forty-four fixed-wing aircraft had been downed by enemy fire in South Vietnam as of May 21.

Helicopter losses in South Vietnam show a different picture. In less than

five months of 1968, DoD reported, 229 US helicopters had been destroyed by hostile fire, compared to 259 lost to that cause in all of 1967.



LTV Aerospace Corporation will begin test flights of the Air Force A-7D Corsair II in September, following completion of the first TF41 engines by the Allison Division of General Motors at Indianapolis, Ind., on June 26.

Preliminary tests of the A-7D are already in progress, powered by the Pratt & Whitney TF30 employed in the Navy's A-7s. The TF30 is rated at 11,000 pounds of thrust, while the TF41, modified from the British Rolls-Royce Spey engine, produces a thrust of 14,250 pounds.

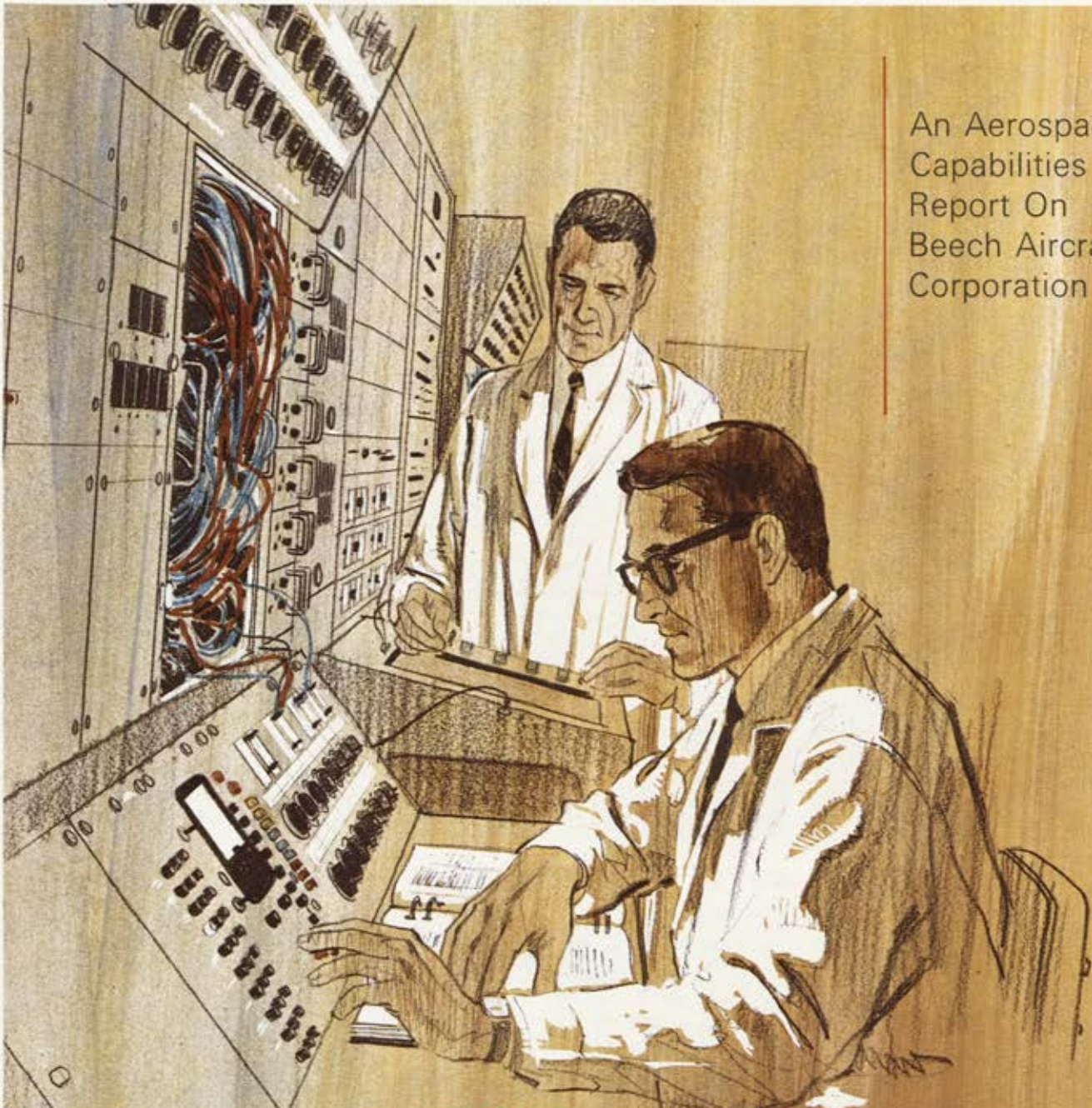
Speaking at the Allison plant during unveiling ceremonies, Maj. Gen. Harry E. Goldsworthy, Commander of AFSC's Aeronautical System Division, hailed the TF41's "tremendous potential . . . as a workhorse engine with many future applications."

While the A-7D is derived from the Navy version, General Goldsworthy said it is no "off-the-shelf item" but a "vastly improved" design for strike, interdiction, and ground-support missions in limited wars. Main differences, in addition to its more powerful engine, are in its avionics suit which gives the A-7D highly precise capability for hitting any target the pilot can find, visually or with the aid of a forward air controller.

(Continued on page 25)

Lockheed C-5 Galaxy made first flight at Dobbins AFB, Ga., on June 30, meeting deadline set thirty-two months before. Leo Sullivan, Lockheed-Georgia chief test pilot, said plane, taking off at 500,000 pounds, handled "beautifully" on flight of one hour, thirty-four minutes.





An Aerospace
Capabilities
Report On
Beech Aircraft
Corporation

BEECH
AEROSPACE ORIENTED
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One out of every 14 Beechcraftsmen is an engineer with one or more degrees. These men need good tools, an encouraging environment and the work of expert craftsmen and technicians to accomplish their missions. They have them. Of nearly 2,000,000 square feet of floor area, one in nine is devoted to laboratories, engineering and tooling.



R&D. Basic and Applied



Models are installed on this 40-foot-high range tower for measurements of radar, antenna and passive radar augmentation patterns.



Every Beech activity associated with aviation and aerospace is backed by complete laboratory facilities.

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The Electronics Development laboratory is staffed by a group of engineering and technical specialists experienced in the development of advanced electronic missile systems. These talents are applicable to many other developmental tasks.

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The Engineering Computer facility occupies 1,600 square feet of operating and office space. Its facilities include advanced digital, analog and data processing computers. In addition, the company maintains a lease agreement for use of a conveniently located IBM 7090 computer and two IBM 1401 satellite computers. Work done in the computer center falls primarily into the following categories:

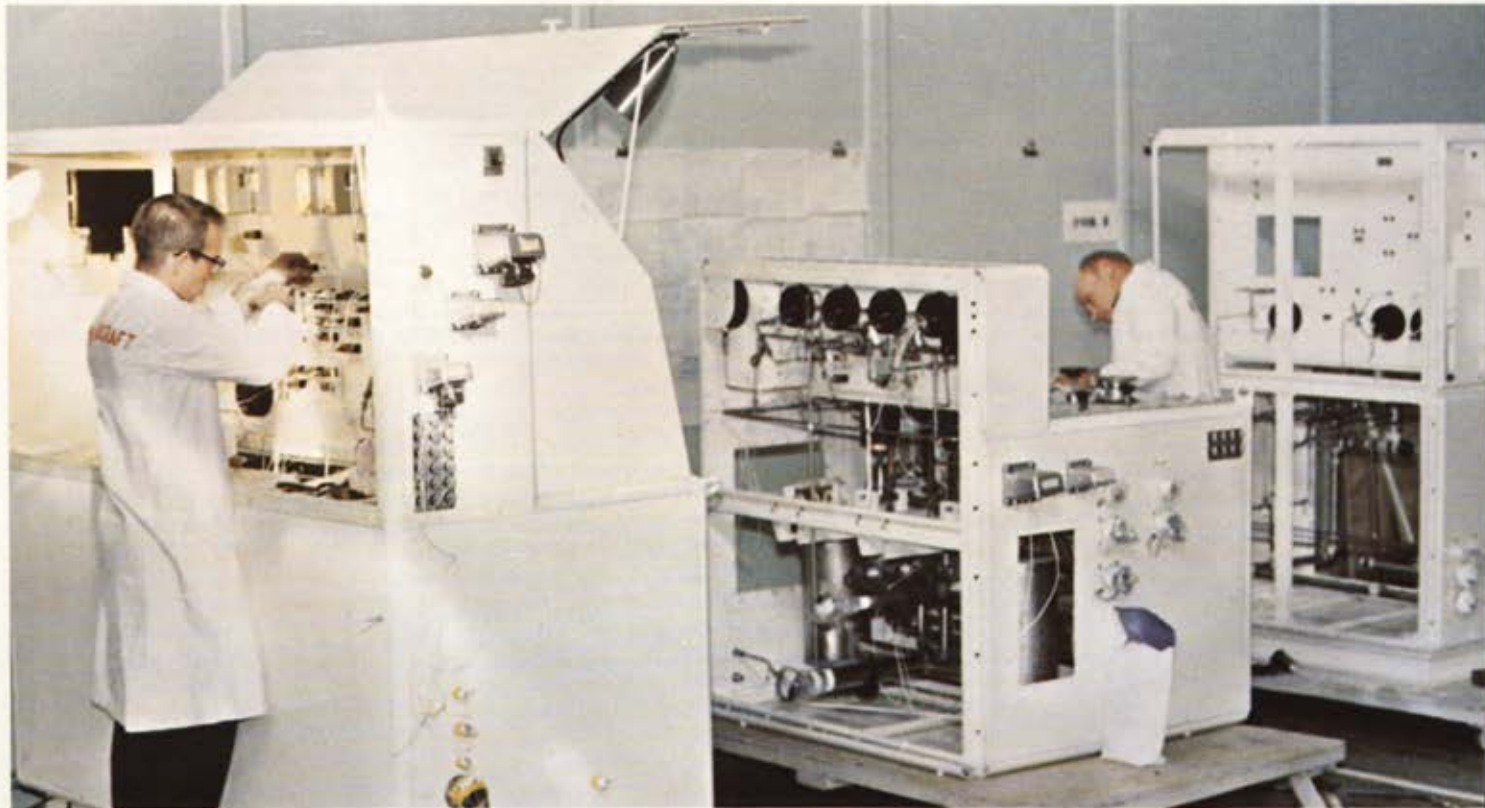
- Missile Trajectory Analysis
- Missile and Aircraft Stability and Control Analysis
- Missile and Aircraft Autopilot Design
- Missile and Aircraft Structural Analysis
- Missile and Aircraft Flight Test Data Reduction
- Missile and Aircraft Propulsion System Analysis
- Missile Aerodynamic Calculations
- Reliability Analysis
- "PERT" Network Analysis
- Aircraft and Missile Dynamics and Flutter Analysis
- Weight Control Calculations
- Calculations on the Economics of Aircraft Utilization



Beech has mastered the techniques needed to fabricate this huge tank of hard-to-work titanium.



Production welding of .012" titanium was pioneered and perfected at Beech. The hemispherical heads on each end of this huge tank were chemically milled in a complex pattern to extremely close tolerances. Beech metallurgists were first to discover—and prove—titanium "creep." This is only a single example of Beech Research and Development applied to fabrication and metallurgy.



Complete control systems for the transfer of liquid hydrogen and oxygen are manufactured at Beech. These control consoles and control boxes are being readied for Gemini shots. To design and build these intricate systems required advanced R&D capabilities in such diverse fields as electronics, pneumatics, metering and sensing.

Beech Applied R&D for Outer Space

At Boulder, Colorado, aerospace systems and components can be ground tested under all temperature conditions encountered from launch to "burnout"—and data collected electronically so that it can be applied to future design problems. At the Beech Transient Heat Laboratory, basic data can be acquired on heat transfer and sink, aerodynamic heating, boil-off and residual vapor, stratification and other fuel conditions, design criteria, tank system operation and complete transient heat information.

Temperatures involved range from minus 423° F to plus 1500° F; measurement and control of liquid hydrogen flow up to 1800 gallons per minute are accomplished.

Flight simulation, high energy fuels, system design, environmental testing, and fabrication of cryogenic support equipment are only a few of the advanced aerospace research and development activities currently in progress.



This radiant heating reflector assembly stands vertically inside a 20-foot high vacuum bell—part of the Beech Transient Heat Facility used for thermal studies of rocket and missile propellant tank systems and components.



By sub-cooling liquid hydrogen to an icy slush, Beech engineers here are testing the feasibility of further reducing hydrogen volume to boost fuel loads without increasing tank size and weight.





Beech has facilities for complete test and evaluation "under one roof"

At Boulder, Colorado, Beech has developed an exceptionally complete aerospace oriented test facility. It includes wide capability in vibration, shock, pneumatics, hydraulics, cryogenics and electronics. The instrumentation for support and data acquisition is traceable to the Bureau of Standards certification.

These Beech laboratories are particularly well equipped for the simultaneous evaluation of multiple environments such as vibration, space vacuum, radiant heat and cold wall, while the component or system is subjected to operating conditions. At any phase of design, aerospace hardware can be tested and evaluated. Most recently completed is a facility for hazardous testing of cryogenic subsystems and components for use with liquid hydrogen and oxygen.

Beech testing capabilities at Boulder include:

Shock—to 500 G's and up to 1,000 lbs.
Vibration—to 22,000 force pounds.

Heat Tower—for aerodynamic or re-entry heat simulation.

Sustained Acceleration—up to 15,000 G-pounds.

Space Simulation:

Bell Jar—with temperature range -320°F to $+200^{\circ}\text{F}$. Vacuum level— 1×10^{-7} Torr.

Explosion Chamber

Space Simulation Chamber—temperature range -320°F to $+140^{\circ}\text{F}$. Vacuum level— 1×10^{-6} Torr. Sinusoidal and random vibration to 8,000 force pounds.

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Humidity Chamber

Sand and Dust Chamber

Rain Chamber

Fungus Chamber

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Hydraulic Capability to 70 gpm @ 4,000 psig.

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Calibration—meets MIL-Q-9858, Quality Control System Requirements and USAF Specification Bulletin No. 520.

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R. H. McGregor
Vice President
Aerospace Marketing and Contracts
Beech Aircraft Corporation
9709 East Central
Wichita, Kansas 67201

DIVISION CODE NO.	RESEARCH	EXPLORATORY & ADVANCED DEVELOPMENT	PRODUCT ENGINEERING	AREA OF CAPABILITY TITLE
1.	X	X	X	Aircraft and Flight Equipment
3.		X	X	Chemical Warfare Equipment and Materials
4.	X	X	X	Chemistry
5.		X	X	Communications
6.		X	X	Detection
7.		X	X	Electrical Equipment
8.		X	X	Electronics — Electronic Equipment
9.	X	X	X	Fluid Mechanics
10.	X	X	X	Fuels and Combustion
11.	X	X	X	Ground Transportation Equipment
12.	X	X	X	Guided Missiles
13.		X	X	Installations and Construction
14.	X	X	X	Materials (Non-metallic)

DIVISION CODE NO.	RESEARCH	EXPLORATORY & ADVANCED DEVELOPMENT	PRODUCT ENGINEERING	AREA OF CAPABILITY TITLE
15.		X	X	Mathematics
16.	X	X	X	Bioastronautics and Life Sciences
17.	X	X	X	Metallurgy
18.		X	X	Military Sciences and Operations
19.	X	X	X	Navigation
21.		X	X	Nuclear Propulsion
22.	X	X	X	Ordnance
23.		X	X	Personnel and Training
25.	X	X	X	Physics
27.	X	X	X	Propulsion Systems
30.	X	X	X	Research and Research Equipment
35.	X	X	X	Spacecraft and Space Equipment
36.		X	X	Range Operations and Studies

*For Research, Development
and Testing...*

***Look to Beech
Capabilities***

For full information about how you may take advantage of Beech's experience in systems management and proven capabilities in designing, developing, manufacturing and testing of components for aviation and aerospace projects, write, wire or phone Contract Administration, or Aerospace Marketing, Beech Aircraft Corporation, Wichita, Kansas 67201, U.S.A.

Beech Aerospace Division

WICHITA, KANSAS — BOULDER, COLORADO



Allison-Spey TF41 engines for Air Force A-7D Corsair II tactical fighter are now coming off production line, with indications that first USAF A-7D squadron may be ready for Vietnam combat early next year. This A-7D is shown on test flight at LTV Aerospace Corporation plant in Dallas, Tex., powered by interim Pratt & Whitney TF30 engine and toting eight 700-pound ordnance tanks.

For ground strafing and air combat, the 650-mph A-7D is equipped with the M61 Vulcan 20-mm cannon, capable of firing at the rate of 6,000 rounds per minute. It has eight stores stations on the fuselage and wings, enabling it to carry more than 15,000 pounds of bombs, rockets, and missiles, including two optional air-to-air missiles. It also carries extensive armor plating to protect the pilot, engine, and fuel lines from ground fire.



Numerous Air Force units have been on the move in recent weeks, some to or from Southeast Asia or elsewhere in the Far East, others as

a result of aircraft being retired from the active inventory.

Five Aerospace Defense Command F-101 squadrons are being deactivated this summer—the 49th, Griffiss AFB, N. Y.; 84th, Hamilton AFB, Calif.; 87th, Lockbourne AFB, Ohio; 98th, Suffolk County Airport, N. Y.; and 444th, Charleston AFB, S. C. A sixth unit, the 445th at Wurtsmith AFB, Mich., previously scheduled for phase-out, will stay on for the time being.

Two ADC F-106 squadrons are being shifted as a result of F-101 retirements. The 438th moves from Kincheloe AFB, Mich., to Griffiss, replacing the 49th, and the 498th leaves Paine Field, Wash., to replace the

84th at Hamilton. This move enables USAF to accelerate termination of its activities at Paine.

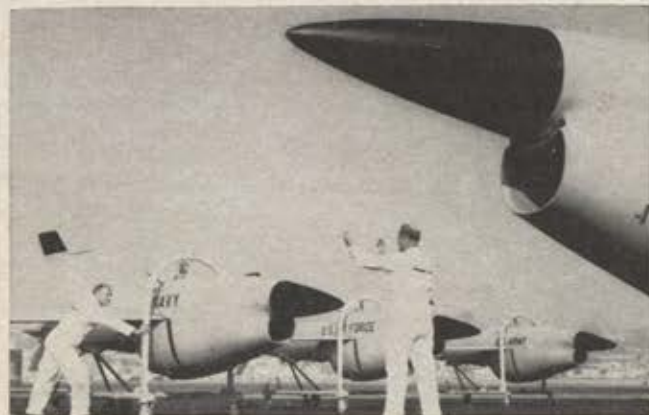
With the Strategic Air Command's 823d Air Division and 19th Bomb Wing leaving Homestead AFB, Fla., that base was turned over to Tactical Air Command on July 1. The 823d is relocating at McCoy AFB, Fla., while the 19th Wing's bombers went to Wright-Patterson AFB, Ohio, and its KC-135 tankers to Loring AFB, Me.

At Altus AFB, Okla., the 11th Strategic Aerospace Wing will be redesignated the 11th Air Refueling Wing when the 26th Bomb Squadron is inactivated and its fifteen B-52Es are retired late this summer. The fifteen KC-135 tankers remaining at Altus will be doubled next spring with

(Continued on following page)



One of two V/STOL test aircraft being readied for flight test is USAF's XV-4B Hummingbird. Lockheed pilot B. J. Dvorscak will begin flights in August. The other is the Ryan XV-5B, below.



New \$20 million contract has been awarded to Ryan Aeronautical Company for Firebee aerial jet targets for all US armed forces. Ryan says it has delivered more than 3,600 Firebees to the three services. From enemy reports, quite a few are employed in unmanned reconnaissance operations.



Employing unique fan-in-wing design, this Ryan XV-5B is undergoing flight tests in San Diego, Calif., before delivery to NASA's Ames Research Center at Moffett Field, Calif. Shown with plane, originally developed for Army as XV-5A, is Ryan chief test pilot William A. Armstrong.



Check for \$26,000 is presented to Air Force Aid Society by Ray Bell, left, President of AFA's Iron Gate Chapter, New York, N. Y., representing proceeds from annual Military Ball sponsored by the Chapter. Receiving the check on behalf of the Air Force is Secretary Harold Brown, second from left. With him are AFA President Robert W. Smart and AF Undersecretary Townsend Hoopes.

the transfer of the 916th Air Refueling Squadron from Travis AFB, Calif. Control of Altus was shifted from SAC to Military Airlift Command on July 1.

Also leaving Travis is the 5th Bomb Wing with its fifteen B-52Gs, moving a few miles to Mather AFB, Calif., to replace the 320th Bomb Wing whose B-52Fs are being retired.

MAC's last two C-130 airlift squadrons—the 29th and 45th at McGuire AFB, N. J.—are being deactivated this summer, with their thirty-two aircraft and some personnel being transferred to TAC, which will activate the 36th Tactical Airlift Squad-

ron at Langley AFB, Va., and 348th at Dyess AFB, Tex., to accept them. Some C-130s remain in MAC, employed in rescue, weather, and photomapping duties.

The 9th Military Airlift Squadron at Dover AFB, Del., is being inactivated for a time, with its C-141s moving to McGuire. The 9th will go back into business when it is equipped with the C-5 Galaxy.

Another MAC move involves headquarters of the Aerospace Rescue and Recovery Service, which relocated from Orlando AFB, Fla., to MAC headquarters at Scott AFB, Ill. Orlan-

do AFB has been turned over to the Navy for recruit training.

The 123d Tactical Reconnaissance Wing, of Louisville, Ky., plus its 123d Group and 165th Squadron and support units, have moved to Richards-Gebaur AFB, Mo., to be joined by the 152d Group and support elements from Reno, Nev. All are former Air National Guard units called up in January, employing the RF-101 Voodoo.

Meanwhile, TAC's 4th Fighter Wing was due to reassemble at Seymour Johnson AFB, N. C., by the end of July, after a five-month tour in Korea. The F-4D-equipped wing, commanded by Col. Charles E. Yeager, was replaced in Korea by the 354th TFW, formerly of Myrtle Beach AFB, S. C., employing F-100 Supersabres, which has been augmented by the arrival in Korea of two former Air Guard squadrons—the 127th from McConnell AFB, Kan., and 166th, Lockbourne AFB, Ohio.

This brings to six the number of former ANG F-100 squadrons now serving overseas. The other four—the 120th, Denver, Colo.; 136th, Niagara Falls, N. Y.; 174th, Sioux City, Iowa; and 188th, Kirtland AFB, N. M.—are in Vietnam.

A new arrival in Thailand is the 25th TFS, formerly with the 33d Wing at Eglin AFB, Fla., now operating its F-4D Phantoms IIs with the 8th TFW at Ubon.

USAF has now confirmed that B-52s are based in Okinawa, a fact newsmen had reported as long ago as

NEW BOOKS IN BRIEF

Chinese Communist Air Power, by Richard M. Bueschel. Since there is little information available about the Chinese air forces, the main sources for this work were Communist publications, China-watchers' reports, and the US archives. Undoubtedly, it is not definitive, but it is a useful study. Praeger, N. Y. 238 pages. \$6.95.

The Man With Two Hats, by B/G Bruce Johnson, USAF (Ret.). In these personal memoirs, General Johnson reminisces about his home life and his accomplishments in two World Wars. Photographs illustrating both are included. Carlton Press, N. Y. 186 pages. \$3.95.

Ho Chi Minh: A Political Biography, by Jean Lacouture. A flattering portrait of the president of North Vietnam that describes his comprehensive political accomplishments and his personal hold on public spirit. There are also suggestions as to how these factors may affect the outcome of the peace talks being held in Paris. Random House, N. Y. 314 pages. \$5.95.

Outer Space—Prospects for Man and Society, ed. by Lincoln P. Bloomfield. Columbia University here revises its 1962 book, designed to broaden public understanding of the space program's objectives. Nine essays cover such topics as international cooperation, research, economic im-

pact, and arms control. Praeger, N. Y. 269 pages. \$6.50.

Over Land and Sea, by Robert Scharff and Walter S. Taylor. From the early days of aviation, Glenn Curtiss was an important name in plane design and piloting. His many innovations turned an experiment into a profession that he followed until his death in 1930. This book tells his story. Photographs included. David McKay Co., N. Y. 310 pages. \$6.95.

The TFX Decision: McNamara and the Military, by Robert J. Art. If this book had dealt with the technical performance of the TFX, now the F-111 fighter-bomber, it might already be outdated. But since it focuses on the civilian-military dispute the contract award involved, it proves to be a provocative political analysis. Little, Brown & Co., Boston. 202 pages. \$5.95.

The Word War: The Story of American Propaganda, by Thomas C. Sorensen. After the US was forced to abandon isolationist policies during World War I, it soon discovered the necessity of favorably influencing foreign public opinion. The roles of the US Information Agency and the Voice of America broadcasts dominate this history. Harper & Row, N. Y. 337 pages. \$6.95.

—MARIA T. ESTEVEZ

March. They were assigned there from the US to support the Korean buildup, said USAF, but are also employed in bombing targets in Vietnam.



After a competition that extended over eight years, West Germany has placed an order for 135 Sikorsky CH-53 helicopters for its army, at an estimated cost of \$325 million. The Sikorsky model won out over the Boeing CH-47.

It will be coproduced in Germany, with Vereinigte Flugtechnische Werke (VFW) expected to take a leading role, since Sikorsky owns a one-fourth interest in that firm.



A "first" at Air Force Institute of Technology was logged by Maj. John Ostrominski by receiving two Master of Science degrees in June graduation ceremony. Major Ostrominski originally enrolled in graduate astronautics but managed at the same time to win an electrical engineering degree in guidance and control option.

The West German Parliament, however, deferred action on a Luftwaffe proposal to buy eighty-eight McDonnell Douglas RF-4E Phantom IIs. It wants to give further consideration to an alternative plan to employ Lockheed F-104G Starfighters in a reconnaissance configuration. The latter could be built almost entirely in West Germany, which participated in building more than 900 Starfighters under Lockheed license, while the West German industry's share of Phantom II production would be lower.

Phantom proponents in the Luftwaffe point out, however, that the reconnaissance capability would be degraded in the RF-104G because it

(Continued on following page)

PUMPAD

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

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

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

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

And he did.

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

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

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

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

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

His face was now bright pink. Eyes slightly glazed.

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

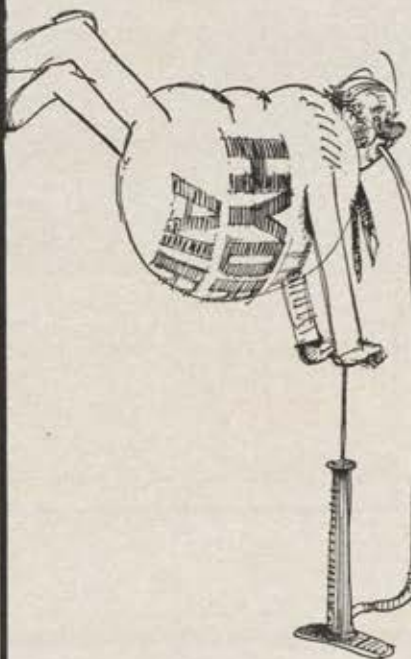
"Now if all that is not very exciting to you, you might just mention that we have fourteen of our pumps on the Boeing 747. The Superjet. Low weight pumps that use less power than any others; that have a highly efficient new liquid seal priming element; that have easily replaced unitized internal parts.

"And finally..."

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

That's when he fell off the desk.

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



HYDRO-AIRE

3000 Winona Avenue, Burbank, California
DIVISION OF CRANE

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

could not accommodate the desired infrared equipment or the long-focal-length cameras carried in the RF-4E.

If the Phantom II is selected, Messerschmitt may be chosen to work with McDonnell Douglas on production, with Man Turbomotoren joining General Electric in coproduction of J79 engines.

The Parliament is expected to reach a decision when it reconvenes this fall.



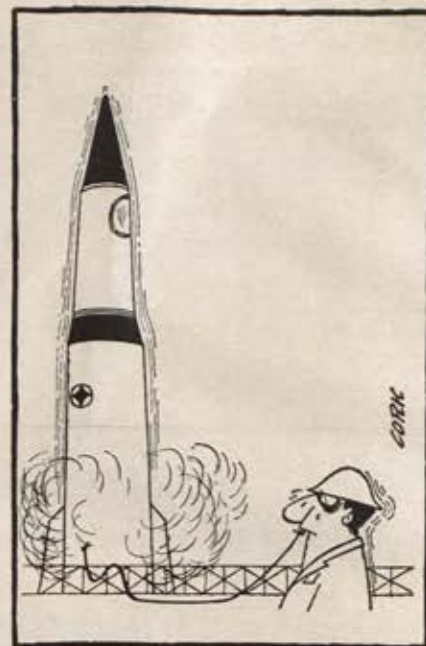
Maj. Bruce D. Stocks, a thirty-six-year-old flight-test engineer on the F-111 program at the General Dynamics plant at Fort Worth, Tex., has been awarded the Air Force Cross and the Koren Kolligian, Jr., Trophy for 1967 for successfully coping with an in-flight emergency as an F-105 Thunderchief pilot in Thailand.

On November 19, 1967, Major Stocks was piloting a two-seat F-105F

on a four-plane Wild Weasel flight to suppress enemy SAM missiles and radar-controlled anti-aircraft guns in support of a strike force over North Vietnam. He and his wingman were both hit by missiles. Fuel streamed from the wingman's plane, with a flameout imminent. Though Major Stocks was wounded in the left arm and chest, his radio destroyed and fuel system damaged, he escorted the other plane to a safe bailout area and flew protective cover until rescue aircraft arrived. Then he made a rendezvous with a tanker and succeeded in bringing his battered plane back to his home base at Takhli.



NEWS NOTES—Col. Francis S. Gabreski, USAF (Ret.), the nation's top living fighter ace, has been elected president of the American Fighter Aces Association. Brig. Gen. Robin



Maj. Bruce D. Stocks was awarded AF Cross and 1967 Kolligian Trophy by USAF Vice Chief of Staff, Gen. Bruce K. Holloway, in Pentagon ceremony. Hit on F-105F mission over North Vietnam, Major Stocks, though wounded, led his flamed-out wingman to a safe bailout area and flew his disabled plane home.

Olds, Commandant of Cadets at the Air Force Academy, was elected executive vice president for programs.

"Fast-fix" cement, developed by the Western Company of Richardson, Tex., which hardens in thirty minutes or less, is being used in Southeast Asia to repair mortar- and rocket-damaged runways. In tests at Eglin AFB, Fla., simulated 750-pound bomb craters were filled to within a foot of the top with sandy debris. The last foot of the forty-foot-diameter crater was filled with aggregate and covered with fast-fix cement, poured at 1,000 gallons per minute. Thirty minutes later it supported a simulated fighter plane weighing 58,000 pounds.

An order for forty-five more twin-engine Cessna O-2A forward air controller aircraft has been placed by the Air Force, for delivery early in 1969. The contract, valued at \$3.5 million, follows previous USAF orders of 192 O-2As and thirty-one O-2B psychological warfare aircraft.—END

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thud.

Thud. (thūd), *n*, nickname applied affectionately to a species of fighter-bombers found in considerable numbers over North Vietnam, noted for extraordinary ability to carry out 75 per cent of Air Force missions despite heaviest concentrations of flak, missiles, etc. in history; excels in SAM (surface to air missile) suppression role; Origin of name, Thud: USAF pilots. Official name of this unusual species: F-105 Thunderchief, designed and built by Republic Aviation, where the Thundercraft of tomorrow are now on the drawing boards.



FAIRCHILD HILLER

REPUBLIC AVIATION DIVISION

Fifty years ago the RAF rode dominant over the world's fledgling air forces. Today the swirl of world events and the tides of history have overtaken the service, and on its golden anniversary the RAF looks forward to a more tranquil middle age. Here a well-known writer and veteran of service in the RAF recalls the men and machines that brought the RAF to its "finest hour" during the Battle of Britain in 1940 and carried the service on into the nuclear age . . .

The Men, the Planes, and the Times That Made THE RAF

By Derek Dempster

WHEN the shooting stopped on the Western Front in 1918, 293,532 officers and men were serving in the Royal Air Force. It had 22,000 aircraft, 188 operational squadrons, 199 training units, and 675 airfields. With airplanes like the Sopwith Snipe, the SE-5, DH-9A, and Handley Page V/1500 bomber, its technical superiority was unrivaled.

By the end of 1919, 31,500 officers and men, 371 aircraft, and twelve squadrons were all that remained of the most powerful air force in the world.

Today, the Royal Air Force has once again been decimated and is unlikely to emerge from the surgery to contribute very much more of significance to history.

Military aviation in Britain started in the last century with observation balloons and man-lifting kites. Col. J. E. Capper, superintendent of the government's balloon factory, was among the first to recognize the military significance of the airplane. He told the United Services Institution in 1906 that they would be fast, small, and difficult to hit . . . and their range of operations "very large."

It was not until six years later, in 1912, that the Royal Flying Corps was formed—with military and naval wings which characteristically drifted apart, the

marine wing to become the Royal Naval Air Service. Thus, when the Great War broke out, Britain went into battle with two separate air services.

Not one British aircraft went to war with any defensive armament. Pilots remember blazing away at the enemy with rifles and pistols. They stuffed their pockets with hand grenades and trailed cables hung with weights and aimed at entangling them in enemy propellers. Bomber crews simply lobbed their missiles over the side. Primitive though their equipment may have been, the early pilots were quick to learn. Those who learned fastest were immortalized in aerial folklore—Ball, Bishop, McCudden, and others too busy fighting to notice RFC-RNAS rivalries and War Office-Admiralty arguments over divided control.

The Germans put an end to all that. In June 1917 they raided London, incensed the people, and jolted Premier Lloyd George into asking Lt. Gen. Jan Christian Smuts, the South African soldier and statesman, to look over the country's air defenses.

Birth of the RAF

Smuts reported to Parliament in September that the air defenses were alarmingly backward. He recommended putting all air services under a single Ministry. The Army and Navy protested, but were overruled. And on April 1, 1918, the Royal Flying Corps and Royal Naval Air Service were merged to become the Royal Air Force—or the Royal April Fool, as some salt-crusted admirals and inflexible generals bitterly preferred to call the Junior Service.

Given their heads, the diehards would have had RAF personnel back in khaki and navy blue with the

The author, Mr. Dempster, is coauthor, with Derek Wood, of The Narrow Margin—the story of the Battle of Britain, now being filmed. Mr. Dempster joined the RAF in 1943, became an instructor, and trained pilots in Rhodesia until the end of World War II. This article appeared originally in the March 29, 1968, issue of The London Daily Telegraph Magazine and is reprinted here by special arrangement with The Daily Telegraph Ltd.

end of the war. But to the rescue of the young service came a man known to posterity as "The Father of the Royal Air Force"—the tall, broad-shouldered, shaggy-browed Sir Hugh Trenchard, whose stentorian voice earned him the nickname "Boom." [See following article.] Trenchard saw that a powerful air force could be molded into a deterrent against future wars. He planned every aspect of the RAF's development in the "Trenchard Memorandum"—presented to Parliament by Winston Churchill on December 11, 1919. When, in 1936, the RAF opened a chapter of great expansion, it was on this sixteen-year-old "blueprint" that the additions to the structure were built. Trenchard saw that a war-weary complement of men idling time away at cards was not the right mixture needed for the foundations of an elite, so he made no effort to stop the wholesale demobilization of his Service in those early postwar years.

His vision was of a new breed of servicemen: a scientist weapon-minder whose indoctrination had to be protected from pollution by diehard military traditionalists.

His plans aimed to create little more than a skeleton force which would lend itself easily to expansion from a reserve established by the creation of the Auxiliary Air Force, the University Air Squadrons, and the Short Service Commission. The Volunteer Reserve was one of the very few organizations not included in the Trenchard plan. Formed in 1936, it became an invaluable source of additional pilots.

The question of Britain's defense cropped up again soon after the Armistice. It was due to the ascendancy of the bomber as a master weapon and the fear that the disparity between the RAF and neighboring air forces might weaken Britain's diplomatic hand. France, for example, had a striking force of 300 bombers and 300 fighters in 1922 against Britain's three squadrons—or less than forty aircraft!

In 1923 the government accepted a recommendation that a fifty-two-squadron Home Defense Force had to be created without delay, but the decision was hampered by the Lloyd George coalition government's ten-year rule which assumed that, since Germany was debarred by the Treaty of Versailles from building warplanes and submarines, it was safe to reduce the RAF to a nucleus for ten years.

The RAF's First Expansion

It was not until 1934—after nine years of futile disarmament negotiations—that the first expansion program got under way. Despite these troubles, the RAF was not idle in the 1920s and early '30s. One of its tasks was to police regions not easily accessible to the land forces in the Middle East, Africa, and Asia. Royal Air Force pilots—attached to the Royal Navy—were even employed against Chinese pirates in the Far East.

[The late] Charles Zorab . . . was one of the few who were able to see at firsthand the changes wrought in the RAF since the days of the depression when he joined the Auxiliary Air Force:

"In those days you could not be a pilot unless you were an officer. We had to learn a trade, and as an air



Supermarine Spitfire, shown here in one of its forty versions, was the only British aircraft in continuous production throughout World War II. Some 20,000 Spitfires were produced during the fighter's twelve-year service career.

gunner, I also had to learn something about navigation, bombing, and photography.

"Discipline was tough, and at the outset we had an important complement of regulars to train us and service the machines. But gradually we became competent and efficient enough to take over practically all duties ourselves."

The importance of the auxiliaries at the time lay in the fact that they were cheap.

On the technical front, the RAF started a research program into high-speed flying, and won the International Schneider Trophy contest outright after three successive wins which raised racing seaplane speeds from 266 mph to 407.

Similar efforts were devoted to long-distance and high-altitude flights. By 1937 a Bristol type 138A had reached 53,937 feet, and in 1938 two Vickers Wellesley bombers flew nonstop from Ismailia, Egypt, to Darwin, Australia, in forty-eight hours—a distance of 7,162 miles.

By the time of the Munich crisis Hurricanes, Spitfires, Blenheims and Hampdens, Whitleys, Wellingtons, and Sunderlands were emerging from the factories, and scientists were perfecting radar, without which the defense of Britain would have been impossible. But the RAF was not yet ready to fight.

How Munich Spurred Training

"Our real training," said Zorab, "—molding the Auxiliary Air Force into an operational force—didn't really start until after Munich. Until 1936 we were flying Wapitis. They were splendid old things, but really rather outmoded for anything serious."

Chuckling at the memory, he recalled that the Wapiti
(Continued on following page)



Principal weapon of RAF's new Strike Command is the Hawker Siddeley (formerly Avro) Vulcan, a four-jet medium bomber. It cruises at Mach 0.94 over a combat radius of about 1,750 miles. There are eighty in the RAF today.

had a big water tank behind the pilot. "It was in case you were forced down in the desert. Wapitis were flown in India too. The idea was to give you enough water to survive on until you were rescued. They persisted in filling their bloody tanks with water, even though we were operating over England!

"By 1937 some of the auxiliaries were so efficient that the Air Ministry decided to equip the best with the same aircraft as the regulars. We got Blenheims. At the same time we were encouraged to visit the regulars more often. The Air Ministry wanted to encourage camaraderie between the regulars and weekenders because there had always been a sort of rivalry between them, especially among the men. The regulars rather looked down on us.

"I always found, in fact, that we bore a stigma, but you bore it happily because you knew you were doing a good job. And when you look back you can see that we were more than justified. The RAF could not have done what it did without the auxiliaries and the Volunteer Reserve."

The spirit in those early days of the war has never been equaled since, said Zorab. There was a tremendous sense of purpose, uncluttered by triviality in the wider sense. There was a job to be done, and if the equipment to achieve the objective was lacking, improvised answers were always tried out.

Bomber Command's Cross Section

Wing Commander Bryan Winslett was twenty-two when he joined the RAF for five years on a Short Service Commission in 1936.

"In Bomber Command we had an incredible cross section. The RAF type didn't happen until the beginning of the war. There may have been a 'type' in Fighter Command—glamour boys . . . Whacko boys!—and the bomber boys may have been more serious, but, on the whole, Flying Officer Kite was a character born in the war.

"If anything, a 'type' grew out of a particular job. I used to drop in on my old mates at North Weald,

Biggin Hill, and Kenley, and there was a rather different atmosphere. By 1938 I had done about three times as much flying on bombers as my contemporaries had done on fighters. The fighter boys were doubling up on jobs like squadron adjutant. And, in any case, they didn't have enough airplanes.

"It was fairly obvious in '37 and '38 that things were going wrong on the Continent, and the only thing that worried us in particular then was whether we in our Haybags (HP Heyfords), against a twenty-mph headwind which gave us a ground speed of eighty-five mph, would ever get to Germany and back! The range was not very good, and the engines were getting very tired. . . . Anyway, we were rather glad the war did not start at the time of Munich."

The RAF was better placed when Germany invaded Poland in 1939, and it was able to send ten light bomber, six fighter, and eight reconnaissance squadrons to France and continue building up its home-based and overseas strength through the Empire Air Training Scheme.

Although they were reinforced to meet the German onslaught of 1940, circumstances were such as to preclude throwing away the additional squadrons demanded by the French to help their collapsing defenses. It was as well. By June Britain stood alone. For the first time in history the future of Western civilization depended on airpower alone. Fighter command needed every aircraft, every pilot it could get.

The Battle of Britain

With most of Europe in Nazi hands, steps had to be quickly taken to extend and strengthen the air defenses at the greatest danger point—England.

Their effectiveness between July 10 and the end of September in the Battle of Britain produced one of the great turning points in history. The German invasion planned for September had to be abandoned because the Luftwaffe failed to overcome the Royal Air Force.

From instructing on Whitleys, Bryan Winslett went on to night fighters, and later joined the special Havoc "Turbinlight" development flight at Heston. Turbinlight was a searchlight in the nose of a Havoc that acted as a mother ship to escorting fighters. On picking up an enemy aircraft on the radar screen, the searchlight would be turned on to light up the target. It was a good idea in theory, but not in practice. If there were any mist or cloud about, "you dazzled yourself."

It was from a Havoc that Bryan Winslett baled out when it broke up. With broken legs, he was taken to Melksham Hospital and then transferred to Torquay. "The thing that shook me most was that there were an awful lot of badly burnt people there—some of them unrecognizable.

"Once you got back to a squadron you tended to forget. But a lot of people hit the bottle *hard* after that. And there was a certain reaction. I used to get nightmares. It was not only what I had seen at Torquay, but the accumulation of incidents such as pulling people out of wreckage at Abindon and falling out of an airplane myself. I began to wonder how long I could continue to get away with it. Experiences like

that upset a lot of people at the time, although we all got over it."

Growth of Strategic Bombing

With the emphasis off defense, the RAF applied itself primarily to developing the role for which it was envisaged in 1918—strategic bombing. And though it played a vital part in every theater of operations throughout the world, it was to the destruction of the Nazi arensals that it addressed its most powerful weapon, Bomber Command, which by V-E Day had dropped nearly a million tons of high explosives on Germany.

By 1943 there was a marked change in the atmosphere among RAF personnel. A whiff of politics was beginning to pollute the sense of purpose.

"I think the idea was to prepare the ex-civilians for their return to civilian life," commented Zorab, "and to imbue them with the belief that the government would do far more for them than it had ever done before.

"The propaganda, oddly enough, was put over by a number of education officers touring RAF stations overseas. They were explaining the Beveridge Plan—the Welfare State. And I think that it was from this that the young chaps in the RAF began to think that the world would owe them a living.

"All the Air Ministry directives seemed to emphasize what was going to happen after the war . . . and the war wasn't even over! And what all this led to was an increase in the grumbling and in the number of people threatening to write to their MPs!"

But the war *was* won—and it cost the Royal Air Force 70,253 killed in action and 22,934 wounded, or ten times as many as in the 1914-18 war.

Victory achieved, the RAF went for the world's

high-speed record and took it with a Meteor jet fighter at 606 miles an hour. A year later the record rose to 616 mph. And then came the Berlin Airlift—a unique operation in which the RAF flew alongside Allied and civilian airmen to relieve the beleaguered city in an operation as yet to be paralleled.

Although British aviation technology could have put an RAF pilot beyond the sound barrier before anyone else, government indecision and vacillation were beginning to put a brake on the momentum that enabled the RAF to make the first jet crossings of the Atlantic and clock up a whole series of firsts around the world.

Where Does the Future Lie?

Equipped with Hunter, Javelin, and Lightning fighters, Canberra light jet bombers and a powerful V-bomber force, the Royal Air Force has been able to fulfill the roles it has been called upon to undertake—Malaya, Suez, Kenya, Aden. But, with the axing since 1951 of more than thirty projects that would have kept Britain among the leaders, the RAF has reached a point where, in its Golden Jubilee Year, it scarcely knows where its future lies.

Christopher Ashbrook, twenty-five, acutely sensed this frustration when he joined the Service in 1961 to make it a career. A civilian once more, he feels the RAF could contribute little physically in any future conflict. What Britain does have, however, is the brain power and experience necessary to help an ally like the United States. "It is as a small and efficient service manned by top-ranking scientists specializing in long-term planning that the RAF's best future lies," he says. "It would, at least, contribute to our invisible exports!"

In these days of uncertainty, it certainly is a point of view.—END

'A Future That Will Continually Renew the Spirit of a Great Past'

On April 4, USAF's Vice Chief of Staff, Gen. Bruce K. Holmway, made the following remarks at a USAF/RAF Guest Night. The event was held at Bolling AFB, Washington.

John Milton wrote, "He alone is worthy of the appellation ['great'] who either does great things, or teaches how they may be done, or describes them with a suitable majesty when they have been done."

By all these measures, the Royal Air Force has an undying claim to greatness.

There were gallant British airmen before there was a Royal Air Force, and they are part of your tradition. So are the fighter pilots of Dunkirk and the Battle of Britain, the bomber crews of two wars, and the men and women who kept all of them in the air. They did great things. More than any other group of comparable size, they changed the course of history.

You of the RAF taught us much about how great things are done. One out of five American aces of World War I flew with the Royal Flying Corps. One of every seven, among our aces with twenty or more victories, wore the uniform of the RFC or the RAF. In two wars we learned from you and with you. You taught us more than tactics and techniques, and between the Royal Air Force and the United States Air Force special bonds were formed.

I think no airmen of any nation have described war in the air or have written about its principles more lucidly

than the men of the RAF: Lloyd, Slessor, Sholto Douglas, Tedder, Johnson, and all the rest.

You also have built some great airplanes, topped, of course, by the indomitable Spitfire of timeless fame and spirit.

But the RAF is an institution, and the spirit of an institution doesn't come from machines. It comes from men. It's that spirit that we salute.

I realize that no outsider can grasp the essence of an organization with the same sensitivity as can its members. It seems to me, however, that the spirit of the RAF is a compounding of self-discipline, respect for tradition, humor in the face of adversity, a knack for living in uncivilized surroundings without losing civility, and above all a stubborn determination to preserve individualism. Whatever the ingredients may be, the sum is unique. It has been, is, and will be an inspiration for fellow airmen wherever they are.

Someday there may be a world with no armies or navies or air forces. If that day does come, men still will remember the RAF and pause for a moment on its anniversary. The Royal Air Force is more than a military organization. It is an idea, and ideas have endurance without death.

On this fiftieth anniversary, I propose a toast to the Royal Air Force: To a past that is secure in history, and a future that will continually renew the spirit of a great past.

"Boom" Trenchard

A towering figure from the RAF's past, whose genius should be acknowledged anew in this fiftieth anniversary year of the RAF, is the late Viscount Hugh Trenchard, first Marshal of the RAF. His legacy may still be found in the air forces of every nation of the world. In the words of General Spaatz, USAF's first Chief of Staff, he was the . . .

'Architect and Patron Saint of Modern Airpower'

By Maj. Gen. Perry B. Griffith, USAF (Ret.)

"If Trenchard had been a German, the Germans would have won the Second World War. . . . The greatest Englishman of the last hundred years, save one—Winston Churchill. . . ."

—LT. GEN. IRA C. EAKER, USAF (RET.)

THE YEAR 1968 marks the Royal Air Force's golden anniversary. In celebration, parades, parties, and fly-pasts are taking place everywhere the sun still shines on the British Empire. But any such observances would be incomplete and meaningless without some recognition being given to the man who created the RAF and fought battle after battle through its formative period, a time span during which legions of bigots, traditionalists, and just plain trouble-makers would have happily smothered the infant in its own crib. The man, of course, is the late Viscount Hugh Trenchard, first Marshal of the RAF.

Gen. Carl A. Spaatz, who was first Chief of Staff of the independent US Air Force, called Trenchard "the father of the RAF, and the architect and patron saint of modern airpower."

The pattern of Trenchard's thinking, iconoclastic to the point of heresy, was, nonetheless, contagious and is reflected in our own air force. He liked Gen. William Mitchell, who served alongside him during WW I, and his preachments influenced such other fellow pio-

neers as Arnold, Spaatz, Hubert Harmon, Doolittle, and O. A. Anderson, bumping along, as they were, over a rock-strewn path. They and their disciples knew what Trenchard's target was, though, on balance, the public did not.

Trenchard possessed an enormous capacity for sounding off loud and clear—of hitting and then assessing—but it was never in his nature to act precipitately. In later years, he harbored a vague ruefulness for not having counseled Mitchell when the latter was skating on thin ice, and regretfully came to regard "Mitchell the showman to be at greater odds than ever with Mitchell the air prophet."

Outside the UK, except in military circles, Trenchard remains a little-known figure, and yet he and Churchill changed history's course. For without Trenchard's creation—the Royal Air Force—there could have been no Battle of Britain.

Some of his far-reaching ideas were put into effect during the closing months of World War I, then next practiced successfully under Sir John Salmond in the Middle East in 1922-23. Fifty years ago Hugh Trenchard was preaching today's commonplaces: close battlefield support; aerial evacuation of the wounded (days in WW I, minutes now); and elimination of an enemy's will to fight through strategic operations.

He was archetypal of the historical character who appears from out of the shadows at the right time and precisely at the right place, a man who believed that ". . . regulations are made for fools to keep and wise men to break." Rather shy, he was parsimonious with praise. He spoke in a series of bellowing grunts; hence, the nickname "Boom" among friends and the opprobrium "all boom and no brains" from his enemies. He was tall and angular, with a face that seemed to have been knocked out of granite. His sense of duty was long, his patience and temper short. Being overwhelmingly efficient himself, he felt stupidity to be unforgivable and honest mistakes expected—but only once.

The author, Maj. Gen. Perry B. Griffith, was stationed in London in the early 1960s as Vice Commander of CINCNELM (US Troops, Eastern Atlantic and Mediterranean), where he worked closely with the RAF. Since his retirement in 1965, he has written widely for several national magazines and the Los Angeles Times. His most recent offering for AF/SD was the article "The US Air Force Flight Safety Program" in the May '68 issue. In business, he is Assistant to the President of Analog Technology Corporation in Pasadena, Calif.



Viscount "Boom" Trenchard, father of the RAF. Blunt and outspoken, like his contemporary, Billy Mitchell, he left no stone unturned, no battle unfought, in championing the capabilities of airpower.

Except for Churchill and a handful of others, he hated politicians. A good part of his life was marked by a running fight with cabinet members and army, navy, and air force officers involved with politicians: Lloyd George, Northcliffe, Rothermere, Beaverbrook, Curzon among the former; and Sir Frederick Sykes, Sir Henry Wilson, Admirals Beatty and Keys (his own brother-in-law) in uniform. He, Sir David Henderson, and Sykes constituted the original RFC troika.

Lord Haig showed his regard for Trenchard when he said, "The war [World War I] produced only two new things—barbed wire and Trenchard." Trenchard worshipped Haig and admired Foch, and, although different in character, all three were singularly alike in one respect: They never forgot a soldier's cardinal principle—the objective.

Hugh Montague Trenchard was born in an elegant South of England mansion on February 3, 1873. His father sold his army commission while in his thirties and took up law. The family dated from a Norman knight who fought at Hastings.

His elementary schooling was happily haphazard, and he boasted that he had never passed an examination in his life. A tutor was hired for the six Trenchard youngsters, but discipline was nonexistent and learning substandard. When Trenchard was packed off to cram school preparatory to a military career, he was so ill-prepared that he twice flunked the examinations for Dartmouth, the Royal Naval Academy. Another trial, this time for Woolwich, then the Royal Military Academy (now located at Sandhurst), ended up by his busting the exam twice. To top off his troubles, his father declared bankruptcy. Trenchard finally gained a commission through the militia, entered the army rolls with a grade of 69 and, at the age of twenty, was posted out to India.

India proved to be a firm training ground for Trenchard. He drank little, didn't gamble or chase women, and stuck to learning a subaltern's job on a wild frontier. He played good polo and on the polo field encountered a Hussar named Winston Churchill who, meeting him for the first time, tried to ride Trenchard off and found him a quite immovable body.

While in Peshawar, faint sounds of the Boer War began to be heard. Along with 10,000 troops, Trenchard was shipped to South Africa and assigned to a rear-echelon billet. From there he ran off once to find some action and stirred up so much activity that he was happily ordered to a slot created by an enemy

gun. His command turned out to be a nondescript, undisciplined gaggle of Australians left "to rot without boots, breeches, or horses." Horses he got through channels, the other equipment through midnight requisition. After an agonizing period of training he whipped his troops into first-rate fighters. During a hand-to-hand fire fight at Krugersdorp, he fell with a bullet in his chest. After a remarkable struggle that cost him a lung, he recuperated enough to take up winter sports and win the 1901 Cresta Run at St. Moritz before returning to the veldt.

Later African service followed in pestilential Nigeria where, of every four soldiers who went out, only one returned to his homeland. The troops, like his old Australian unit, were a near mutinous, insubordinate rabble, given to chewing up officers and spitting them out. But the methods he had learned in India and employed in South Africa paid off with successful military campaigns and civic action.

Trenchard mistrusted doctors, and suffered a succession of maladies. His convalescent periods were undoubtedly lengthened by his do-it-yourself approach to medication. In 1910 he was so sick with a liver abscess that he was laid off duty to get well. While recuperating, he heard from an old friend, a Grenadier seconded to the newly formed Central Flying School. The Guardsman regaled him with the thrill of flight and stirred something in the mind of a prematurely aging, thirty-nine-year-old bachelor with one lung and no future other than square-bashing about a peacetime barracks quadrangle. Here was something with a future!

Before being accepted in the Royal Flying Corps and posted to the Central Flying School, he needed an aero certificate. So, securing leave, Trenchard went to Weybridge, to T. O. M. Sopwith's school and paid seventy-five pounds tuition. Thirteen days later—with one hour and forty minutes flying time—he soloed and received his brevet and wings. The date was July 13, 1912.

A new, unshackled life unfolded, with a return of the vigor he had enjoyed before wounds, illness, his father's debts, and a telling lack of personal home life had left their cumulative scars. Ordered to the newly formed CFS, at Upavon, his first act was to take the naval and army regulations, incorporate the good and chuck the rest into a fireplace. His age was reflected in his indifferent flying; nonetheless, he flew each day, if possible, in a careless, clumsy, and rather cavalier fashion. He suffered but one serious accident, and he walked away from that. Flying was for youngsters. His contribution was to lie mostly in the areas of administration, training, and supply discipline.

Military aircraft were first used in the British Army on the maneuvers of 1912. Two men there were thoroughly impressed: Haig and Trenchard. They would never forget what they saw.

With Henderson and Sykes, Trenchard provided the framework and muscle for the RFC and sparked its growth. He and Henderson were friends, but Sykes and Trenchard never agreed on anything, and much of Henderson's time was spent keeping them from each other's throats. As the RFC's head, Henderson

(Continued on following page)

chose Sykes as Chief of Staff. Trenchard was assigned to build up forces at home until November, when he went out to the front as a wing commander of what air there was, in support of anyone who needed help. Haig, as a cavalryman, had a feel for dependable reconnaissance and continually pumped Trenchard on what air could do. Haig became so strong a convert that he flatly stated his battle plans would be dictated by weather which, in turn, would determine whether Trenchard's pathetically inadequate birds could fly. Trenchard said, "Haig believed in air. And he accepted what I said."

In August 1915, Trenchard was appointed General Officer Commanding the RFC in France. The RFC official historian states: "... The new arm was imperfectly understood ... but, in its new chief, the Flying Corps had an officer whose personality impressed itself in the difficult days ahead on a service responsive to a degree to the inspiration of its leaders."

Trenchard's struggle with the navy was continuous. With his squadrons being chewed up too fast for replacement, he jarred Whitehall out of a navy squadron settled in a quiet sector near Dunkirk. But, when the Germans sailed over London with a few Gothas, a deafening clamor from the home front forced the unit's return. Trenchard cursed, ranted, and declared that the navy got the best and most spare parts, the most desirable billets, and the lion's share of funds. Though overly parochial in his views, he could usually document his outcries. Whitehall was denounced and condemned; and whenever Trenchard departed London after his infrequent visits, scores of raised hackles were left to be smoothed by the patient Henderson. Trenchard was happiest at the front where he knew everyone, ground types and air alike, and in "The Chief," as he called Haig, he found a professional of his own make-up: rock-steady, devoted to duty, quick of mind—a man who, like Trenchard, "expressed open contempt for soldiers who let political calculations influence strategic thinking."

At the New Year in 1918 he was recalled to London, knighted, and given command of the entire Flying Corps. Plans were afoot to create a separate arm on a parity with the army and navy. It was agreed Trenchard was the man for the job. But an interminable political struggle began, involving the two brothers, Lords Northcliffe and Rothermere, Admirals Sir David Beatty and Sir Roger Keyes, and the Army CIGS, Sir Henry Hughes Wilson. Inauguration date for the new RAF was set for April 1, 1918. But early in March Trenchard got hung up in a hassle with Rothermere over responsibilities and an out-and-out ploy by the two peers to sack Haig. This, Trenchard couldn't stomach. He felt morally bound to ask for relief from his civilian boss—Rothermere; but a couple of days later the German spring offensive began, and its initial successes created near panic in Whitehall. Trenchard stayed on to direct things, but when the situation had stabilized, action was taken to grant his request. Sykes moved in as Chief of Air Staff and Trenchard was jobless.

Offered four assignments, he accepted command of a newly created Independent Air Force in France, a job that threw him among Americans, significantly

with Generals Patrick, Mitchell, and Foulois—to all of whom he took a liking and for whom he worked hard to whip their Air Service into combat readiness. During the last few weeks of the war, several Allied strategic bombing assaults were launched from Nancy over Stuttgart, Mannheim, and the Saar. Immediate cries of self-righteous anguish arose in London, protesting the killing of civilians in these cities, but Trenchard's purpose was "to weaken the enemy's will to resist." Civilians' homes were not his target, but if they fringed on munitions producing factories the risk was obvious.

When the shooting war at last ended, a long interservice fight began, involving the RAF and its future. Scores of politicians and senior military men got into the fratricidal strife, took violent sides, and split with friends and even relatives. To compound things, Britain was nearly broke and had to shave its budget. Sykes took over Civil Air. Trenchard went in to take over the RAF and straightaway fell ill. While lingering near death, he called for the one woman for whom he had ever cared, Katharine Boyle—the widow of a friend killed at Mons—and asked for her hand. She gently turned him down; but after he had recuperated, Trenchard, who had worshipped her for years, persisted, and in July 1919 they were married.

Now he had a wife, stepsons, a challenging assignment, a free hand, and a blank sheet, and was told to make it work. The results speak for themselves—Cranwell, short-term services, the Air Force Staff College, auxiliary squadrons (from which the nucleus of WW II RAF commanders emerged), and the brilliant conduct of activities in India and the Middle East—a new force of arms bringing stability throughout the whole vast area.

Finally, in December of 1929, a grateful King made him a peer, and he retired. His dear friend, T. E. Lawrence—of Arabia—wrote at the time: "You'll be shocked to find that three weeks after you've gone, your past services haven't any interest or value in the Government's eyes. It's what we can do yet which makes us regarded."

As a Baron, Trenchard could henceforth take his case to the House of Lords. But he was restless, so when asked to revitalize Scotland Yard he accepted an appointment as Commissioner of Metropolitan Police. Encountering a force shot full of slack discipline and unhappy constables, an intractable governing union that actually ran the place, poor morale, bad working conditions, and a Victorian system of crime prevention, Trenchard patterned his reforms after the RAF. He introduced an educational system, promotion by merit, modern scientific methods of criminology, higher pay, and better living and working quarters. In Parliament and from the press, he suffered the kind of criticism that law-enforcement agencies accept as a fact of life, but the King backed him and so did a majority of Englishmen. When he resigned in 1935 the Force "knew in their bones he was leaving Scotland Yard a cleaner and healthier place than he found it."

When World War II came, he implored the Prime Minister for a job in uniform. Several sinecures were offered and refused. He advocated attacks on Germany's war machine, and vainly deplored a policy of awaiting blows on both cheeks. The retreat at Dunkirk

was salvaged by British air and small boats and, for the first time, Germany lost air superiority. Chamberlain fell and Churchill, who hadn't forgotten Trenchard, became Prime Minister.

Many in government were trying to put Trenchard back in as Chief of Air Staff. Then one night he dined at Churchill's flat, got into a heated and personal argument with the Prime Minister on how the war should be fought, and carried the debate through dinner and to the port and cigars. Churchill had offered him the post of Commander in Chief of all Home Forces in the event of a German invasion, but during the long and vitriolic exchange Trenchard larded his remarks with so many conditions and condemnations that the evening ended as a dismal, stupefying nightmare.

Trenchard excused himself preemptorily, went home, and wrote a letter of apology to Churchill. But as a public figure, he was through.

He became a military visitor—a sort of traveling "Inspector General" and, among other things, father-confessor for the senior US airmen running the show in Britain. He was offered a position—as Director of Military Intelligence. This, too, he turned down. It was not his war. He was content now to sit it out and watch the products of his labor fight the Battle of Britain and then fight on to final victory: a victory

that, in large measure, would have been impossible had it not been for this man.

During these present trying times in our own country, it seems fitting to extract part of a letter General Eaker recently wrote this writer: "One morning I opened the *London Times* and saw that Lord and Lady Trenchard had just been notified that the last of their five sons had been killed in action in Africa. I was due to pick up Lord Trenchard at 9:00 o'clock for a tour of Eighth Air Force bases. When I arrived, I told him I had read of the loss of his last son [four had been killed previously] and that I would understand if he did not make the trip as planned. He promptly dismissed this idea, saying, 'There is a war on and I want to do the little I can, as my sons would have me do. The only thing I ask is that you tell your base commanders to please not mention the death of my son during our visits with them the next few days.'"

They buried Viscount Trenchard on February 10, 1956, with the rest of Britain's great in Westminster Abbey, as Andrew Boyle, one of Trenchard's biographers, sadly says, "... a blinkered visionary who had contributed his own apocalyptic footnote to the history of this tortured and frenzied age. A giant in his own right, he kept faith with his high and lonely destiny."—END

How AFA's London Chapter Helped Celebrate the RAF's Anniversary

By Capt. Francis P. Rezac, USAF

DEPUTY DIRECTOR OF INFORMATION, HQ. THIRD AIR FORCE (USAF)

The Air Force Association's London Chapter and USAF's Third Air Force were cohosts to a reception on June 7, honoring two significant anniversaries—the Fiftieth Anniversary of the Royal Air Force and the Silver Jubilee of the Royal Air Forces Association. Hosts were AFA Chapter President Thomas P. Wright and Maj. Gen. Clyde Box, Commander of USAF's Britain-based Third Air Force. Guest of honor was the most distinguished member of the Royal Air Forces Association, Her Majesty, Queen Elizabeth, The Queen Mother.

Her Majesty was greeted by Mr. Wright, General Box,

and the Hon. Philip M. Kaiser, American Minister in London. This was the first visit of The Queen Mother to the Third Air Force headquarters at South Ruislip Air Station near London, and her first visit to an American unit since World War II. During that war, The Queen Mother and her late husband, King George VI, were frequent visitors to units of the Eighth Air Force based in the English countryside.

Throughout her stay at the Fiftieth Anniversary reception, Her Majesty, The Queen Mother, took every opportunity to meet her American hosts and Royal Air Force and Royal Air Forces Association guests.

The Royal Air Force guest list was headed by Air Chief Marshal Sir John Grandy, Chief of the Air Staff. Merlyn Rees, Parliamentary Undersecretary of State for Defense (RAF), also attended the reception. USAF representation was headed by Gen. Maurice A. Preston, Commander in Chief of USAF. More than 250 distinguished members of the RAF, RAFA, USAF, and USAFA were on hand.

Representing the Air Force Association was Warren B. Murphy, Boise, Idaho, AFA Vice President. His escort for the evening was Edward D. Gray, London Chapter Executive Council member.

General Box acknowledged the long and proud history of the RAF and the many years of close cooperation between USAF and the RAF, saying, "No two nations' forces in the world today are as closely aligned in doctrine, mission, and camaraderie as the RAF and USAF."

"It is indeed an honor for the USAF and our Air Force Association to host such a distinguished gathering of British friends," General Box said. "I am delighted to have this opportunity to pay our respects to the RAF during its golden jubilee year and to the RAFA on its twenty-fifth anniversary."

"We are especially grateful to Her Majesty for honoring us with her presence this evening. It is an occasion that we Americans will long remember."



Third Air Force Commander, Maj. Gen. Clyde Box, left, escorts Her Majesty, Queen Elizabeth, The Queen Mother, into the main ballroom on her arrival at South Ruislip Air Station for the AFA-USAF reception honoring RAF's anniversary. Accompanying them are the Hon. Philip M. Kaiser, American Minister in London, and Thomas P. Wright, President of the Air Force Association's London Chapter.

The Close Air Support Team

A pair of North American F-100D Supersabres takes off from Tuy Hoa Air Base in South Vietnam. Once airborne, they're directed to an area where friendly ground forces are in contact with the enemy. The target will be marked for them by a Forward Air Controller. Now imagine yourself in the cockpit with the lead pilot, and dive with him as the FAC tells him he's . . .

'CLEARED IN —WET!'

By Col. F. D. Henderson

VICE COMMANDER, 31ST TACTICAL FIGHTER WING



PEACOCK, this is Sabre 21. Are we cleared to FAC freq? Over."

"Roger, Sabre 21—contact Cider 45 on 301.5. Your rendezvous—340, twenty-five miles off channel 107."

"Sabre 21 Flight—let's go 301.5."

"Sabre 22."

"Hello, Cider 45, this is Sabre 21."

"Sabre 21, this is Cider 45. Read you loud and clear. How me?"

"Cider, you're five square. Want our line-up?"

"Rog . . . ready to copy."

"Sabre 21 is a flight of two F-100s, mission number 2311. We're carrying eight 117 slicks, point oh-two-five, and 1,600 rounds of mike-mike."

"Rog, Sabre, I copy. Ready for target info?"

"Rog."

"OK, your target is a known VC location. We got some mortar fire out of here last night. Also, there is at least one fifty cal in the vicinity. I'm not being shot at now, but the FAC up here this morning took a hit. So you can expect auto weapons fire. Copy?"

"Rog, Sabre 21 copies."

"OK, the friendlies aren't too close to this target.

There is a fire-support base about 700 meters southwest of the target. When you get below the clouds you'll be able to see it on a bald hilltop. Target elevation is 2,700 feet. We've got a pretty stiff wind from the east, about fifteen knots on the surface and at 2,000; and twenty knots at 5,000 and 7,000. Copy?"

"Rog. Do you have a preferred run-in heading?"

"Rog, Sabre . . . I don't want you to overfly the friendlies. Make your runs from southeast to northwest, breaking right after your drop. That way the bomb smoke won't obscure the target on your run-in heading. Over."

"Rog, Cider 45 . . . I understand—friendlies 700 meters to our left as we attack from southeast to northwest . . . break right. I'm down below the clouds now at the rendezvous point. Don't have you in sight, but I think I have the fire-support base in sight. Over."

"Rog, Sabre . . . I'm about one k north of that now. I see you. I'm at your three o'clock low. I'm rocking my wings. Over."

"This is Sabre 21. Have you in sight. We're ready to go to work."

"Stand by, Sabre—I'm getting final clearance from the Army on FM."



—Illustration by Sharon Farr

"Standing by."

"OK, Sabre. We're ready now. If you have me in sight, the target is just off my right wing. Call me when you want a mark."

"Rog, Cider, I'm turning base now—go ahead. Sabre Flight, set 'em up hot—arm nose and tail."

"Sabre 21, my smoke rocket is away. I'll hold to the south. I have you in sight. Do you see my smoke?"

"Rog, I have your mark. Am I cleared in wet?"

"You are cleared in wet. Hit ten meters to the right of my mark."

"Understand cleared in wet. I have you in sight. You want me to hit ten meters northeast of your mark."

"... Two away. Sabre 21 is off right."

"Good hit, lead. Two, do you have lead's bomb?"

"Rog, I see it."

"OK, move yours up the hill twenty meters."

"Rog, understand twenty meters at twelve o'clock."

"That's right. I have you in sight, on base. You are cleared in wet."

"Rog, Cider, I understand cleared in wet. I have you in sight to my left. ... Two away—off right."

"OK, good hit ... outstanding. Now, Sabre Flight, hold high and dry while I take a look."

"This is Sabre 21 ... high and dry."

"Sabre 22, high and dry."

"Cider 45, this is Dusty 41. We're over rendezvous."

"Dusty 41, this is Cider 45. Stand by—I'm working another set of fighters. How much loiter time do you have?"

"Cider, this is Dusty. We're fat; we can wait quite a while."

"Good ... I should be able to work you in shortly."

"Cider, this is Sabre ... they're shooting at you. I see flashes right below you."

"Rog, Sabre, I hear 'em and I see it now. If you're ready I'll plunk a mark in there and you guys can shake 'em up a little."

"Rog ... mark."

"Marks away. Hit my smoke, Sabre!"

"Rog, Sabre 21 is out of position. If you're right, 22, go on in."

"Sabre 22, turning in. I have the smoke ... I have the FAC."

"Rog, 22, I have you in sight. Cleared in wet."

"Cleared in wet. I can see the flashes just right of your mark."

(Continued on following page)

"Rog. Go get 'em, boy."

"One away . . . off right."

"OK, good; excellent! Lead, if you have two's bomb in sight put yours right in the same place."

"OK . . . lead's turning final. Have you in sight?"

"Cleared in wet."

"Cleared in wet. . . . One away and off right."

"Outstanding hit, lead. That should get some results. Go high and dry and watch me. I'll go over the area again and see if I can draw more fire."

"Roger . . . have you in sight?"

"Sabre, this is Cider. You really creamed them. Through the hole you blew in the trees I can see the remains of a gun position, a beat-up quad fifty, and one body. Let's put your last two bombs between this position and the original target. About half way. Want another mark?"

"This is Sabre 21. Yes, if you have enough rockets left to mark for the next flight."

"OK, Sabre, I'll save my rockets and drop a smoke can. Have you got me?"

"Rog, I see you. I see your can going down."

"Rog . . . turning base. I see the smoke just starting to appear."

"OK, Sabre lead, put your last bomb twenty meters at twelve o'clock to the smoke . . . and two, put yours twenty at six. I have you, lead; you're clear in wet."

"Rog, cleared wet—twenty at twelve, that is, to the northwest . . . one away—off right."

"Right where I wanted it. Hey, lead, you got a big secondary with that one!"

"Cider, this is 22 turning in. Am I cleared?"

UNJUMBLING THE JARGON

For those who have not flown fighters over South Vietnam, some explanations of terms may be in order. "Peacock" is the call sign of a Combat Reporting Center (CRC) in South Vietnam, which controls all tactical aircraft in its area. Peacock's instructions pertain to a tactical air navigation (TACAN) fix, on a compass heading of 340 degrees from the CRC at a distance of twenty-five miles.

"Sabre 21" is the call sign of the flight leader, or "lead," with Sabre 22, his wingman, being second, or "two," in the flight. (A four-plane flight would be made up of lead, two, three, and four.)

"Cider 45" is the call sign of the Forward Air Controller (FAC), who must mark all ground targets and approve each specific bomb or strafing run. A "wet" run is one in which weapons may be fired. If no clearance is obtained from the FAC, the pilot must make his run "dry."

The term "117 slicks, point oh-two-five" refers to the M-117 general-purpose 750-pound bomb with low-drag fins, fuzed to detonate .025 seconds after impact. "Mike-mike" is phonetic for mm, or millimeter. The F-100 Supersabres on this mission carry four 20-mm cannon, each loaded, in this instance, with 400 rounds.

To avoid excessive radio interference, Army units normally employ FM equipment while Air Force aircraft use VHF and UHF radio. The FAC plane is equipped with all three types.

"Right, 22. Forget my last instruction. Put your next bomb right in lead's smoke. Let's see if we can get another secondary."

"Rog, am I cleared wet? Cider 45, this is Sabre 22, am I cleared wet? . . . Sabre 22 going through dry."

"Sabre 22 . . . Cider 45 here. Sorry about that . . . the Army had me tied up on the other radio. Save your last bomb a minute. Go high and dry. They think they spotted something. I'm going to drop another smoke can where I think they want your last bomb. I'll get confirmation from them before I clear you to drop. Do you copy?"

"Rog, I'll stand by. I'm high and dry."

"Sabre, my mark's away. Do you have it?"

"Rog."

"OK, stand by one . . . OK, that's near where they want it. Hit ten short—that's ten meters southeast. Copy?"

"Rog . . . ten at six o'clock."

"Rog, I have you on base. You're cleared in wet."

"Understand, cleared wet. One away and off to the right."

"Beautiful, 22—you guys are really sharp today! That's all your hard stuff, isn't it?"

"Cider 45, this is Sabre 21 . . . right, we're clean of bombs. You want our twenty mike-mike?"

"No, Sabre, I've got Dusty standing by to come in. Check with Peacock on your way home. Somebody will be needing your guns. I'm going in to get your BDA now."

"Rog—you're covered, Cider."

"Sabre 21, Cider 45."

"Go ahead, Cider. Ready to copy."

"OK, Sabre—your target coordinates were Yankee Alpha 360 080. Your rendezvous time was ten, you were on target from fifteen to thirty-three. You put 100 percent of your bombs on target. Really outstanding bombing—all within ten meters. Target coverage was sixty percent due to its large area. On the first bombs, I can see nothing but smoke and foliage. However, on the other bombs, I'll give you one gun position destroyed, one automatic weapon destroyed, and one KBA confirmed. I'll add two more KBA estimated. And, oh yes, one large secondary explosion and a secondary fire with black smoke. Copy?"

"Rog."

"You guys really did a job. The Army commander down here has been cheering into my ear on the other radio. I think you did a lot more damage than I can see and give you credit for. The Army's going into this area today. I'll pass on any extra BDA they come up with."

"Thanks a lot, Cider 45. We'll appreciate that. It was a pleasure working with you. If you're clear of the target area, we'll leave your freq."

"Rog, Sabre, I'm clear. Hold a heading of east or northeast until you're above 1,200 feet to avoid friendly artillery which is active now. Thanks again for a great job. You're clear my freq."

"Sabre 21. Let's go channel 5."

"Sabre 22."

"Dusty 41, this is Cider 45; I'm ready to copy your line-up."

And so on.

You have just read the dialogue of two fighter-bomber pilots and a Forward Air Controller on an average mission in South Vietnam in the 1967-68 period of the war. There are many variations of this conversation. Some missions are more exciting than others.

"Sabre, our boys are catching hell down there. You've got to hit my smoke exactly. Twenty meters to the west are the friendlies."

or

"Sabre, the weather is a little stinky in the target area—about 500 and one right in the target area here in the valley. The hills are in the clouds on three sides, but I think you can sneak in from the south, drop your high drags, and pull up into the soup to miss the hills."

or

"Sabre 21, you've got a chopper dead ahead. Don't break that way, there's another one at . . . oh, my gosh! They're all over the place."

or

"Hey, Lead, I've just taken a hit. Look me over."

Other missions are almost boring—radar bombing, for instance;

"Turn right two degrees, you're approaching the track, you are one minute from drop, turn left one degree . . . very nice . . . now back right half a degree . . . ten seconds . . . five-four-three-two-one-HACK!"

But always with control. Not one USAF bomb or bullet is delivered in South Vietnam unless the aircraft is under the positive control of a USAF Forward Air Controller flying an O-1 or O-2 who is in visual command of the situation, or, in bad weather, a radar operator who, teamed up with a flight of fighters, can produce remarkable bombing accuracy.

This is one of the reasons that the professionalism of the fighter-bomber pilot has reached a peak never before achieved. In no other war has every mission been so closely controlled, graded, and recorded.

In Korea we worked with FACs on front-line missions—but, once across the easily seen friendly lines, we were free to drop bombs whether a FAC was on hand or not. In World War II we occasionally worked with a FAC, but in most cases he was in a jeep and relatively ineffective compared with today's FACs.

Another reason for the increased effectiveness of the FAC-fighter-bomber team is experience. In WW II, twenty-five or fifty missions was a tour. In Korea, 100 missions was the normal tour, and it took the better part of a year for most pilots to reach that goal. Furthermore, in Korea the majority of F-84 fighter-bomber jocks showed up for duty with fewer than 500 total hours and usually no more than 200 hours in that aircraft.

In contrast, the average F-100 pilot in Vietnam has about 1,000 hours—not total time, but time in the F-100. Flying an old airplane isn't bad at all. With that experience they can put the FAC's smoke out with their bombs more often than not. And a normal tour isn't fifty or 100 missions, or even 200, but closer to 300. Not counting leave, TDY, ferrying aircraft, etc., most jocks average a flight a day—and on each flight they drop bombs. Nobody likes a war, but there's no doubt it provides one hell of a training mission. We're turning out fighter-bomber pilots that are the world's

best. They've gotten ten years of bombing experience in one. They have picked up 500 or more fighter flying hours—an amount that would take two and a half to three years anywhere else.

Another difference in this war is the leadership. In WW II, group commanders were in their twenties and early thirties. Today, the squadron commanders of Korea are the wing commanders—mostly in their late forties. Many squadron commanders now are in their late forties, too. They're still tigers in the cockpit, but they run their organization with the ability to manage firmly—ability gained from a career of varied duty in the Air Force.

Living standards are nearly Stateside, and discipline, military courtesy, appearance, and behavior are Stateside or better, because all these are stimulated by the high spirit and outstanding morale of a unit in combat.

Even the younger jocks are more sedate. One reason is the tough schedule. When you fly every day, you keep most of your evenings pretty quiet. Not that there isn't plenty of social life. With a one-year tour, people are constantly leaving, and farewell parties come one after another. But, by and large, they are mannerly, and only the few who are both party boys and who are not flying the next day keep going hard and late.

I don't mean that today's young fighter pilots aren't the same red-blooded American boys they always were. But from my standpoint as an "old man" of forty-six, they don't seem to be nearly so obsessed with high living as we were at their age. Instead, many of them are saving their energy for flying and their money to meet their wives in Honolulu.

Another reason they're different is the one-year tour—a real blessing in disguise. In past wars a fighter pilot's tour was determined by the number of missions he flew. In Southeast Asia the pilot is here for a year whether he flies 100 or 400 missions. So the motivation isn't to finish a tour, but get as many missions, as much combat time, and as much flying as possible. I don't know of a pilot in the wing who wouldn't welcome the chance to fly two missions a day.

This wing came over as a unit. Consequently, last December we lost a wad of pilots and received only a few. As a result, there was a period when most available jocks were scheduled twice a day.

Complaints? Hell, yes, there were—when we got back up to strength and the guys could again get only one a day. That's when they complained.—END

The author, Col. F. D. (Dave) Henderson, is Vice Commander of the 31st Tactical Fighter Wing at Tuy Hoa Air Base in South Vietnam, a unit equipped with North American F-100 Supersabres. This is Colonel Henderson's third air war. A native of Columbus, Ohio, he graduated from West Point in 1944 and completed pilot training in time to fly a fighter-bomber in the Pacific in World War II. In the Korean War he logged 119 missions in the F-84 Thunderjet. A graduate of all three Air University schools, he served as aide to the late Gen. Thomas D. White, USAF Chief of Staff, 1957-61.

Soviet manuals used to train pilots of the Egyptian Air Force were among the booty captured by the Israelis in the six-day war last year. Detailed study of their contents, which apparently apply also to training of Soviet and satellite-bloc military pilots, indicates that the tactics are basically sound but tend to discourage on-the-spot variations by resourceful and aggressive pilots . . .

SOVIET AIR TACTICS— NO ROOM

By Leo Heiman

AMONG the immense booty taken by the Israelis during and after last year's war in the Middle East were quantities of material on the training and combat procedures of the Soviet Air Force. Russian advisers had used the textbooks for training and organizing the Egyptian Air Force. This wealth of information is still being processed and evaluated in Israel.

Preliminary findings indicate that every air force of the East-bloc countries equipped with Soviet fighters and fighter-bombers is trained along the lines of the pattern uncovered in Egypt and that most likely the Soviet air tactics and organizational structures employed during the recent war in the Middle East are used in other nations, too. These procedures give a fair insight into the way satellite air forces are trained, as well as how the Soviet Air Force controls and uses its own fighter aircraft.

Soviet Air Force Organization

The Soviet Air Force organization pattern has remained essentially unchanged since World War II and is based on the Air Army (*Vozdushnaya Armiya*) concept, with downward division into Air Corps, Air

Divisions, Air Regiments, and Air Squadrons. The Egyptian AF was correspondingly divided into three divisions with twelve regiments (called brigades in Egypt) and a total of thirty-one squadrons. The latter number indicates that the Egyptians were still five squadrons short of what was accepted by the joint Soviet-Egyptian planning board as the permanent EAF strength—that is, twelve regiments of three squadrons each. The training command made up the fourth division.

As can be expected, the training procedures involved in supplying a relatively backward nation with an efficient air force are of prime importance, and are almost carbon copies of the Red AF system. Graduates of Egyptian high schools can volunteer for air training. Before acceptance they are screened by three commissions—the medical examination board, the psycho-technical examination group, and the aptitude test section. The applicant who passes all three stages gets sixteen months of preliminary, basic, and primary flying training. He finishes the course in YAK-18 trainers. The graduate then moves on for another twelve months of advanced training, flying MIG-15s, MIG-17s, and the indigenous HA-200. Before continuing his education at an operational flying base, he gets a further twelve to sixteen months of training in the Soviet Union.

While EAF personnel occasionally trained in Czechoslovakia, Poland, and in the Moscow-Leningrad areas, their advanced training has been largely confined to three Russian schools. The Saratov Air Base serves multiengine bomber and transport crews. Helicopter pilots train at Bataisk (Sea of Azov) Air Base, and fighter pilots are introduced to advanced flying at Krasnodar Air Base. Air traffic controllers and technical personnel attend courses at the same schools. Progress reports are sent regularly to Egypt.

The returning pilots and crews are supervised by

The author, Leo Heiman, is exceptionally well qualified to write on Middle East military affairs. He has lived in Israel since 1948, serving for more than seven years as a naval officer. A native of Warsaw, he fled the Nazi invasion in 1939. He was captured by the Nazis but escaped to join the Russian partisans, later serving in the Soviet armed forces. After the war, when the Soviets grew increasingly belligerent toward the West, he deserted, escaping to West Germany before moving on to Israel. His article on the Israeli Air Force appeared in the January 1968 issue of AIR FORCE/SPACE DIGEST.

FOR INITIATIVE

their Soviet advisers for another six to nine months during operational training in Egypt. According to this procedure it takes three to four years to train a combat pilot. While this time is not excessive, it becomes clear, in retrospect, that the pilots were taught to fly rather than to fight. For example, the Israelis discovered that the average captured pilot had an excellent knowledge of his aircraft, standard flying techniques and maneuvers, but that his tactical combat skill was very limited. It would be wrong to imply that this is due to any inherent inferiority of the Egyptian as a fighter; the culprit was obviously the Soviet-devised training system.

Training Stops with Assignment

In particular, the final period in the operational training squadron seems too short compared to the three and a half years that precede it. Moreover, once the graduates of the course are assigned to the combat squadrons, they simply stop training. It was standard operating procedure in all Egyptian combat squadrons to allocate only one hour a week of flying time per pilot. This was simply not enough time to turn a flyer into a fighter pilot. During this single hour per week, broken up into ten- to fifteen-minute periods on alternate days, the pilots practiced what they had learned without getting any advanced combat training.

Extremely damaging in the end was the standard procedure of weeding out any attempt at individualistic thinking and behavior by the pilots. Improvisation and inventiveness were frowned upon and were, therefore, not even attempted. It is impossible to believe that the same holds true in the Soviet Air Force proper. Most probably the Soviet advisers considered the EAF to be essentially a training command.

The EAF paid dearly for this strict adherence to the rules during the June war of 1967. Most of Egypt's

aircraft were lost on the ground. This loss, however, overshadowed the fact that seventy-two fighters were downed in air combat with few losses on the Israeli side. Israeli pilots discovered early that the enemy pilots attempted regularly three, or at best, four standard tactical maneuvers. If these failed to achieve any results they tried to break off the fight and return to base. Apparently they had no idea that many more tactical and defensive countermoves were possible or feasible. They simply had not been schooled to think beyond the scope of their training.

Categories of Air Tactics

Soviet air tactics, as interpreted and demonstrated by the Egyptian Air Force during and after the Middle East war, fall into four main categories: combat air patrol, combat air cover, combat sweeps, and interception.

- Air Patrol utilized *Kubanskaya Etazherka* (Kuban shelves) tactics, which the Soviets claim to have invented in 1943 during the air battles in the Kuban-Crimea-Caucasus region against the Luftwaffe. Briefly, it consists of six to twelve planes flying in three groups at varying distances and altitudes. For example, if the first flight of four MIG-21s flies at 15,000 feet, the second flight moves at 25,000 feet, one mile behind, the third flight at 35,000 feet, another mile to the rear. The distances and altitude differences can be enlarged or compressed, but the idea remains the same—to draw enemy fighters into air combat by using the leading low-level flight as a decoy, then jumping the enemy with the second flight from above. If the enemy has his own protection higher up, the third flight moves in for the kill.

This technique worked well in the age of prop-driven planes, but Israeli fighters countered *Kuban-*
(Continued on following page)

skaya Etazherka tactics by combining vertical and diagonal maneuvers in air combat. It remains a mystery why the Soviet manuals do not take the climb performance of modern fighters into account, which allows them to move at high speed in any direction.

- Air cover for airfields, convoys, ships, troops, slower transports, etc., is flown using *Nozhmitsy* (scissors tactics), wherein groups of four planes are used in two flights of two, each flight passing in front of the other by a series of wide turns resembling opening and closing scissors. This technique has the advantage of retaining altitude and speed without losing visual contact with the objects that must be protected, and it also enables the fighter pilots to keep a sharp lookout in all directions without turning their heads.

- Interception tactics include *Barazhivaniye* (blockage), *Navedeniye* (direction), and *Perekhvat* (intercept). Blockage can be exercised by the air force which has won air superiority. Fighters and fighter-bombers circle at various levels over enemy air bases, or suspected targets. In case enemy antiaircraft or missile batteries expose themselves by opening fire, they are attacked by the lowest fighter-bomber group. Should enemy aircraft attempt to take off, they are attacked by another section of the blocking group, preferably during takeoff maneuvers. Enemy air intervention is intercepted by the fighter cover of the blocking force.

"Direction" operations are devised for night and all-weather interception, utilizing airborne radar and ground-control intercept radars to direct fighters to enemy planes in the air and maneuver them into the most advantageous positions.

Tactical Maneuvers for Interception

Interception recognizes four tactical maneuvers:

- *Lobovaya Ataka* (head-on attack), which seems like an anachronism in the age of supersonic planes, guided missiles, and radar. Soviet air tacticians insist, however, that head-on attacks are still the best method of interception, using radar-guided missiles at long range and cannon at short range. At gunfire range the idea is that the enemy pilot will lose his nerve and avoid the head-on attack to prevent a collision or close-range cannon fire. Head-on attacks, however, are a knife that can cut both ways. If the enemy does not lose his nerve and is not impressed by the possibility of a midair collision, it is the attacker who must turn first, or die. And then the hunter becomes the hunted, exposing himself to missiles and cannon fire, which is precisely what happened on several occasions in the Middle East war.

- *Boi Na Glubokih Virazhakh*, which translated is "fighting on deep banking turns," means utilizing high G turns to pull lead on the enemy fighter for cannon attacks or longer range infrared missile attacks. The idea behind this concept is a sound one: Deep banking turns and violent twists make it difficult for the enemy to hit a plane with radar-controlled fire and/or infrared missiles.

- *Vertikalniye Manevry* (vertical maneuvers) utilize the good climbing capabilities of Soviet fighter



aircraft to gain altitude and execute maneuvers that resemble the one explained in the previous paragraph translated into vertical coordinates.

- *Khvostovaya Ataka* (tail attack) is to be utilized with radar direction only, or against an exceptionally slow and inept enemy, coming up from the rear, and launching missiles by radar or visual control.

Close-Support Maneuvers

Six standard tactical maneuvers are performed when fighters or fighter-bombers are providing close support for ground forces, by attacking tanks, trains, convoys, artillery positions, missile batteries, headquarters, etc., with cannon, rockets, or bombs.

- Attack from a loop is utilized for pinpoint accuracy against strongly defended targets such as radar stations or headquarters buildings. The aircraft heads toward its target at low level, to evade detection and antiaircraft fire, climbs in front of the target, executes a three-quarter loop, and attacks at its lower end, from a steep dive.

- Another form of attack is also executed from low level, but the plane climbs suddenly away from the target, executes a half-loop, rolls over and releases bombs, rockets, or cannon fire from a steep dive toward the target.

- "Attack from a combat turn" is utilized by entire flights or squadrons, attacking large-size targets. The target is also approached at low level. All planes climb suddenly, execute a simultaneous 120-degree turn—the angle of the turn can vary, but is never less than ninety or more than 180 degrees—and fan out. Each plane then rolls in to its assigned target, releasing bombs and rockets from a medium (forty-five degree) dive.

- Attack from a climb—known as "over-the-shoulder" in the West—is accomplished by approaching stationary, well-defended targets at low level. The attacking plane pulls sharply up, out of range of the defenses,



—Tass from Sovfoto

Strictly a show formation is this flight of seven MIG-21D Fishbed fighters at the Domodedovo air show near Moscow in July 1967. The Soviets have not yet made the MIG-21D available to Egypt, though it is reportedly being furnished to Poland, Czechoslovakia, and India.

releasing its bomb load during the vertical maneuver.

- A flat dive is executed where there is little or no air opposition, and the antiaircraft defenses are weak. Planes flying at medium or medium-low levels go into a flat dive toward target, attacking with cannon fire and rockets.

- A diagonal approach is used against columns, convoys, etc., protected by antiaircraft fire. The target is then approached on the deck at angles from fifteen to forty-five degrees. Fire is opened within cannon-rocket range and kept up until the plane passes over the head or tail of the attacked column. This was the technique favored by Egyptian pilots on the rare occasions when they strafed Israeli columns in Sinai.

Forms of Operational Control

Soviet air doctrines, as utilized by the Egyptian Air Force, recognize three basic forms of operational control of combat aircraft.

- Control Station of Air Defense, SN/PVO (*Stanziya Navedeniya Protivo-Votivo-Vozdushnoi Oborony*), is used for interception of enemy aircraft only, utilizing the techniques developed by the Royal Air Force during the Battle of Britain in 1940, and perfected since with modern electronic and communications devices. But the principle remains the same; namely, that squadrons assigned to air defense are tightly controlled from permanent headquarters of air defense sectors. Soviet textbooks and instruction manuals explain that the enemy may utilize decoys, ruses, diversionary tactics, and other methods to lure the air defense squadrons away from the principal target of his attack. The complete picture is known only to the commanders and air controllers of air defense sectors, not to the squadron leaders in the air who are not allowed, therefore, to develop their own initiative in combat.

- Main Point of Direction, OPN (*Osnovnoi Punkt Navedeniya*), is set up by regimental air commanders

at critical sectors of the war. The commanders do not fly and fight themselves, but direct their squadrons toward air or ground targets from OPN, coordinating their actions with commanders of the ground forces they are supporting, or protecting. Unlike SN/PVO, the function of OPN is to direct but not control the aircraft deployed in a certain sector. Command functions are exercised by squadron leaders in the air.

- Forward Point of Direction, PPN (*Peredovoi Punkt Navedeniya*), can be maintained on the ground or in the air. Air brigade staff officers are attached to front-line divisions or army corps with their radio vans and equipment, directing air squadrons to targets as requested by ground force commanders. If the targets are far behind the front lines, PPN is established in the personal aircraft of the squadron leader, or aerial task force commander. The PPN plane stays out of combat, flying higher than the aircraft it directs, with a combat escort of its own. The commander directs the attack by radio from the airborne PPN post.

Little Room for Pilot Judgment

Soviet air tactics are basically sound, but leave little room for the individual pilot to apply his own judgment, since respect for proper channels of command is stressed above all. Operational planning which stems from these rigid attitudes shows little daring, imagination, or willingness to take risks. Additionally, everybody, including the planners, prefers to play it safe by adhering to standard methods and operating procedures, thereby saving their heads should something go wrong.

The Arab-Israeli war was the first combat test of post-WW II Soviet air tactics. Training, command and control, and personnel management were inferior. It can be assumed that after this disaster the manuals are being rewritten and that procedures are being progressively revised as the lessons of that war are digested.—END

Until recently a coincidental by-product of passenger service, air cargo now is growing at a fantastic rate and shows a much greater growth potential than the passenger market for the foreseeable future. But there are many pitfalls along the way, from the competition of streamlined rail and oceanic service to the desperate need for standardized containers and automated cargo-handling procedures—not to mention a requirement for huge amounts of capital to build larger aircraft optimized for cargo and modern airfreight terminals . . .

AIR CARGO—THE AWAKENING GIANT

By Edgar E. Ulsamer

ASSOCIATE EDITOR, AIR FORCE/SPACE DIGEST

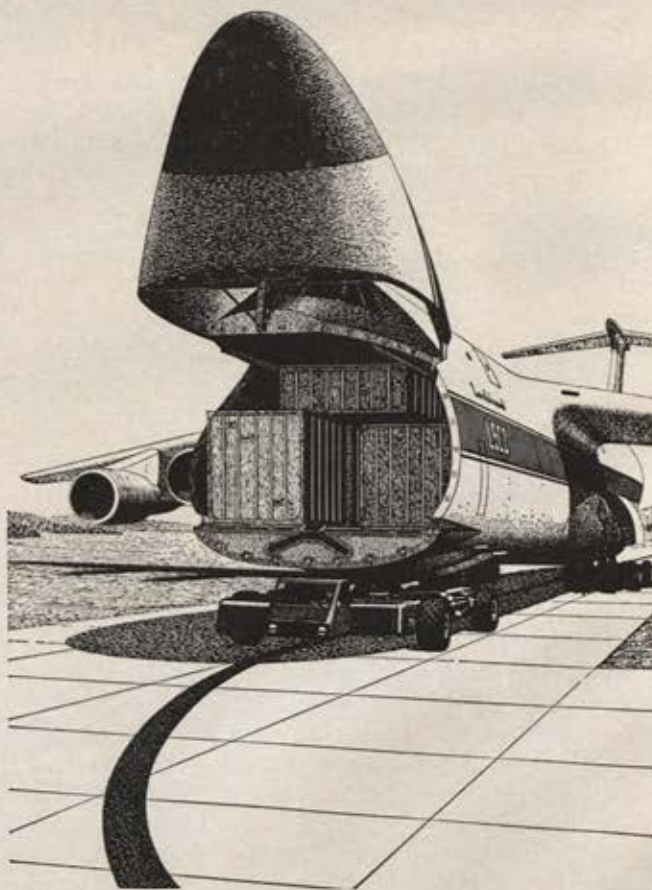
COMMERCIAL aviation, which came into existence because of airmail (a form of air cargo) and which subsequently directed most of its attention to passengers, has rediscovered the cargo market.

While airfreight in its various forms produced less than one-eighth of the total revenues of the airlines of the free world last year, its growth since the advent of jet aircraft has equaled or outpaced the passenger market. The industry sees last year's growth rate of sixteen percent as a "slump" because of the annual twenty percent increases of the preceding years, which at times almost doubled the growth rate of the passenger traffic.

For the moment, air cargo experts acknowledge that the industry is on a plateau, or as Flying Tigers' Vice President for Planning, J. J. Healy, puts it: "We are running out of beginner's luck." But new generations of aircraft are coming into the inventory. Together with vastly improved cargo-handling systems, they should transform air cargo from a coincidental by-product of passenger service to an industry within its own right.

Growth Potential of Air Cargo

The growth of potential for air cargo, in a purely pragmatic sense, far outstrips that of the passenger market. In 1967 air travel accounted for sixty-eight percent of all intercity passenger traffic involving public carriers. As a result, further percentage increases cannot be easily realized, and growth will be chiefly a function of increasing population and gross national product.



Visor nose open and ready to discharge up to 300,000 pounds of cargo, the L-500 in this artist's concept moves toward terminal where easy access will permit fast unloading.



Newest version of the Lockheed Hercules (USAF's C-130 being used extensively in Vietnam) is the 100, a stretched version of the airfreighter. Delta Air Lines will have its three standard Hercules, one of which is shown above with its roller rail loading system in use, modified into the longer (100 inches) and thirty percent more productive turboprop freighters.

By contrast, air cargo represents only about 0.01 percent of all intercity freight movements, or as Boeing Company Vice President J. E. Steiner graphically explains: "It's only by fudging the width of a pencil line that air cargo even makes a showing [on freight charts]." Air cargo authorities concede, however, that a penetration of the freight business analogous to that of air travel is not feasible because pipelines, barges, steamships, and the railroads will continue to handle the transport of raw materials and other major bulk items which constitute the greater volume share of all freight. Foodstuffs, manufactured goods, and a variety of other items valued at more than one dollar per pound are seen as candidates for air cargo shipments. They represent a vast future market, more than twenty times the present level, and account for between five to ten percent of the entire transport market.

Assuming modest investments by the airlines in specialized cargo equipment and facilities, forecasts by Boeing, McDonnell Douglas, and Lockheed peg the 1980 air cargo volume at about eight times that of the current year. A more energetic pursuit of this market could push this figure even higher. Eventually, according to Mr. Steiner, air cargo could account for fifty percent of all airline revenues.

Cargo Jets of the Future

The swing toward airfreight started in almost accidental fashion with the advent of the passenger jetliners in the last decade. Their belly compartment capacity far exceeded the baggage requirement. With passengers paying the operating costs of the aircraft and the cargo loading and unloading costs representing a minimal factor, the airlines quickly discovered that airfreight represented a very lucrative and painless sideline.

As business boomed, the airlines recognized the need for all-cargo operation by both the regular trunk car-

riers and special airfreight operators. With no "optimized" cargo jets available, the airlines and the manufacturers simply adapted existing passenger jets to cargo operations or created so-called quick change (QC) models that can be converted from passenger to cargo operation in twenty minutes by removing the palletized seating. These derivative aircraft, while capable of profitable cargo operations, suffer one major failing: In the language of the cargo industry they "cube out" long before they reach the payload's weight limits, meaning their limited volume is used up by cargo by the time about fifty percent of the load limit is reached. The current cargo density, for instance, equals the volume-to-weight relationship of Ping-Pong balls.

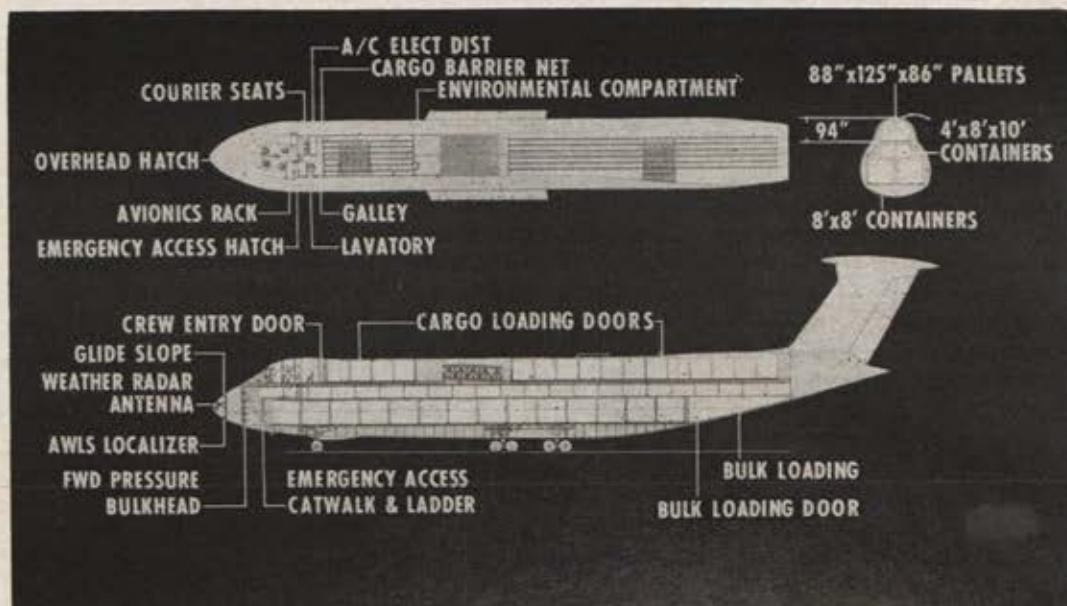
In addition, their tubular shape and inability to load through the nose prevents the use of truck-sized eight-foot by eight-foot containers, often thought to be the most crucial factor in the growth of airfreight. (Most military transport aircraft, while capable of accepting the eight-by-eight containers, have other intrinsic disadvantages when operated in commercial cargo operations since they are designed for outsized, heavy loads, which also leads to cubing out.)

The Next Generation

TWA's Vice President for Equipment Planning and Research, R. W. Rummel, recently told an international air cargo forum that the next generation of cargo liners will "lift the air transport industry one more important step up the ladder of operating efficiency." He was referring to the 747 jumbojet freighter, the L-500 (a commercial version of the C-5), the long-bodied version of the Hercules, and cargo versions of the Lockheed 1011 and the McDonnell Douglas DC-10 advanced technology trijet, all of which are expected to come into the inventory by the mid-1970s.)

(Continued on following page)

The 143-foot cargo deck of the Lockheed 500 accommodates two rows of standard eight-by-eight-foot containers and will be able to handle even larger pallets. It can also carry a row of half-size pallets atop the others. Upper lobe will handle contemporary "igloos."



While none of these aircraft can be said to be fully optimized for air cargo operations, they represent a substantial step forward by virtue of their wide-body design and substantially increased cube volume. The 747 can transport a gross payload of 221,000 pounds transcontinentally (or 179,500 pounds in the cargo-to-passenger convertible version known as the 747C). This is four times the revenue ton-mile capacity of the 707-320 cargo airplane. Pending availability of more powerful engines, even more productive growth versions of the 747 are being contemplated by Boeing.

Lockheed's C-5 derivative, the L-500, which is likely to receive program go-ahead this year, can carry a gross payload of 300,000 pounds over a distance of about 3,000 statute miles or about 270,000 pounds in transatlantic traffic. Both aircraft have nose-loading capability and can accommodate two rows of eight-by-eight containers side by side. These aircraft have a sufficiently high cargo volume in relation to their payload to prevent cubing out under foreseeable conditions. The usable cargo space of the 747F is 23,890 cubic feet and in the L-500 is 31,680 cubic feet, as compared to 6,907 cubic feet in the present-generation Boeing 707-320C.

The L-500, as well as the 747F, will be able to complete "turnaround"—loading, unloading, and servicing—within thirty minutes because of integral, automated cargo-handling systems. This is faster and requires less manpower than present large cargo aircraft. Ton-mile costs for the 747 and the L-500 will be substantially lower than at present, and will reach a nominal \$.0225 in the case of the L-500, which compares favorably with trucking costs.

Opening Up New Fields

These aircraft can, and in order to be economically viable will have to, open up completely new fields to air cargo. Lockheed and Boeing are busy creating "scenarios" to stimulate increased shipper interest. A typical area which shows substantial promise is shipment of automobiles across the Atlantic. The L-500, for instance, can transport ninety Opels or Volks-

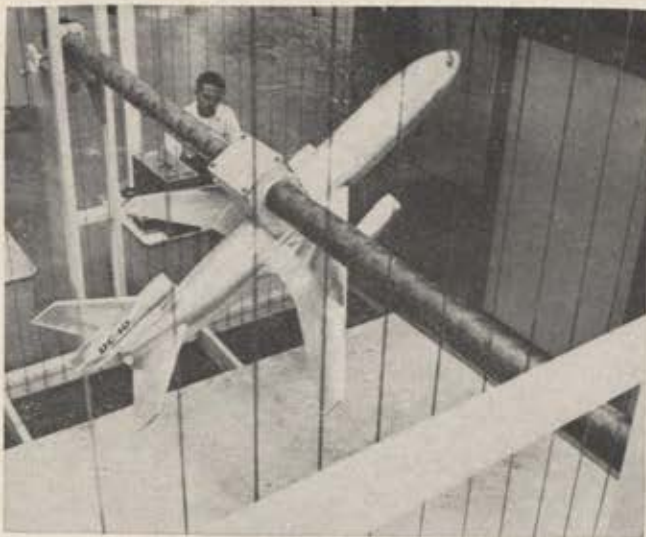
wagens from Germany to the United States at rates attractive to the car industry. The principal advantage is the reduction in transit time (during which the cars are nonproductive inventory items) from four to six weeks to just a few days. Even domestic distribution of cars from central manufacturing facilities to major markets (sixty-nine standard cars on the L-500) may eventually prove practical, according to automobile industry executives.

While several of the major trunk and international carriers profess great interest in jumbo cargo liners, there has not been any great rush to buy these expensive aircraft. The L-500 is priced at \$22.75 million and the 747F at about \$20 million.

Moreover, new airline cargo terminals which are needed to operate these aircraft profitably will cost on an average about \$75 million. This represents an enormous financial burden on the airlines, already suffering because of heavy equipment orders (more than \$13 billion) and sliding profits. There are currently eleven 747F aircraft on order, according to Malcolm T. Stamper, Boeing Vice President and 747 Program Manager. No orders have been announced for the L-500, but two airlines are said to be close to announcing purchase of the aircraft. Mr. Haddon told AF/SD that, because of its basic similarity with the USAF C-5, a relatively small number of orders will enable Lockheed to go ahead with the L-500 program.

Meanwhile, McDonnell Douglas Corp. formulated two design concepts involving what the company's Director for Advanced Cargo Systems, Lloyd Aschenbeck, calls the first truly optimized cargo aircraft. Designated C-4 and C-6, respectively, the two Douglas designs are "built around the intermodal eight-by-eight containers and capable of a cruise speed of slightly better than Mach .8, deemed the most productive for transatlantic and transcontinental operation."

At present no decision has been reached as to which of the two designs might be built first or if eventual go-ahead on one might cancel out the other. The C-4 is a 500,000-pound, four-engine aircraft capable of accommodating two rows of eight-by-eight containers side by side with a maximum payload of 200,000



Six-foot model of new DC-10 airbus, which is already being considered in a cargo version, is tested in charged wire cage to check antenna placement in various attitudes.

pounds and a full range of 2,600 nautical miles. While it is also referred to as the cargo version of the DC-10 wide-body trijet, it bears little resemblance to that passenger aircraft. Operating empty weight is 180,000 pounds and speed is Mach .8 to .82.

The Gargantuan C-6

The C-6 design, truly gargantuan in all aspects, involves a six-engine aircraft with a gross takeoff weight of 1,200,000 pounds, a payload of 480,000 pounds, and a full range of 4,200 nautical miles. Empty weight is given as 530,860 pounds and speed as Mach .85. Engine thrust is to be about 55,000 pounds and is not premised on any presently existing engines. At least one US and one foreign engine manufacturer are known to have completed designs for advanced-technology fan engines in the 54,000- to 55,000-pound-thrust range. Pratt & Whitney designers, further, have reported that powerplants in the 80,000- to 150,000-pound-thrust range can be expected to power large commercial aircraft within about fifteen years. The possibility of military application of the C-6 is being considered.

Less definitive is a design by Lockheed-Georgia Co. of a follow-on to the C-5/L-500 aircraft which bears the designation LGX-160 and is also in the one million-pound weight class; it is being considered for both commercial and military applications. It would employ four 60,000-pound-thrust engines and cruise at Mach .9.

A number of airline executives have been talking about even larger, more productive cargojets, on a long-term planning basis. TWA's Vice President Rummel speculated recently that the successful merchandising of air cargo may generate sufficient volumes and profit to warrant serious consideration of a commercial all-cargo aircraft with a gross weight of over two million pounds and a payload of "600,000 pounds in international traffic and still more in domestic traffic."

He cautioned, however, that such a development presupposes capital and financial risks in the \$2 billion to \$3 billion range, adding: "Without a prior related military development of powerplants or aircraft or both, undertaking such a project could prove to be



The Pratt & Whitney JT9D turbofan engine, which will power the Boeing 747, develops 43,500 pounds of thrust. Even more powerful engines are expected in the next decade.

wholly impractical, at least without direct government assistance such as the current US SST program."

Mr. Rummel also termed it "intriguing indeed" to consider infinite-range-constant-payload type aircraft employing nuclear or other novel powerplants for future cargo operations, but explained that they appeared to be "many years away."

Less dramatic and possibly less costly, but also less productive, according to preliminary industry studies, is the adaptation for cargo operations of contemporary passenger aircraft of the 707, 727, and DC-8 type by enlarging the upper fuselage lobe to accept a single row of eight-by-eight containers, by increasing the gross weight, and by incorporating front loading doors. The economic soundness of such an elaborate "retrofit," in the opinion of airline executives, would have to be premised on the concomitance of rapid market growth and obsolescence—because of the arrival of advanced-technology equipment—circumstances which at the moment are considered probable.

Clearing the Red Tape Logjam

Air cargo's theme song is that time is money. As a result, airfreight's appeal increases with the distance over which it has to be shipped. (Conversely, there exist cutoff points below which freight shipments by air are not economically attractive because the "block time" is barely better than what can be attained by cheaper ground transportation.) Depending on circumstances and what economic standards are applied, productivity of air cargo is said to start somewhere between 500 and 1,200 miles. The airfreight industry's key pledge is "second-morning delivery" (delivery two working days after receipt of the cargo), an ambitious and not always kept promise. The bottleneck is, in the words of Boeing's Mr. Steiner, the imbalance caused "because the technological developments of the vehicle are far more advanced than the other portions of the system which control the flow of cargo to and from the airplane."

With international traffic representing a key growth
(Continued on following page)

area in air cargo because of the generally greater distances and time savings, governmental administrative delays become critical. This fact was recognized by President Johnson in last year's transportation message when he requested the Department of Transportation to reduce the maze of 810 different categories of bureaucratic forms that slow down the exports and imports entering and leaving the United States, a condition he called "paperwork run wild." Seaboard World Airlines Vice President Charles H. Bell calls it "astounding that in this day and age when aircraft span oceans in six hours or less, it takes an average of three days at volume points to clear and release cargo." Pan American World Airways' Manager of Facilitation Jay L. Sheppard illustrated the US government's regulations and procedures concerning international air cargo by saying, "Tranquilizers have been prescribed for conditions that require major surgery."

Mr. Sheppard contrasted the "lethargic approach" here with "more farsighted and advanced policies instituted by other countries." He said, "The British government has appropriated funds, assigned responsibility, and is well along the road toward computerized control of air cargo," in terms of customs and other procedures. The French government is following the London concept and is setting up a similar system. US efforts, by comparison, are sagging.

Technologies which can shorten the procedural delays of international air cargo include electronic data-processing of all required documents and the use of communications satellites to transmit copies or airbills and export declarations for advance examination and clearance.

Speed-Up on the Ground

About half the operating costs of the air cargo industry consist of ground handling and loading, which are up to four times as high as for other modes of transportation. A major cause for these high costs is the fact that the average airfreight shipment is smaller than that shipped by rail, trucks, or steamships. Equally important is the fact that most operations are per-



Part of the L-500 airfreighter total-system approach is the study of various terminal/cargo-handling possibilities such as artist's concept of automated complex above.

formed in archaic "bucket brigade" handling methods.

According to Dortech, Inc., a leading designer of cargo terminals and cargo-handling systems, it took eight to ten men three hours at each end to bulkload a DC-6 with 30,000 pounds of payload. Palletized loading of the 65,000-pound payload of a 707 or DC-8 can be accomplished in twenty-five minutes by three or four men.

Dortech now has designed equipment that eventually will load or unload the 220,000-pound payload of the 747 jumbojet in ten minutes, with the same number of men. The gains from this speedup are substantial: keeping a 747 tied up on the ground for loading and unloading for just one hour a day more than necessary will cost the operator about \$2 million a year in revenue loss. (The advanced-technology superjets of the 747 and L-500 type are designed for a daily utilization rate of seventeen hours or more compared to about eleven hours in the case of present equipment with higher maintenance requirements.)

Complementing the highly automated and accelerated loading and unloading operations in the jumbojet era will be mechanized terminals with computers performing such routine paperwork as inventory and routing and load planning as well as controlling the mechanical equipment. According to Dortech Vice President Bruno S. Frassette, "Packages will be automatically coded, routed, weight and volume checked, and recorded." Prewired information to the computer "will determine what to do with arriving goods," he said.

Containerization: Great Leap Forward

Flying Tiger Vice President Healy views the impact of containerized airfreight as "powerful because it is an idea whose time has come." The airfreight container is important not so much because of what it is but because of what it "does." The intermodal container of the superjet era, sanctioned by the International Air Transport Association, is eight by eight by ten, twenty, or forty feet. Mr. Healy says it "does" this: It eliminates unnecessary handling of freight, reduces packaging costs, reduces damage and theft, encourages mixing of freight, improves space utilization, simplifies accounting, provides storage when necessary, represents a unit for pricing purposes (in place of the singularly complex present system which is seen as a



The mockup of the Boeing 747 is shown at Everett, Wash., plant where it is used by engineers to develop installations, components, and methods to produce the plane.



The cargo version of the Boeing 747, shown at left in its passenger configuration, will be able to transport a gross payload of 221,000 pounds across the country—four times the revenue ton-mile capacity of the 707-320.

deterrence to the use of air cargo), and can be transferred directly to trucks and thereby bypass the costly, time-consuming terminal process. In short, the container can cure most of what ails airfreight at the moment and reduce costs in the process; it is meant for door-to-door delivery, instead of airport-to-airport delivery.

Mundane as it would appear on first sight, the container coupled with automatic cargo handling will increase air cargo productivity fivefold over the present, according to industry calculations. Dorteck studies, for instance, indicate that one man will be able to handle annually 5,500 tons of containerized air cargo compared to about 280 to 800 tons at present.

According to Boeing Vice President Steiner, a worldwide, all-airline-owned organization which owns and keeps track of these containers should be created, in conjunction with IATA, the International Air Transport Association. Similarly, he told AF/SD, the US Post Office can be expected to become a major owner and operator of airfreight containers since the Post Office may well become air cargo's best customer. Also, consideration is being given by the Congress, the Department of Transportation, and the Department of Defense to bring the military services into the container standardization wherever possible.

The Spur of Competition

Robert F. Stoessel, Lockheed Aircraft Corp. transportation consultant and Chairman of the Air Cargo Committee of the Society of Automotive Engineers, credits airfreight with having "forced surface carriers to provide better and more dependable service." Department of Defense logistics experts, with an understandable interest in air cargo, agree but feel that the shoe may be on the other foot. The container-ship and the container-barge and the container-train may provide stiff competition for air cargo. The German Federal Railroad will start operating a "Container-Blitz Train," and the Santa Fe's new Super C, the world's fastest freight train, covers the run from Chicago to Los Angeles in less than forty hours. Flying Tiger Vice President Healy, for one, is concerned. The coordinated door-to-door system of the container-train forces the air cargo industry to recognize that "three-day service coast-to-coast is well within the technical capability of this combination service with a second-

morning delivery capability on the horizon in the time from 1975-1980." In the price department, this service combination has a "clear-cut cost advantage," Mr. Healy warns.

The maritime industry is also moving forward rapidly in intermodal containerization with some ships, currently under construction, capable of handling 1,200 intermodal containers. When linked to the 100-mph FDL (Fast Deployment Logistics) concept of the US Navy, such advanced container-ships, spanning the Atlantic in two days, could seriously affect the growth potential of air cargo. Another competitive development, according to Mr. Stoessel, is the barge-carrying ship, which can drop off and pick up high-capacity barges and is completely independent of cumbersome port operations. Eleven barge-carrying ships, with a capacity of sixty-one barges each, are under construction in the United States at present. Their ton-mile costs, he predicts, will be "far superior" to conventional ships. A similar barge-carrier ship currently in the planning stage will shuttle thirty-eight barges between such points as New Orleans and Rotterdam with the barges, coupled together in twos, actually operating from cities all along the Rhine River and the Mississippi.

But none of the surface modes has the flexibility of air cargo, or as Mr. Healy puts it, the "freedom of the skies." We must "learn to capitalize on this element of flexibility if we are to maintain a competitive balance," he explains.

Mr. Steiner seconds this thought, emphasizing that the loss of the Suez Canal has forced major changes in the movement of goods over such routes as the Far East to Western Europe, involving sea transport to the Western US, ground transport across the US to the Atlantic ports, sea transport across the Atlantic, and rail or truck to the final European destination. In place of "such a tortuous intermodal trip" air cargo flies directly over the polar routes from Hong Kong to Europe, he points out.

Presumably, both the high-speed container cargo ship and the mammoth cargojet will be able to function in a mutually advantageous environment, applying the beneficial spur of competition. With about 46¢ of the consumer dollar covering present distribution costs, the public at large has a great deal to gain from greater efficiency in air cargo and other modes of transportation. So does national defense.—END

With the NATO nuclear consultation committee now permanent, some progress can be made in at least defining the problems involved in developing NATO's nuclear strategy. The author, former Military Adviser to the Canadian Delegation at NATO, suggests a new way of looking at the nuclear needs of the alliance—one that is oriented toward the realities of deterrence and the integration of NATO nuclear strategy with the strategic policies of the US, rather than toward building a totally separate second-strike force including too many missiles and a thinly stretched conventional force . . .

NATO and the Nuclear Reality

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

PERHAPS the most promising advance in the evolution of NATO's defense system since it was agreed to introduce nuclear weapons was a relatively unheralded event that took place on April 29 last year. On that day five Defense Ministers of the alliance, meeting in London, decided that an *ad hoc* committee for consultation on nuclear weapons should be made permanent.

When nuclear weapons were first added to the armory in Europe, it is understandable that the types and numbers of weapons allocated were a function of the existing state of the art plus availability. It is also understandable that NATO's planning wouldn't change overnight to adjust to the nuclear reality. But what is much less comprehensible is that the nuclear stockpile should grow like Topsy for so many years without any real reconciliation between the enemy threat and the preponderance of US power on the one hand, and the strategy of NATO plus requirements to implement it on the other.

Many people thought the new nuclear consultation committee would simply be another device to avoid facing the old issues. But under the aggressive chairmanship of then US Secretary of Defense Robert S. McNamara, it got down to business in surprisingly short order. For the first time there now is a routine mechanism by which military commanders can get at some top civilian executives in a working conference with their nuclear problems. Reports indicate that both soldiers and civilians are benefiting enormously from the more intimate discussion that is now possible. The prospect of some new and useful decisions on the alliance's nuclear policy is thereby greatly enhanced.

Three-Part Problem

Deterrence is what we are after. We talk about it a lot and think we know what we're talking about. But we don't seem to be quite clear how it should be achieved with our new weapons. We've continued to plan force goals on a weapon-for-weapon basis, as if the concept of nuclear deterrence had never evolved. Our rationale apparently has been to keep ahead of



The first British Polaris sub, which recently fired her first missile (above), adds to NATO's nuclear capability.



Britain's first Polaris submarine, the HMS *Resolution*, has already fired her medium-range ballistic missile, the Polaris A-3, off Florida coast and is now on patrol off the European Coast, adding to Britain's and NATO's nuclear deterrent capability.

the enemy in numbers in the hope that this would give enough credibility to gloss over the glaring weakness of an ambiguous force posture, plus a completely centralized control system with the trigger finger on the other side of the Atlantic.

Don't misunderstand. There has been almost continuous discussion, planning, and even useful action on all NATO nuclear problems. Dedicated individuals have devoted much sweat and tears, if not blood, to bettering the situation. But it's high time we did better. So let's take a look at the three fundamentals of nuclear power in any defense system—numbers and types of weapons, force posture to exploit them, and their control. And since numbers are the central problem, let us deal with them first and in considerable detail.

NUMBERS

I first came face to face with controversy over NATO's nuclear numbers in 1962 when I arrived in Paris to work at the headquarters. USAF's Gen. Lauris Norstad was still the Supreme Allied Commander in Europe (SACEUR) and was asking for 400 to 500 new medium-range missiles. They were intended to counter the growing Russian arsenal targeted on NATO forces. The request seemed quite straightforward, so after familiarizing myself with the supporting facts, I started arguing in its favor while continuing to study the problem.

The year 1962 was also a period of great controversy over the French *Force de Frappe*. As we know, the French plans were vigorously opposed by the Kennedy Administration, and this opposition included most of my US military colleagues in Paris. I soon found myself in opposition to many of the US criticisms. And in general my objections were seldom disputed; the points raised had simply been overlooked.

The net result of my support for France's fifty weap-

ons at one end of the scale and SACEUR's 400 at the other created a bit of a quandary. I began to suspect that if there were some magic about as few as fifty weapons, maybe I too could do with further homework on the little-understood art of nuclear deterrence.

What finally convinced me that a rethink of the whole problem of weapons requirements would indeed be advisable was the following anomaly. On the one hand, the additional destructive power being requested by NATO's principal military commander indicated a most alarming weakness in his defense. But on the other hand, even though the political authorities were courteous and apparently sympathetic to SACEUR, it was quite evident that practically no one seemed overly concerned about the safety of Europe. Moreover, anyone with half a wit could see there wasn't the slightest chance of the requirement's ever being filled.

The conclusion was inescapable; either NATO was in a truly desperate situation or there was something wrong with our military planning. And since there were plenty of military people to argue the first proposition, I devoted my energies to investigating the latter possibility.

Rethink

When I started to refocus with a more critical eye on the justification for the new medium-range missile, I was much less impressed with the principal argument, the "time-sensitive" one. SACEUR has always maintained that he needed these relatively long-range weapons in Europe, and under his control, because he could get them on enemy targets threatening NATO forces much faster than SAC could by launching from the USA. And the saving of time was held to be critical.

SACEUR presumably would use the missiles, if he
(Continued on following page)

got them, in one of two circumstances. Either he would fire them on a first strike, in which case the few minutes difference in delivery time could not conceivably be vital. Or he would be firing them in a second strike and at an enemy base complex that had already launched maybe upward of 1,000 missiles on NATO. With the chaos and destruction that would follow this sort of a disaster, it is difficult to believe that there would be any significant difference in the end result if SACEUR were to create part of the rubble a few minutes earlier than SAC would do it. The time-factor argument didn't seem to justify the emphasis being placed on it.

But the most alarming weakness in the case for new weapons became evident once one started to war-game the effect their acquisition might have on the enemy and the ultimate cost to ourselves.

Supposing SACEUR did get his missiles, what could the enemy do to counter? Harden his own weapons, disperse them, or go mobile—these were three good possibilities. But what then? To be consistent, SACEUR would have to boost his requirement to perhaps 800 missiles so as to maintain a satisfactory kill ratio. And then? Perhaps more hardening, dispersal, and mobility by the enemy. Or the enemy could play a trump card and shift his NATO-aimed weapons (modified or new, slightly longer-legged ones) further inland, to a target area that SAC always considered its private preserve, where SACEUR repeatedly avowed he had no interest.

But this sort of force planning is a fool's game for NATO. The only end to it would be an assured second-strike capability in Europe, which would simply duplicate the capability the US already provides. And even so, the millions of new money poured into such armaments wouldn't necessarily make NATO more secure.

This line of reasoning not only pointed up a fallacy in our planning, but also cast in doubt the contention that the nuclear strike plans of SAC and SACEUR were well coordinated. They were, of course, in the most obvious sense of avoiding unnecessary duplication and overkill. But the critical question of how many missiles SACEUR would need to fire before SAC got into the act seemed to have been lost in the shuffle. *And the ability of SACEUR to trigger SAC is all that really matters for the strategy of deterrence to be successful in Europe.*

Rationale

Viewed in this light, SACEUR's nuclear weapon requirement is not for a capability to wage an independent battle deep in enemy territory and of some duration. For theater commanders, this went out of fashion after World War II. It became obsolete in Europe with the advent of strategic support that can be effective in a matter of minutes. *All that is needed is a capability that the enemy must overwhelm for his attack to succeed, and which, if overwhelmed, would be sufficient provocation to invoke the big stick.*

What this means in practical terms is that SACEUR first of all must have sufficient weapons to oppose the forward elements of Russia's tactical capability against NATO. And secondly, the weapons should be so dis-

posed that their destruction, with the associated loss of real estate and human lives, would clearly precipitate retaliation by the West.

How many weapons would be needed to create this nuclear lock between SAC and SACEUR? A few token weapons certainly wouldn't do the trick. Russia could probably knock out a small number with conventional means and still not risk a major response by NATO. But once we talk in terms of fifty or so protecting each critical area—not counting such defensive weapons as nuclear land mines, air defense rockets, and short-range artillery—then it's a different sort of game.

Under no circumstance should Russia be able to launch a counterforce strike on this number of weapons without bringing the roof down on herself. And this should apply even if she used only conventional



—Wide World Photos

If NATO were to get the large number of medium-range ballistic missiles it wants, the Soviet Union would only use more MRBMs such as this Iron Maiden on Moscow parade.

weapons in the attack. On the other hand, if NATO is prepared to accept such a substantial loss without a violent response, then it is perhaps best we recognize that our strategy of deterrence is bankrupt and sign Western Europe over to Russia right now.

To make this idea of a deterrent lock between strategic and tactical forces abundantly clear, it may be helpful to consider a contrasting situation in an area where there is no such concentration of people and wealth as in Western Europe. Take, for instance, a frontier between two mythical powers in the Sahara Desert.

In this scenario only military units would be lost in a battle. And to avenge the lost military units, neither opponent is liable to retaliate on the home territory of the other and thereby risk destruction of its own vital interests. Threats to do so would not be credible. So in this sort of a tactical situation a limited nuclear capability in the field simply wouldn't deter. The only way to achieve stalemate would be to build to an assured second-strike capability in the local area.

People and real estate make all the difference in deterrence. We should recognize and trade on this fact in Europe.

Reactions

Since what I have outlined represents a relatively new approach to the question of nuclear numbers, I

have naturally discussed it with everyone I could find with any ideas on the subject. Of the negative reactions encountered, three are typical.

In response to the thesis that counterforce targeting would logically lead only to the purchase of an expensive and unnecessary second-strike capability in the European theater, some have responded: "OK. That's not bad. It's good, as a matter of fact. It will ruin the Russians economically if they try to keep up with us." But this is another game, not the military one for which SACEUR is responsible.

Another response was: "What you say is all right. But the Europeans need some long-range missiles here in Europe anyway." While I happen to agree with this argument, it again isn't one that falls within the ground rules of the discussion.

The third type of argument was this: "If we restrict the number of SACEUR's weapons, what about his responsibility to go on and win if it comes to general war?" The simple response is that if we spend our money wisely and back it with credible determination, there will be no general war. But even if we blunder or chicken into it, the marginal utility of more forces than those needed to trigger SAC makes absolutely no military sense in a nuclear holocaust in Europe.

The above arguments are highly significant for this reason: Not one of them opposes the basic premise that straightforward counterforce targeting, as we have been doing to date, is wrong for NATO Europe.

Impact of Nuclear Committee

While perhaps not tying itself to any specific reasoning, I have a feeling the Nuclear Committee is quite clear that there are already more than enough nuclear weapons in Europe to accomplish what we are after. Also, my grapevine tells me that SACEUR (US Army Gen. Lyman L. Lemnitzer), or at least his staff, is being won around to the realization that, while he must have a substantial number of nuclear weapons, he doesn't need them in sufficient quantities to fight an independent tactical war. Therefore, we should hear no more of the old medium-range missile requirement or such flights of fancy as the *seaborne Multilateral Force (MLF)*.

If the Committee and military planners subsequently come to recognize the protection that SAC, once it achieves an assured second-strike capability, affords to SACEUR's sensitive forces in Europe, we should also hear less about dispersal, hardening, and VTOL for the safety of manned interceptors. In addition, great savings would be possible in the complementary Quick Reaction Alert system, which is so costly in manpower. That deterrence can offer greater protection to military forces than these former precautions may come as a surprise to many, but it is, nonetheless, a reality.

FORCE POSTURE

As we all know, the official policy of the NATO alliance is that of defense. We hope to achieve our defense with a deterrent force structure consisting of both conventional and nuclear weapons. This posture is to be made credible to the enemy by a strategy of

flexible response—which is to say, conventional resistance in the first place, but escalating up to the use of nuclear weapons if necessary.

Flexible response is fine in theory, for no one really wants to use a bomb when a bullet will do. But when it results in an effort to give our limited forces a "dual capability," as now seems to be the plan, then we are guilty of fuzzy thinking.

It was long ago agreed that we couldn't defend Europe with conventional arms. Therefore, why give the impression of trying it now with a "dual capability" when our technological progress and our available resources demand ever more reliance on sophisticated weaponry? And in view of the fact that, although our air forces might give a good account of themselves in a conventional struggle for air superiority, enemy ground forces could meanwhile roll through to the Rhine?

I am not too worried about the argument that if we gear our forces for conventional resistance in the first instance, we will be highly vulnerable to nuclear attack. Our force posture needn't be concerned with the idea of a tactical nuclear war for it is no part of the strategy. NATO has said that it will escalate as necessary, which means to the use of SAC, and that will be that.

No, the real objection is this: In attempting to stretch the flex in our response, we simply undermine the credibility that we will defend ourselves the only way we can, and we thereby invite the enemy to exploit our weakness in conventional forces. So the net effect of a dual-capability strategy is to make the very disaster we hope to avoid not less likely, but more so!

There is another and opposite standard argument against a dual capability. It holds that if we maximize our force posture for a nuclear defense, but don't really intend to use it as we say we will, then we are highly vulnerable to a conventional attack. Maybe so. But the great advantage of being in a nuclear posture is that we would at least give the *impression* that we meant what we said. Therefore, it would be less liable to encourage the enemy into a mistake that could be fatal for both sides.

A fundamental fact about force posture in Europe that needs recognition at the highest level is this: Giving our forces an extended capability to fight conventionally when it makes no military or economic sense may be good for credibility in our own eyes, but what counts is how the enemy sees it. And whereas the prospect of conventional fighting is not liable to deter the Russians, it could very well do just that to the West and lead to another Munich.

CONTROL

In the final analysis, the deterrence of our nuclear capability cannot be very great unless there is an adequate system of control to match the strategy. But here again, arrangements in the alliance are far from equal to the challenge.

As indicated earlier, the control of NATO's weapons is highly centralized. And since the US owns most of them, the really important trigger finger is in the White House. No one doubts that the release system

(Continued on following page)

will work smoothly and effectively once the US has made up its mind to use some nuclear weapons. On the other hand, most people are now beginning to wonder if this would be soon enough.

For a considerable period in the 1950s, one had the feeling that the White House would be very responsive to the military assessment of SACEUR. Consequently, the credibility of a timely nuclear response in case of need was very great.

As the influence of SACEUR in Washington started to wane, General de Gaulle raised the possibility of nuclear control being vested in the US, UK, and France. But this was sharply shouted down, both by the US itself and by many of the lesser nations. This was unfortunate. What they failed to see is that a firm agreement for consultation among three big powers in a crisis is greatly preferable to control based on the wishful thinking that fourteen nations could somehow or other reach a consensus in time to be of practical use.

Meanwhile, two factors have radically altered all the earlier debate on control. One is the development of a remotely controlled safety device called the Permissive Link. And the other is a growing fear of escalation that has become almost pathological in certain US circles.

The net result of these two new inputs has been tighter unilateral control over a system that was highly centralized to begin with. Add to this the present US emphasis on flexible response, plus the dual capability policy, and it's understandable that the present arrangements don't inspire much confidence among the field commanders.

Those who study the problem objectively agree that, so long as the countries of Western Europe remain part of an alliance and not a federation, the way to break out of the strait we're in is to split the problem into two parts: create a quick-reaction control system for relatively small, short-range weapons that would be highly useful along the frontier in the early stages of an aggression (nuclear land mines—ADMs—are the best example of these, but ground-to-air rockets are in the same category) and have another system for those weapons of greater consequence that would be fired into enemy territory.

The reasoning in favor of such a division is simply that if we improve our deterrence on the frontier, a lack of agreement on the control of other nuclear weapons becomes relatively less important.

On the prospect of this separation's ever coming to pass, it is interesting to note that the Nuclear Committee is actively involved in a proposal for the use of ADMs with modified control on the Turkish frontier. A similar need exists in Germany. An important benefit from greater reliance on ADMs in both these areas would be the freeing of manpower that could then be used for much-needed reserves.

Although there is some justification for hope that we may ultimately see ADMs more responsive to the needs of keeping our frontiers intact, I see no grounds for optimism that the US will modify its unilateral authority over the bigger, offensive-oriented weapons. One US observer put it this way: "It's academic to talk of our using such weapons except in desperation."

This may be so. And it's hard to reconcile with our announced strategy of deterrence. On the other hand, it is still a safe bet that the US will reach the point of desperation sooner than most of its allies—excepting perhaps France. So a form of NATO control would not necessarily improve the reaction time for the offensive-oriented weapons. Therefore, it's not as high a priority project as that for the smaller weapons.

The situation of France is relevant to the control problem. Although talked out of de Gaulle's idea for a Big Three control of nuclear weapons, France nevertheless has some high cards to play in an emergency. With two divisions in Germany, that in all probability will be equipped with their own tactical weapons, this intransigent ally may have a very salutary control of the "point of desperation" in Europe.

PROGNOSIS

Up to now NATO has suffered because its nuclear policy has been largely a fallout of what was developed for the US's global strategy. It has not had a competent source of comprehensive, independent thinking of its own in Europe. And, without this, there has been little possibility of affecting the march of events. SACEUR's staff machinery has, therefore, tended to concentrate on the *types* of weapons it needed to do the military job in time-honored fashion.

That the Nuclear Committee may help change this and get everyone thinking in the new, and not yet well understood, dimension of deterrence is the bright promise of the future. Nevertheless, fundamental to any rationalization of NATO's nuclear policy in the short term is the attitude of the US and how far she is prepared to go to help matters.

On the question of nuclear numbers, the US will no doubt play a constructive part. But in the equally important areas of force posture and control, the outlook is gloomy. There are too many people in the present Administration who consider the only real road to détente is by endless sacrifice of sound strategic thinking; too many who believe that the only answer to mutually opposing nuclear forces is to "march back to World War II"—as one writer on defense matters has succinctly put it.

A long-term prospect for improvement is some form of European unity that will insist on a greater measure of nuclear autonomy. The elements of this autonomy already exist in the UK and France. Sentiment for it is smoldering beneath the surface in many places. Common sense demands it. Therefore, it is only a matter of time till it becomes a reality. And when it does, we can probably add the Iron Curtain to the growing list of peaceful frontiers in the Western world.—END

The author, Air Vice Marshal Cameron, spent much of his thirty-five-year career in the Royal Canadian Air Force in the management area. Before his retirement in 1966 he was assigned as Military Adviser to the Canadian Delegation at NATO and Canadian Military Representative at SHAPE. Prior to that assignment he was Director of Organization and Management for the RCAF. AVM Cameron has previously written for us on the NATO alliance; "New Home for an Old Dilemma," appeared in May '68.

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Speaking of Space

"[The search for extraterrestrial life] is what the exploration of space is really all about, and this is why many people are afraid of it, though they may give other reasons, even to themselves. It may be just as well that there are no contemporary higher civilizations in our immediate vicinity; the cultural shock of direct contact might be too great for us to survive it. But by the time we have cut our teeth on the solar system, we should be ready for such encounters . . ."

—ARTHUR C. CLARKE

Getting from Here to 2001

BY WILLIAM LEAVITT

Senior Editor/Science and Education

AMID the alarms of war and the pain of space budget cutbacks it is sometimes hard to recall that there is a space program under way and that there are people still spending most of their energy and talent on the business of advancing man's progress into the cosmos.

A distinguished collection of such people convened a few weeks ago in San Antonio, Tex., home of the Air Force System Command's Aerospace Medical Division, where they reported on the prospects and problems of man in space. The occasion was the Fourth International Symposium on Bioastronautics and the Exploration of Space. The sponsor of the meeting was AFSC's Aerospace Medical Division.

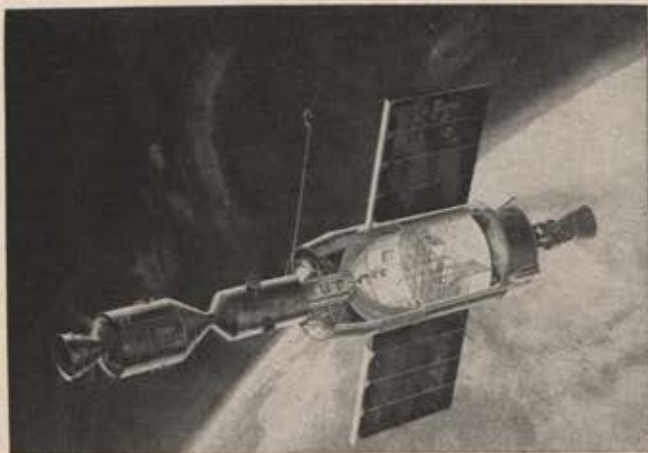
In some ways the meeting was a subdued affair. Space exploration is no longer new. And most of the papers presented were by way of reviewing the state of the art. There were far fewer reporters on hand than at past such meetings. This was no doubt a sign of the times and the flagging public interest in space. Indeed, a main subject of discussion was that very fact of shrinking public enthusiasm and support and what, if anything, to do about it. No one had any real answers to that question.

But some important and refreshing things were said at the meeting, particularly by Arthur C. Clarke, the remarkable British science-fiction writer and cocreator of the movie hit, "2001—A Space Odyssey." Projecting the future of space travel in the light of the history of aviation, Mr. Clarke asked what lessons we can draw from the history of aeronautics.

"Soon after the failure of [Samuel] Langley's 'aerodrome' in 1903," Mr. Clarke observed, "Simon Newcomb



After his appearance at Air Force-sponsored bioastronautics symposium and tour of San Antonio Hemisfair, author Arthur C. Clarke (left) took time out to visit USAF Aerospace Medical Center at Brooks AFB and enjoy award of "Martian Indian Chief" status from Center Chief Scientist, Dr. Hubertus Strughold, space medical pioneer and authority on the planet Mars. Dr. Strughold reported on medical requirements of Martian manned exploration at the meeting.



Evolution of space stations as described by NASA's Robert Gilruth in San Antonio: Above, the Apollo Applications Manned Orbital Workshop in its simplest configuration.

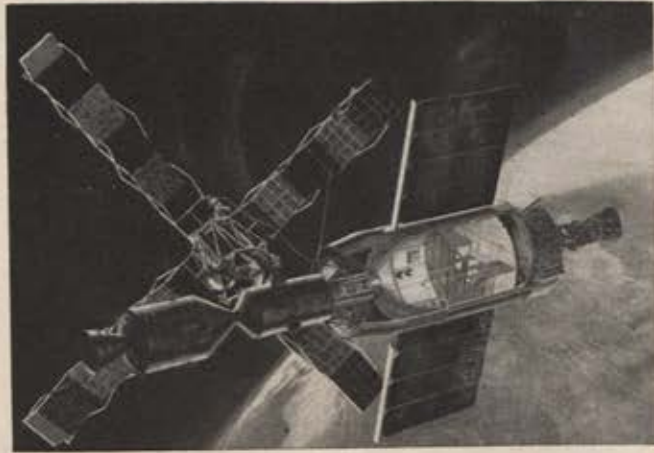


What Mr. Gilruth and others see down the space road—a million-pound space station, which would rotate to provide artificial gravity and would carry a fifty- to 100-man crew.

wrote a famous essay, which is well worth rereading, proving that heavier-than-air flight was impossible by means of known technology. The ink was hardly dry on the paper when a pair of bicycle mechanics irreverently threw grave doubt on the professor's conclusions. When informed of the embarrassing fact that the Wright brothers had flown, Newcomb gamely replied:—"Well, maybe a flying machine *can* be built. But it certainly couldn't carry a passenger as well as a pilot."

"Now," said Mr. Clarke, "I'm not trying to poke fun at one of the greatest figures in celestial mechanics. When you look at the Wright airplane hanging up there in the Smithsonian, Newcomb's attitude seems very reasonable indeed, and I wonder how many of us would have been prepared to dispute it in 1903."

"Yet—and this is the really extraordinary point—there is a smooth line of development, *without any major technological breakthroughs*, from the Wright Flyer to the last of the great piston-engine aircraft. . . . All the many orders-of-magnitude improvement in performance came as the result of engineering advances, which in retrospect seem completely straightforward, and sometimes even trivial. Let me list the more important ones: variable-pitch airscrews, slots and flaps,



A later phase, the rendezvous with the basic Orbital Workshop of a solar observation experiment module, which would give crews experience with really complex operation.

retractable undercarriages, concrete runways, streamlining."

Mr. Clarke said that all these advances, along with steady progress in materials and design, "lifted much of the commerce of mankind into the air." As he put it, "They had a synergistic effect on performance: their cumulative effect was much greater than could have been predicted by considering them individually. They did not merely add; they multiplied."

"All this took about forty years; then there was the second technological breakthrough, the advent of the jet engine, and a new cycle of development started," he noted.

"Unless the record of the past is wholly misleading," Mr. Clarke predicted, "we are going to see much the same sequence of events in space. As far as can be judged at the moment, the equivalent items on the table of aerospace progress may be: refueling in orbit, air-breathing boosters, reusable boosters, refueling on (or from) the moon; lightweight materials (e.g., composites)."

Mr. Clarke suggested that the exploitation of such advances will take less than the forty years that it took aviation to reach its present state of the art. The full impact of spaceflight advances should, he said, be felt by the year 2000. And "well before then," he said, "the next breakthrough or quantum jump in space technology should also have occurred, with the development of new propulsion systems—presumably [nuclear] fission-powered, but hopefully, using [nuclear] fusion as well."

"And with these," Mr. Clarke declared, "the solar system will become an extension of the earth—if we wish it to be so."

But it is at this point, Mr. Clarke said, that "all analogy with the past breaks down; we can no longer draw meaningful parallels between aero- and astronautics. As soon as aircraft were shown to be practical, there were obvious and immensely important uses for them—military, commercial, scientific. They could be used to provide swifter connections between already highly developed communities—a state of affairs which almost certainly does not exist in the solar system, and may not for centuries to come."

We may thus become involved, Mr. Clarke sug-

gested, in a "particularly vicious circle," in which planetary exploitation will not be really practical until we have developed a mature spaceship technology—but we won't have good spaceships until we have worthwhile places to send them to, places, above all, with adequate refueling and servicing facilities, now sadly lacking anywhere else in the solar system.

"How can we escape from this dilemma?" Mr. Clarke asked.

There is one encouraging aspect to the situation, he suggested, which can help us off the cosmic hook: "Almost the whole of the technology needed for long-range space travel will, inevitably and automatically, be developed during the exploitation of *near* space. Even if we set our sights no higher than a thousand miles above the earth, we would find that by the time we had perfected the high-thrust, high-performance surface-to-surface transports, the low-acceleration inter-orbital shuttles, the reliable, closed-cycle space station [living environments], we would have proved out at least ninety percent of the technologies needed for the exploration of the solar system. And the most expensive ninety percent, at that."

Mr. Clarke, in the cheerfully irreverent style that has endeared him to millions of science-fiction readers, then went on to chide "those strange characters who think that space is the exclusive province of automatic robot probes, and that we should stay home and watch TV, as God intended us to do."

"This whole man-machine controversy," he said, "will seem, in another couple of decades, a quite baffling mental aberration of the Early Space Age. . . ."

"I won't waste time arguing with this viewpoint," he declared, "[since] I hold these truths to be self-evident: (1) unmanned spacecraft should be used whenever they can do a job more efficiently, cheaply,

and safely than manned vehicles; (2) until we have automata superior to human beings (by which time all bets will be off), all really sophisticated space-operations will demand human participation.

"It is true," he went on, "that a great deal can be done by 'telepuppets' or radio-controlled slaves, but these cannot be used over astronomical distances because of the time delay. Even for an object as near as the moon, the two-and-a-half-second lag is almost intolerable. For planetary exploration, we will only be able to use such devices under the control of *manned* ships in close orbit; and they will doubtless be invaluable during our first assaults on Venus and Jupiter."

Mr. Clarke is particularly enthusiastic about space-borne astronomy. "The impact on solar system studies of medium-size telescopes outside the atmosphere—a mere couple of hundred miles above the earth—will be overwhelming," he said. For, as he pointed out, "until the advent of radar and space probes, everything we knew about the planets had been painfully gathered over a period of about a century and a half, by astronomers with inadequate instruments, hastily sketching details on a tiny, trembling disc glimpsed during moments of good seeing. Such moments—when the atmosphere is stable and the image undistorted—may add up to only a few hours in an entire lifetime of observing."

Under these circumstances, Mr. Clarke observed that "it would be amazing if we had acquired any reliable knowledge about planetary conditions; it is safest to assume that we have not. We are still in the same position as the medieval cartographers with their large areas of 'Terra Incognita' and their 'Here Be Dragons,' except that we may have gone too far in the other direction—'Here Be No Dragons.' Our ignorance is so great that we have no right to make



We must prove space projects can pay their way, earn their keep, bring something to society, AFSC Commander, Gen. James Ferguson, told participants at space symposium.

SPACE DIGEST / AUGUST 1968



Space technology adds heavily to the nation's economy and strength, symposium keynoter, Dr. Edward C. Welsh, Space Council Executive Secretary, declared at the meeting.

either assumption" about conditions on other planets.

We have cleared away much ignorance by direct astronomical observation, Mr. Clarke noted, citing such space-age discoveries as the "good, honest dirt" that appears to make up the surface of the moon, contrary to the carefully developed but incorrect earlier theories of scientists who had firmly believed either that the moon was covered with a deep layer of dust or, if they belonged to the other school of thought, that it was made of hard volcanic lava. Without space probes, he asked, who would have postulated craters on Mars, radio emissions from Jupiter, or the high temperature under the clouds covering Venus?

"A tremendous amount of reconnaissance—the essential prelude to *manned* exploration—can be carried out from earth orbit," Mr. Clarke said. "It is probably no exaggeration to say that a good orbiting telescope could give us a view of Mars at least as clear as did Mariner-4. And it would be a view infinitely more valuable—a continuous coverage of the whole visible face, not a snapshot of a few percent."

Other worlds, other forms of life, trips beyond the solar system?

"Every world is itself a plurality," Mr. Clarke said. "To realize this, one has only to ask oneself: How long will it be before we have learned everything that there can be known about the planet earth? It will be quite a few centuries yet before terrestrial geology, oceanography and geophysics are closed, 'surprise-free,' subjects. Consider the multitude of environments that exists here on earth, from the summit of Everest to the depths of the Marianas Trench—from high noon in Death Valley to midnight at the South Pole. We may have equal variety on the other planets, with all that this implies for the existence of life. It is amazing how often this elementary fact is overlooked, and how often a single observation—based on a provisional theory—has been applied to a whole world."

This is a vital point. It is possible, for example, that earth may well be listed in astronomical books on planet X far, far away as an obviously uninhabitable orb, enveloped as earth is in an atmosphere dominated by oxygen, a toxic and fire-feeding gas.

"The whole history of astronomy," in Mr. Clarke's view, "teaches us to be cautious of any theory purporting to show that there is something special about the earth. In their various ways, the other planets may have orders of complexity as great as ours. Even the moon—which looked a promising candidate for geophysical simplicity less than a decade ago—has already begun to unleash an avalanche of surprises."

Yet, "for all practical purposes, we are still as geocentrically minded as if Copernicus had never been born; to all of us, the earth is the center, if not of the universe, at least of the solar system," Mr. Clarke declared.

But, now, he said, there are scientists who believe that Jupiter, the giant of the solar system, may be "the biological as well as the physical center of gravity of the solar system."

Once astronomers took it for granted that all the planets teemed with life, Mr. Clarke noted. Then the pendulum swung the other way, and by the 1930s you could read theories that ours might be the only solar system, and hence the only abode of life, in the

entire Milky Way. Now, said Mr. Clarke, "the pendulum has indeed swung, perhaps for the last time, because in another few decades we should know the truth. The discovery that Jupiter is quite warm and has precisely the type of atmosphere in which life is believed to have arisen on earth, may be the prelude to the most significant biological findings of this century."

"[As] Carl Sagan and Jack Leonard put it . . . in their book, *Planets*: 'Recent work on the origin of life and the environment of Jupiter suggests that it may be more favorable to life than any other planet, not excepting the earth.'"

We may well discover no trace of extraterrestrial life, living or dead, on or near that distant giant, but "even such a negative finding would give us a much sounder understanding of the conditions in which living creatures are likely to evolve—and this in turn would clarify our views on the distribution of life in the universe as a whole. However, it seems much more probable that long before we can certify the solar system as sterile, the communications engineer will have settled this ancient question—in the affirmative."

This is what the exploration of space is really all about, Mr. Clarke declared, "and this is why many people are afraid of it, though they may give other reasons, even to themselves."

"It may be just as well there are no contemporary higher civilizations in our immediate vicinity; the cultural shock of direct contact might be too great for us to survive it. But by the time we have cut our teeth on the solar system, we should be ready for such encounters. The challenge, in the Toynbeeian sense of the word, should then bring forth the appropriate response."

Beyond the solar system? Mr. Clarke put it this way: "Do not doubt for a moment that we will one day head out for the stars—if, of course, the stars do not reach us first. I think I have read most of the arguments proving that interstellar flight is impossible. . . . They are latter-day echoes of Professor Newcomb's paper on heavier-than-air flight; the logic and the mathematics are impeccable, the premises wholly invalid. The more sophisticated [arguments] are roughly equivalent to proving that dirigibles cannot break the sound barrier."—END



Intelligent planning, an end to the fragmentation of authority that has barred progress in the past, the use of applicable technology, and the imaginative employment of the kind of effective management techniques that helped build our missile arsenal could do much together to advance the task of . . .

Rebuilding Our Cities for People

BY GEN. B. A. SCHRIEVER, USAF (RET.)

TODAY our people are caught up in an urgent effort to adjust our political and social environment so that we can all work and live together more harmoniously. Nowhere is this effort more active or more crucial than in the great cities of America.

It is the dream of every one of us to own a piece of land and to have built on that land a home designed to our individual taste. And yet, in this industrial age, most of us must earn our living in city offices or in production and distribution centers. Therefore, we must live close to our cities and close to each other, often in multiple-family dwellings.

Proximity demands cooperation—even the giving up of some personal liberty in the interest of the group. But people are more protective by nature than they are cooperative. Therefore, proximity also produces irritation and ill will.

It is ironic, indeed, that we are a nation with an urban problem in large measures because we are an advanced industrial nation.

I believe everyone who has studied our urban problems agrees that we can no longer allow our cities to grow and develop on the principle of *laissez-faire*. In the interest of the general welfare and the convenience of the millions who must live and work in our metropolitan centers, we must have more long-range master planning.

The mention of master planning or central planning raises instinctive fears in this country. As we see it, central planning represents a threat to our freedom and to our right as individuals to express our likes and dislikes in the kinds of buildings we build and in the kinds of businesses we operate. Central planning also suggests a city without architectural variety. What we need is some form of master planning that includes a compromise, an accommodation, between the basic interests of the individual and the collective good of all citizens. Urban

planners need to study their Aristotle as well as their architecture.

I am confident that we can solve our basic urban problems and [create] both pleasant and efficient places in which to work and to live. The basis of my confidence is the progress recently made in science and technology. Today, technology can give us, for example, clean air and clean water, efficient transportation, and desirable housing at an acceptable cost.

Along with advances in science and technology, there have also been in recent years major improvements in management. Of equal importance, those urban prob-



"In the interest of the general welfare and the convenience of the millions who must live and work in our metropolitan centers, we must have more long-range master planning."

—General Schriever on cities



This picture of human tragedy happens to have been taken in San Francisco, but the City by the Bay is by no means alone in the array of urban centers plagued by such blight.

lems that by nature are more social than technical will become less severe, I'm sure, if the technical problems are solved. . . .

I have served for several months as an adviser to the Secretary of Housing and Urban Development, Robert Weaver. I have been asked to suggest ways in which American technology and American industry can be of most value in the nation's effort to improve our cities. Here are some of the ideas I have been discussing with the officials in the office of Housing and Urban Development.

What the Military Has to Offer

Many people with whom I have discussed urban affairs in recent months have asked me, frankly, how a retired military officer can be so sure that he has answers to our critical and complicated urban problems. Such skepticism is justified. The average military man does not have the kinds of experiences during his career that would qualify him to deal with the difficulties that face the great cities. Frankly, I had a unique military career. During my last ten years in the service, I was responsible for the management of a number of very large weapon-system programs, the most important of which were intercontinental ballistic missiles. In the course of those years, I began to realize that many of the problems we faced in the Air Force in the research, development, and production of our weapon systems were similar to the problems facing our cities. I also became convinced that the solutions we devised in the Air Force to our technical and management problems were applicable to the problems of our cities.

Let me illustrate. Military weapon systems, such as intercontinental ballistic missiles, or aircraft, or ships,

are large, costly, and complex. To manage a weapon-system program of that type, one must use a systems approach. That is to say, the manager must deal with all the major parts of the weapon system in a unified plan. Engines, ordnance, maintenance facilities, personnel training, and so forth must be studied [individually]. But each of these parts or subsystems must also be considered in its relationship to all the others.

A recent systems analysis of one American city revealed that it had 130 subsystems, including water, sewerage, transportation, education, law enforcement, housing, recreation, industry, and so on. If one is concerned with the rehabilitation of that city, he must consider how each of those subsystems interacts with the other subsystems.

There are many examples of cities which have tried a piecemeal approach to redevelopment, rather than a systems approach—that is, they have worked on one subsystem at a time. Some cities, for example, have built new transportation systems or new low-cost housing without considering the effects of those projects on the other subsystems that make up the total city-system. The results of these piecemeal efforts have often been the creation of more problems than have been solved.

Piecemeal slum-clearance projects have often turned out to be nothing more than slum-relocation projects. You will recall the case in Washington, D. C., several years ago, in which the people who lived in the slum area just south of the Capitol were forced out of their old dwellings. Of course, they could not afford the modern and attractive housing that replaced their old dwellings. The new housing was simply too good. So they had to move to other slum areas. The effect of their relocation was to overload the schools in their new neighborhoods, and to some degree the public transportation system as well. In general, the workers ended up further from their jobs than they were in the old slum area.

A systems analysis of Washington would have pointed out the need to go beyond that one slum-clearance project and to plan on a larger scale.

A systems approach to the rehabilitation of a city means planning not only on a broad scale, but over a long time period. It means multiyear programs in which all of the many individual projects and activities are scheduled. Not only must the projects and activities be scheduled over a number of years, but so must the funds. In some cases, the availability of funds will be the controlling factor in a total city-program schedule. In the armed forces, we are never sure from year to year exactly what funds the Congress will approve. But at the Department of Defense level, we try to work out funding plans for major weapon-systems programs on the basis of a five-year projection. In the case of a rehabilitation program for a city, the program may very well cover a ten- to fifteen-year span.

Getting officials to commit a city to a ten-year program with long-term financial obligations will be one of the most difficult problems we will face in redeveloping an urban center. Getting the people to be patient and to see the need for a ten- or fifteen-year effort will also be difficult. But the fact of life is that there is no such thing as "instant" city rehabilitation.

In dealing with our large weapon-systems programs,

I also learned that there must be more than just systems planning and systems programs. There must be a strong management authority as well to direct the long and complicated programs through to completion. In the early days of the ballistic missile programs, the Air Force tried to manage those programs with fragmented management organizations; that is to say, no one command had total responsibility. Several commands were involved, each of which had a part of the responsibility. With this fragmented management, things just did not get done properly and on time. So, we threw out the old ways of managing and created new ones.

Among other steps, we set up a single Air Force Systems Command to be responsible for all the activities that related to the development and production of Air Force weapon systems. Within that command, we created System Program Offices, one for each program, to manage and direct all efforts relative to that particular program, including research, development, planning, production, personnel training, installation, logistical support, and so forth. Final authority and responsibility rested in a System Program Director. These System Program Offices supervised the industrial firms that did the actual work.

Need for Unified Management

In the case of cities, there is a need for a unified management and planning authority. At present our cities do not have a single political authority able to commit the cities and adjacent areas to long-range programs of rehabilitation. To use my word of a moment ago, authority is *fragmented*.

Most of our urban problems focus on the so-called core city area. Here we find the older apartments and row houses in which the masses of low-income families now live. But, to solve the problems of our core city areas, we must look to the suburbs, because most of the large production and distribution companies are moving their plants and warehouses into the suburbs, and because so much of the life of the city overflows into the suburbs. Unfortunately, the people of higher incomes who live in the suburbs do not want to see low-income people move into the suburbs. They are actively resisting any immigration from the core area. However, common sense tells us that we must find ways to move certain numbers of people out of the core areas into the suburbs, so they can be close to places of employment. And, we must also redesign the downtown areas with emphasis on government buildings, office buildings, culture and amusement centers, and possibly colleges and universities.

To make such a change in the basic structure of our cities will require cooperation between the cities and the suburbs. And it will require a regional planning authority. It cannot be done with fragmented authority.

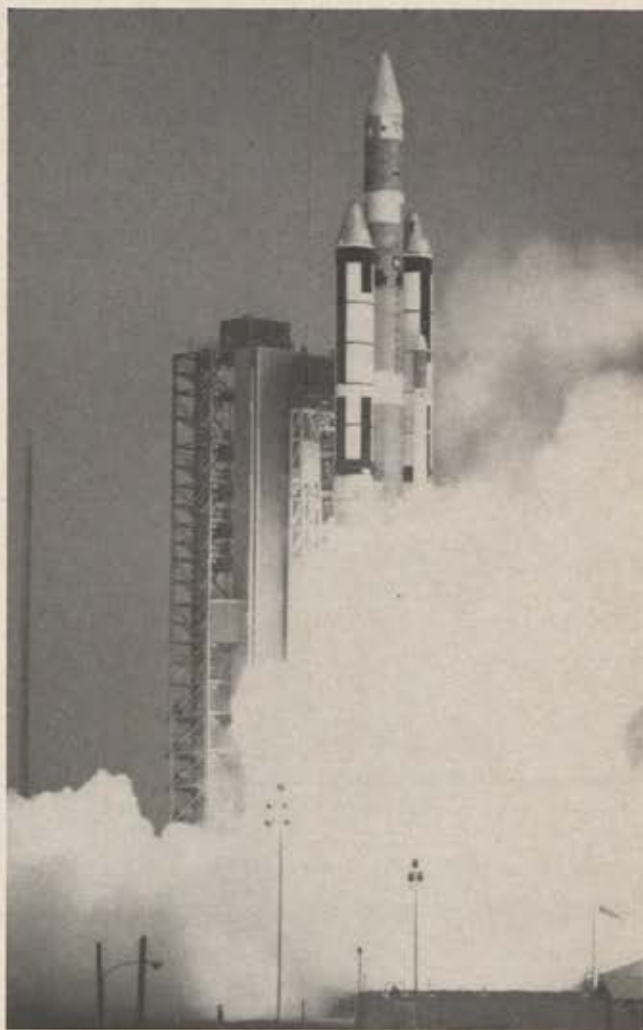
When someone mentions a regional planning authority, there is usually an immediate defensive reaction. It's that old fear of central planning. As I see it, a regional planning authority need not diminish the existing powers of either the city or suburban governments. It certainly would not require the formal incorporation of the suburbs into the cities. The planning authority would be a representative and cooperative body, created to

deal only with those activities everyone agreed upon as necessary and beneficial to the entire area.

Without such a regional planning authority, there would be no office or agency able, legally, to contract with the industrial firms which will, in the final word, have to do the physical work. Within that regional planning authority could be created the city or System Program Office to direct and oversee the work of the industrial contractors.

Another of the problems we faced when we began work on the ballistic missile system was an inability to get rapid decisions out of the Department of Defense. The difficulty was that there were many different offices in the Pentagon all concerned in some way with our ballistic missiles. In the early days, I would send a paper over for a decision, and it would go from office to office. All kinds of people would comment on it. But getting them to say "yes" was very nearly impossible. This was another case of fragmented authority.

The solution was a decision-making committee, composed of men from all the responsible offices. When a decision was needed, the committee was convened. Before the meeting was over, we had a decision—yes or no. The final details were worked out afterward.



Complex weapon and space hardware programs like Titan booster have required careful, forceful systems management. Similar approaches will be needed to save our cities.



A city is people and they should not live this way. This scene in Kansas City is unhappily illustrative of what has happened to many US cities, even in an era of affluence.

Today, at the federal level, there is also fragmentation of authority relative to urban problems. When major programs are created in the future to rehabilitate our cities, we will need a means for rapid and centralized decision-making. The arrangement may not be identical to the one worked out in the Department of Defense. But, I would think it would have to be similar to it in principle.

What Must Be Done?

In quick summary, urban problems in the United States have reached a critical point. In my opinion, several actions are necessary: first, a centralized decision-making arrangement at the federal level; second, a regional planning authority for each major city and its suburbs; third, a city-system management office to oversee the work of the industrial contractors; and fourth, a long-term program for the city's rehabilitation based upon a thorough systems analysis.

In addition to these points, there is one other factor I would like to touch on briefly, and that is the role of private industry in the rehabilitation of our cities. It is recognized throughout the country that private industry must play a major part in this activity. No one American company, not even a General Motors or an AT&T, is large enough and sufficiently diversified to do the entire job of planning a city rehabilitation program and executing all the tasks that would be involved.

One means of bringing together the wide range of industrial talents and capabilities that would be necessary to do a city rehabilitation job is a consortium of companies. At present I am attempting to create such a consortium, consisting of eight to ten leading companies, each with different but complementary capabilities. The concept is that each of the associate member companies would contribute a certain number of experienced men to staff a new and separate company. This new company would be independent of the member companies as far as policy is concerned. But it could call upon the member companies for people and facilities to carry out a city-rehabilitation job. It could and would

also contract with firms outside the associate members.

Several leading American companies have contributed to the solving of urban problems by local efforts in their neighborhood. Some have even done systems planning for certain cities. But the consortium is aimed at being able to do a city-system study and then to execute a program based on that study. We also expect to be able to organize the financing of the program. As we see it, most of the money will come from private sources, with some assistance from federal, state, and local sources.

Let me state frankly that the consortium would not be a not-for-profit organization, nor would it be a quasi-governmental organization. We would expect to make a reasonable profit—but no more than that. I see no reason for hiding our hope and intention of making a profit. But it is not propaganda to say we will take great pride and satisfaction in the service we will be able to render to our cities and to our country.

At present the consortium is in a study phase. We are trying to get a clearer understanding of how we should be organized and how we should go about the job. We feel we have learned a great deal about urban problems recently. We still have some learning to do. We hope to be able to announce our formal incorporation before the summer is over.

I expect in the future that many American firms will form consortiums or teams of companies, similar to the one I am organizing. I am also sure that individual companies will be able to make increasingly important individual contributions to the communities in which they are located.

The one thing that all American industries agree on is that we cannot just stand by and watch our cities deteriorate. We know that American industry has the knowledge and ability to be able to do the job of urban redevelopment. We believe that the responsibility for American urban renewal must not be left completely with the federal government. The only thing we still must learn is *the best way* for industry to make its contribution. We cannot wait. We must do some of that learning as we go along—even at the risk of some mistakes.

I am confident that if American industry can build rockets that can fly to the moon, we can also revitalize and renew our cities.

And I am confident that the need is so urgent that we will be able to find ways to develop the necessary spirit of cooperation between the people in the core city areas and the people in the suburbs; between the people in industry and the officials in the cities; and between the authorities in the federal, state, and local governments. What may be sacrificed by each person will be more than repaid by the pleasure and privilege of living and working in a vigorous, prosperous, and beautiful city.—END



General Schriever, former Commander of the Air Force Systems Command, is now active in the urban planning field and heads his own management consultant firm, B. A. Schriever Associates, in Rosslyn, Va. The above is excerpted from a presentation at a Conference on the Urban Challenge, cosponsored by The George Washington University, the Systems Development Corp., and the North American Rockwell Corp., and held June 19-21 at Airlie House, Warrenton, Va.



Strange place to put a protection channel?

Not at all.

Not since the Bell System finished its proposal for one of the most comprehensive communications jobs in history. Known as the Space/Earth Satellite System, it will combine satellite facilities with existing microwave and coaxial facilities to create one completely integrated system.

To the communications industry, this system will furnish enough voice circuits and TV channels to meet

long-haul growth requirements through 1980.

Message service via satellite will be economical when the distance between points is greater than 1300 miles. TV service via satellite will be economical at much shorter distances.

To the military, however, the system will provide another important benefit: satellite communication facilities will supply a still further

degree of diversity to the domestic network.

Depth of experience, highly trained people, and a capacity to provide continuity of service back up the world's largest communications network.

This proposal is one more example of how the Bell System constantly strives to make its services even more reliable.



AT&T
and Associated Companies

Partially as a consequence of intense specialization in higher education, and for other reasons rooted in the mass nature of our society and the emphasis on expertise rather than responsibility, the vital idea and necessity of leadership in a free society is being obscured and even resisted. Now is a good time to consider the question of . . .

The Power Structure:



IT IS generally believed that we need enlightened and responsible leaders—at every level and in every phase of our national life. Everyone says so. But the nature of leadership in our society is very imperfectly understood, and many of the public statements about it are utter nonsense.

The most fundamental thing to be said about leadership in the United States is also the most obvious. We have gone as far as any known society in creating a leadership system that is *not* based on caste or class, nor even on wealth. There is not yet completely equal access to leadership (witness the remaining barriers facing women and Negroes), but we have come a long, long way from the family-based or class-based leadership group. Even with its present defects, ours is a relatively open system.

The next important thing to be said is that leadership is dispersed among a great many groups in our society. The President, of course, has a unique, and uniquely important, leadership role, but beneath him fragmentation is the rule.

The Fragmented Power System

This idea of fragmentation is directly at odds with the notion that the society is run by a coherent power group—the Power Elite, as Columbia's late C. Wright Mills called it, or the Establishment, as later writers have named it. It is hard not to believe that such a group exists. Foreigners find it particularly difficult to believe in the reality of the fluid, scattered, shifting leadership in America that is visible to the naked eye. The real leadership, they imagine, must be behind the scenes. But at a national level this simply isn't so.

cast a decisive vote on question A may not even be listened to when question B comes up.

Curious Ideas About Power

People who have never exercised power have all kinds of curious ideas about it. The popular notion of top leadership is a fantasy of capricious power: The top man presses a button and something remarkable happens; he gives an order as the whim strikes him, and it is obeyed.

Actually, the capricious use of power is relatively rare except in some large dictatorships and some small family firms. Most leaders are hedged around by constraints—tradition, constitutional limitations, the realities of the external situation, rights and privileges of followers, and the requirements of teamwork. Most of all, they are contained by the inexorable demands of large-scale organization, which does not operate on capriciousness. In short, most power is wielded circumspectly.

There are many different ways of leading, many kinds of leaders. Consider, for example, the marked contrasts between the politician and the intellectual leader, the large-scale manager and the spiritual leader. One too often sees solemn descriptions of the qualities needed for leadership without any reference at all to the fact that the necessary attributes depend on the kind of leadership under discussion.

Even in a single field there may be different kinds of leadership with different required attributes. Think of the difference between the military hero and the military manager.

If social action is to occur, certain functions must be performed. The problems facing the group or organization must be clarified, and ideas necessary to their solution formulated. Objectives must be defined. There must be widespread awareness of those objectives, and the will to achieve them. Often those on whom action depends must develop new attitudes and habits. Social machinery must be set in motion. The consequences of social effort must be evaluated and criticized and new goals set.

A particular leader may contribute to this process at only one point. He may be gifted in analysis of the problem but limited in his capacity to communicate. He may be superb in communicating, but incapable of managing. He may, in short, be an outstanding leader without being good at every aspect of leadership.

If anything significant is to be accomplished, leaders must understand the social institutions and processes through which action is carried out. And in a society as complex as ours, that is no mean achievement. A good leader, whether corporation president, university dean, or labor official, knows his organization, understands what makes it move, comprehends its limitations.

Every social system or institution has a logic and dynamism of its own that cannot be ignored.

We have all seen men with lots of bright ideas but no patience with the machinery by which ideas are translated into action. As a rule, the machinery defeats them. It is a pity, because the professional and academic man can play a useful role in practical affairs. But too often he is a dilettante. He dips in here or there; he gives bits of advice on a dozen fronts; he never gets his

BY DR. JOHN W. GARDNER

Sense and Nonsense

In many local communities and even in some states there is a coherent power group, sometimes behind the scenes, sometimes out in the open. In communities where such an "establishment" (a coherent ruling group) exists, the leading citizen can be thought of as having power in a generalized sense: He can bring about a change in zoning ordinances, influence the location of a new factory, and determine whether the local museum will buy contemporary paintings.

But in the dispersed and fragmented power system that prevails in the nation as a whole one cannot say, "So-and-so is powerful," without further elaboration. Those who know how the American system works always want to know, "Powerful in what way? Powerful to accomplish what?"

The United States has leaders in business and leaders in government, military leaders and educational leaders, leaders in labor and in agriculture, leaders in science, in the world of art, and in many other special fields. As a rule, leaders in any one of these fields do not recognize the authority of leaders from a neighboring field. Often they don't even know one another, nor do they particularly want to. Mutual suspicion is just about as common as mutual respect—and a lot more common than mutual cooperation in manipulating society's levers.

Most of the significant issues in our society are settled by a balancing of forces. A lot of people and groups are involved, and the most powerful do not always win. Sometimes a coalition of the less powerful wins. Sometimes an individual of very limited power gets himself into the position of casting the deciding ballot.

Not only are there apt to be many groups involved in any critical issue, but their relative strength varies with each issue that comes up. A group that is powerful today may not be powerful next year. A group that can

hands dirty working with one piece of the social machinery until he knows it well. He will not take the time to understand the social institutions and processes by which change is accomplished. . . .

Problems of Fragmented Leadership

Nothing should be allowed to impair the effectiveness and independence of our specialized leadership groups. But such fragmented leadership does create certain problems.

One of them is that it isn't anybody's business to think about the big questions that cut across specialties—the largest questions facing our society. Where are we headed? Where do we want to head? What are the major trends determining our future? Should we do anything about them? Our fragmented leadership fails to deal effectively with these big questions.

Very few of our most prominent people take a really large view of the leadership assignment. Most of them are simply tending the machinery of that part of society to which they belong. The machinery may be a great corporation or a great government agency or a great law practice or a great university. These people may tend it very well indeed, but they are not pursuing a vision of what the total society needs. They have not developed a strategy as to how it can be achieved, and they are not moving to accomplish it.

One does not blame them, of course. They do not see themselves as leaders of the society at large, and they have plenty to do handling their own specialized role.

Yet it is doubtful that we can any longer afford such widespread inattention to the largest questions facing us. The United States achieved greatness in an era when changes came more slowly than now. The problems facing the society took shape at a stately pace. We could afford to be slow in recognizing them, slow in coping with them.

Today, problems of enormous import hit us swiftly. Great social changes emerge with frightening speed. We can no longer afford to respond in a leisurely fashion.

Also, our inability to cope with the largest questions tends to weaken the private sector.

Any question that cannot be dealt with by one of the special leadership groups—that is, any question that cuts across special fields—tends to end up being dealt with by government. Most Americans value the role played by nongovernmental leadership in this country and wish it to continue. In my judgment it will not continue under the present conditions.

The cure is not to work against the fragmentation of leadership, which is a vital element in our pluralism, but to create better channels of communication among significant leadership groups, especially in connection with the crucial issues that transcend any particular group.

The Failure of Confidence

Another of the maladies of leadership today is a failure of confidence.

Anyone who accomplishes anything of significance has more confidence than the facts would justify. It is

something that outstanding executives have in common with gifted military commanders, brilliant political leaders, and great artists. It is true of societies as well as of individuals. Every great civilization has been characterized by confidence in itself.

Lacking such confidence, too many leaders add ingenious new twists to the modern art which I call "How to reach a decision without really deciding."

Such new-style leaders require that the question be put through a series of clearances within the organization and let the clearance process settle it. Or take a public opinion poll and let the poll settle it. Or devise elaborate statistical systems, cost-accounting systems, information-processing systems, hoping that out of them will come unassailable support for one course of action rather than another. . . .

The confidence required of leaders poses a delicate problem for a free society. We don't want to be led by Men of Destiny who think they know all the answers. Neither do we wish to be led by Nervous Nellies. It is a matter of balance.

We are no longer in much danger, in this society, from Men of Destiny. But we are in danger of falling under the leadership of men who lack the confidence to lead. And, I believe, we are in danger of destroying the effectiveness of those who have natural leadership.

Of all our deficiencies with respect to leadership, one of the greatest is that we are not doing what we should to encourage potential leaders. In the late eighteenth century we produced out of a small population a truly extraordinary group of leaders—Washington, Adams, Jefferson, Franklin, Madison, Monroe, and others. Why is it so difficult today, out of a vastly greater population, to produce men of that caliber? It is a question that most reflective people ask themselves sooner or later. There is no reason to doubt that the human material is still there, but there is excellent reason to believe that we are failing to develop it—or that we are diverting it into nonleadership activities.

Administering Antileadership Vaccine

It is my belief that we are immunizing a high proportion of our most gifted young people against any tendencies to leadership. Let's examine how the antileadership vaccine is administered.

The process is initiated by the society itself. The conditions of life in a modern, complex society are not conducive to the emergence of leaders.

The young person today is acutely aware of the fact that he is an anonymous member of a mass society, an individual lost among millions of others. The processes by which leadership is exercised are not visible to him, and he is bound to believe that they are exceedingly intricate. Very little in his experience encourages him to think that he might some day exercise leadership.

But this unfocused discouragement is of little consequence compared with the expert dissuasion the young person will encounter if he is sufficiently bright to attend a college or university. In these institutions today, the best students are carefully schooled to avoid leadership responsibilities.

Most of our intellectually gifted young people go from college directly into graduate school or into one of the

older and more prestigious professional schools. There they are introduced to—or, more correctly, powerfully indoctrinated in—a set of attitudes appropriate to scholars, scientists, and professional men. This is all to the good. The students learn to identify themselves strongly with their calling and its ideals. They acquire a conception of what a good scholar, scientist, or professional man is like.

As things stand now, however, that conception leaves little room for leadership in the normal sense. Almost the only kind of leadership encouraged by our better colleges is that which follows from the performing of purely professional tasks in a superior manner. Entry into what many of us would regard as the leadership roles in the society at large is discouraged.

In the early stages of a career, there is a good reason for this: Becoming a first-class scholar, scientist, or professional requires single-minded dedication. Unfortunately, by the time the individual is sufficiently far along in his career to afford a broadening of interests, he often finds himself irrevocably set in a narrow mold.

The antileadership vaccine also has other more subtle and powerful ingredients.

The image of the corporation president, politician, or college president that is current among most intellectuals and professionals today has some decidedly unattractive features. It is said that such men compromise their convictions almost daily, if not hourly. It is said that they have tasted the corrupting experience of power. They must be status seekers, the argument goes, or they would not be where they are.

Needless to say, the student picks up such attitudes. It is not that professors propound these views and students learn them. Rather, they are in the air and students absorb them. The resulting unfavorable image contrasts dramatically with the image these young people are given of the professional who is almost by definition dedicated to his field, pure in his motives, and unencumbered by worldly ambition. . . .

As a result, the academic world appears to be approaching the point at which everyone will want to educate the technical expert who advises the leader, or the intellectual who stands off and criticizes the leader; but no one will want to educate the leader himself.

For a good many academic and other professional people, negative attitudes toward leadership go deeper than skepticism concerning the leader's integrity. Many have real doubts, not always explicitly formulated, about the necessity for leadership at all.

Two Kinds of Doubt

The doubts are of two kinds. First, many scientific and professional people are accustomed to the kinds of problems that can be solved by expert technical advice or action. It is easy for them to imagine that any social enterprise could be managed in the same way. They envision a world that does not need leaders, only experts.

The notion is based, of course, upon a false conception of the leader's function. The supplying of technically correct solutions is often the least of his responsibilities.

There is another kind of question that some academic or professional people raise concerning leadership: Is

the very notion of leadership somehow at odds with the ideals of a free society? Is it a throwback to earlier notions of social organization?

These are not foolish questions. Modern Americans have in fact outgrown or rejected several varieties of leadership that have loomed large in the history of mankind. We do not want autocratic leaders who treat us like inferior beings. We do not want leaders, no matter how wise or kind, who treat us like children.

But at the same time that we were rejecting those forms of leadership, we were evolving forms more suitable to our values. As a result, our best leaders today are not out of place in a free society—on the contrary, they strengthen our free society.

It is in the nature of social organization that we must have leaders at all levels of our national life, in and out of government—in business, labor, politics, education, science, the arts, and every other field. Since we must have them, it helps considerably if they are gifted in the performance of their appointed task. The sad truth is that a great many of our organizations are badly managed or badly led. And because of that, people within those organizations are frustrated when they need not be frustrated. They are not helped when they could be.

In the minds of some, leadership is associated with goals that are distasteful—power, profit, efficiency, and the like. But leadership, properly conceived, also serves the individual human goals that our society values so highly, and we shall not achieve those goals without it.

Moral Leadership

Leaders worthy of the name, whether they are university presidents or senators, corporation executives or newspaper editors, school superintendents or governors, contribute to the continuing definition and articulation of the most cherished values of our society. They offer, in short, moral leadership.

The thing that makes a number of individuals a society rather than just a population or a crowd is the presence of shared attitudes, habits, and values, a shared conception of the enterprise of which they are all a part—shared views of why it is worthwhile for the enterprise to continue and to flourish. Leaders can help in bringing that about. In fact, it is required that they do so. When leaders lose their credibility or their moral authority, then the society begins to disintegrate.

Leaders thus have a significant role in creating the state of mind that is the society. They can express the values that hold the society together.

Most important, they can conceive and articulate goals that lift people out of their petty preoccupations, carry them above the conflicts that tear a society apart, and unite them in the pursuit of objectives worthy of their best efforts.—END



Dr. Gardner, former Secretary of Health, Education, and Welfare, now heads the Urban Coalition, a nationwide organization dedicated to enlisting private enterprise in the battle to overcome the urban crisis. He is a former president of the Carnegie Corporation. The above article is reprinted from the Winter 1967-68 issue of Columbia College Today with permission of that publication and of the author.

Through Air Force Institute of Technology's carefully planned program of assigning top-quality USAF officers to working tours with defense industry, Air Force people are getting invaluable insights into research and development, procurement, finance, and a host of other aspects of the continuing Air Force-industry partnership . . .

AFIT's Education With Industry Program —A Real-World Curriculum

BY MAJ. NICK P. APPLE, USAF

AIR FORCE and industry have quietly combined resources in recent years to educate a select group of officers in aerospace management and technology through a little-known Education with Industry (EWI) program operated by the Air Force Institute of Technology for Air University and the Air Force. Each year, since EWI was vitalized in 1957, some 150 officers have been stationed with thirty to fifty industrial firms across the nation to learn their operations from the inside.

The primary benefits for the Air Force include better qualified officer-managers and smoother working relations with industry. The individual officer benefits, too. His ten-month tour with industry is directed toward education and career development rather than mere preparation for his next duty assignment. During their tours, which normally last from September through June, EWI officers are rotated through the various departments of their companies, with some actually working on management programs in each department. Their programs are designed to prepare them to meet Air Force requirements in industrial programs and operations, with primary emphasis on engineering, production, and procurement of military weapon systems and components.

As EWI graduates, the "blue-suiters" are assigned to responsible engineering, production, and procurement positions—principally in Air Force Systems Command and Air Force Logistics Command. Those who are assigned as plant representatives are not sent to the firms where they have studied lest they unintentionally take advantage of privileged information they might have acquired as students.

Maj. Alton J. (Jack) Hendrick, who studied at the Convair Division of General Dynamics in San Diego, is one recent EWI graduate. In 1955 he received a bache-

lor of science degree in industrial technology from Texas A&M. Last year he received his master's degree in industrial management from the University of North Dakota, while serving as a Minuteman combat crew commander at Minot AFB, N. D. At Convair, Major Hendrick studied planning and procurement as practiced by industry in fulfilling Air Force contracts. Particular areas of interest in his course were the management of raw materials and finished products, production and assembly, recording and accounting, industrial and public relations, service and maintenance, and reliability control.

Major Hendrick's curriculum at Convair was divided into three phases. The first, during September, consisted of a general orientation on company organization and operations. During the second phase, October through January, he participated in seminars dealing with data processing, value engineering, and Convair administrative and staff functions. His other activities included participation in an upgrading program for supervisors, and industrial field trips in the San Diego area. The final phase included on-the-job working assignments and field trips, including a visit to the corporate offices in New York.

Capt. Robert I. Pianalto, with Lockheed Missiles and Space Co. in Sunnyvale, Calif., is another recent EWI graduate. He has nine years of service, with experience as a combat crew radar navigator in B-47 and B-52 aircraft. He holds a bachelor of arts degree in marketing from San José State College, Calif. This background provides an interesting base upon which to apply the knowledge and training received through the industrial planning and procurement option.

In order to provide basic tools for proper understanding, Captain Pianalto was first exposed to an intensive six-week overview of the major divisions and

operations of the corporation. With this working base established, he was assigned on a rotational basis to various organizations throughout the Sunnyvale company. In a good part of the work in the Space Systems Division, Captain Pianalto and five other EWI students were paired off on productive assignments. Captain Pianalto and his partner researched and developed a ten-page audit checklist that covered every step in the preparation of a proposal. The job ordinarily would have been handled by line managers' staffs.

Another team at Sunnyvale was called upon to define a military mission and establish a rough order of costs for a reusable space vehicle in the 1975-85 time frame. A third pair was required to assist in formulating and negotiating a missile contract change. The ultimate EWI result was to provide an intimate insight into management problems and activities of a typical aerospace company.

"In the over-all group, we had very little practical business background, and no business experience," Captain Pianalto has commented. "The program was set up very adequately to give each individual a sense of industry management problems and procedures—everything that goes on in dealing with the customer."

Industry's viewpoint is described by R. L. Knotts, EWI representative at Lockheed Missiles and Space

Co.: "We try to give them an insight into all phases of the management development and manufacturing processes. We try to show them how decisions are made, and how you get visibility of program status on cost, schedule, and performance—in general, how you find out where the problems are. The officers need to see the full spectrum. How you negotiate the contract, how the financing is done, where the design work starts, where the procurement function fits in, and something of production planning and control and product assurance."

The industrial planning and procurement course conducted by Convair, Lockheed, and other firms is one of thirteen EWI options offered this year by the Air Force Institute of Technology. The others are advanced photo technology, armament development, astronautics and space vehicles, automated data communications, civil engineering design, engineering construction, civil engineering industrial maintenance, commercial communications, management engineering, management of research, missile range technology, and industrial medical planning and procurement.

Regardless of their field of interest, EWI students generally study at one location with a number of field trips in the immediate area. One officer in the latest class went to South America and to the Orient. Capt. Richard V. Bratton worked out of Los Angeles with the international operations division of Daniel, Mann, Johnson and Mendenhall, one of the largest architectural-engineering firms in the world. His EWI assignment took him to DMJM field offices in Bolivia, Japan, Korea, Okinawa, and Hawaii as he continued his civil engineering design studies. In Bolivia Captain Bratton worked on a study of the Bolivian national transportation systems—including airfields, railroads, highways, and waterways. In the Orient he participated in the design and construction of Air Force facilities.

Captain Bratton studied architectural design and en-



EWI students look over a transistor display at an EWI symposium. Left to right, Lt. Col. David Yedlicka and Maj. Gary Hayman, assigned to North American Rockwell, and Capt. Barry Thompson, assigned to United Airlines.

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The long sheet of paper is used in Boeing's business gaming part of management course. Left to right, Boeing President T. A. Wilson, Maj. Bernard Gregory, Capt. Paul Hasz, Capt. Gordon Sparks, EWI Coordinator Walter H. Kee.



Cpts. Kenneth Kaplan and Ernest Harrison visit Lockheed-Georgia's data center during EWI tour. Lockheed's H. M. White and Mrs. M. V. Atkinson brief the blue-suiters.

gineering at Rensselaer Polytechnic Institute, N. Y., and was graduated in 1959 with a bachelor of architecture degree. Prior to his EWI tour, he was with the civil engineering squadron at March AFB, Calif., and in 1965 was chief of the advance party for the first deployment of "Prime BEEF" to Vietnam. The advance party conducted surveys and prepared site development plans for the construction of steel revetments throughout Southeast Asia.

DMJM is one of the few architectural-engineering firms to operate overseas on a large scale, providing unusual learning situations for EWI students. Many of the management techniques used in the Los Angeles office are applicable to the operation of an Air Force civil engineering office at an overseas major command headquarters.

Maj. Bernard L. Gregory last September was assigned to the astronautics and space vehicles operation at the Boeing Co. in Seattle. Major Gregory has an AB in zoology from Miami University in Ohio in 1953 and a BS in mechanical engineering from Texas A&M in 1964. The Air Force ROTC graduate had served as a SAC navigator for seven years and, more recently, for three years as a systems-engineering program manager with the San Antonio Air Materiel Area. Major Gregory has this to say about Education with Industry:

"The EWI program does not award a degree of any kind. But the Air Force considers it a graduate-level program and has recognized the value of this type of program. You get out of the program what you put into it; I know that this sounds familiar, but it happens to be confirmed in this case. One is exposed to working managers in current dynamic programs in functional specialties and disciplines such as planning, finance, personnel, industrial relations, engineering, applied research, bio-research, pure research, mission simulation, training, production, manufacturing, contracting, customer relations, and new product development—to mention but a few. We have also been given formal classroom courses in computer programming, systems and configuration management, value engineering, and senior management development."

Major Gregory cites the value of exposure to a large

number of industrial managers. He also stressed the importance of learning various ways to manage and communicate with people. He considers that the most important aspect of the EWI program.

Lt. Col. Frank J. Dever, Jr., who completed the industrial planning and procurement program four years ago at Lockheed in Sunnyvale, is now chief of the Defense Supply Agency Office at Curtiss-Wright Corp., N. J. Colonel Dever says the in-plant EWI exposure installs "a random-access memory drum in your head. There's sort of a subtle nature to the experience. This information on plant techniques in management, manufacturing, inspection, etc., is fed into your head, and it's there, on file, in any area you want to look. I draw on it a couple of hundred times a day, and I find that I have an understanding of proposals and of questions raised by the contractor that otherwise I would not have, and often would take considerable study and research to get."

Col. Allen B. Chealander, currently Air Force plant representative (AFPR) at the McDonnell Douglas Co. in Huntington Beach, Calif., believes his EWI experience with the Boeing Co. in 1959-1960 has been even more important to him than his advanced degree. He has subsequently served in California as deputy and as the Air Force plant representative at North American Rockwell's Rocketdyne Division in Canoga Park, was the Air Force plant representative for the Lockheed-California Co. in Burbank, and was chief of quality control for the Western Contract Management Division in San Bernardino. He returned last October from one year in Vietnam as procurement officer for seven bases.

Maj. Gen. Jack N. Donohew, Vice Commander of Air University and Commandant of its Air War College, summarized benefits of the Education with Industry program in comments to a group of EWI students and coordinators:

"The Education with Industry program uniquely prepares our officers for the industry-Air Force part of our Air Force economics and technological environment. In no other manner can our officers gain a better understanding of how industry manages its business, learn the capabilities of industry, and develop an appreciation



Lockheed-Georgia Vice President H. Lee Poore talks about EWI goals with Cpts. John Strange, Jr., John Neaton, Ernest Harrison, Jr., Kenneth Kaplan, and Calvin Popp.

for the close relationship between defense contractors and the Air Force than through an education with industry program. This understanding will equip each EWI graduate with the ability to perform in his next Air Force assignment at a level of competence far in excess of that which could be attained any other way."

Addressing the industry representatives, General Donohew assured them that "the long-range benefits to our nation which will accrue from this program will be considerable. Officers who have completed past programs, those currently enrolled, and future participants will certainly occupy key jobs in tomorrow's Air Force. Their understanding, derived from their EWI programs, will help the Air Force to make sound decisions on research and development and procurement questions. These sound decisions will benefit industry as well as the Air Force in the conduct of our mutual business of national defense."

General Donohew's sentiments are echoed by H. G. Blocker, supervisor of customer training for the Norair Division of the Northrop Corp.

"Industry has known many instances of increased understanding in the Air Force-industry conduct of business through the prior EWI experience of Air Force officers. I have been involved with the EWI program since 1961 and realize a feeling of genuine accomplishment in management development from it. We at Norair consider EWI to be a vital program."

Industry also benefits from projects conducted by the EWI student, Capt. Carroll C. Bobb, an EWI student with the Douglas Aircraft Co. in Santa Monica, Calif., developed a specification and outline stating the requirements and objectives of a program work breakdown structure for the Delta space payload launch system. In developing this project, he was able to draw on his four and one-half years of management experiences with the Minuteman Guidance and Control Project Office. He had served as an original member of the team that developed and implemented the first integrated and continuing financial estimating and reporting system for Minuteman CFRE (Contractor's Financial Reporting Estimates). Captain Bobb is a 1962 graduate of Clemson University, S. C., in industrial management.



EWI student at Douglas, Capt. Carroll Bobb, traces Saturn booster needs. At session are R. L. Keirse of Douglas, Capt. William Cudmore, Douglas' N. J. Estes, J. E. Kirner.

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Capt. William Smith views a model of OV-10A at the EWI symposium. Capt. Smith's EWI assignment was with Allison Division, General Motors, in the field of industrial planning.

Another Douglas student, Capt. William T. Cudmore, was able to clarify for company officials several technical and management areas pertaining to the Athena missile program. Prior to his EWI assignment and during the design-development phase of the Athena program, he was project officer for the development and production of the third-stage solid-rocket motor. After the system became operational, Captain Cudmore was responsible for payload integration and flight-test planning for all reentry experiments. (The Athena Program Office is responsible for testing small reentry vehicles and penetration aids, by launching the Athena missile from Green River, Utah, and recording the flight data on radar and optical equipment located at White Sands Missile Range, N. M.) Captain Cudmore was graduated from West Point in 1957 and from the AFIT School of Engineering in 1965.

The contributions of Captains Bobb and Cudmore at Douglas point up one of the unique aspects of the EWI program. In addition to the basic objective of giving Air Force officers insights into the operations of a large aerospace company, the program allows industry to benefit from the student's knowledge of Air Force management systems and programs.

Col. Thomas G. Flynn, Director of Aeronautical Systems for Air Force Systems Command, adds a financial viewpoint to benefits accruing to both industry and the Air Force. EWI has helped him "to assist the contractor in most effectively fulfilling the terms of his contractual obligation to the Air Force." In his AFSC role, Colonel Flynn, a 1958 EWI graduate, has staff responsibility for development and acquisition activities for practically all current aeronautical programs.

The Education with Industry program goes back to 1948 when it was established with forty-seven officers at seventeen industrial locations. It was originated to indoctrinate senior Air Force officers (lieutenant colonels and colonels) with a good working knowledge of high-level management techniques used by major defense industries. No formal course work was followed. The intent was to allow Air Force officers to spend time with senior line and staff executives in all phases of operation. Over the years there has been little change

in this broad concept, although less senior officers are now selected for EWI.

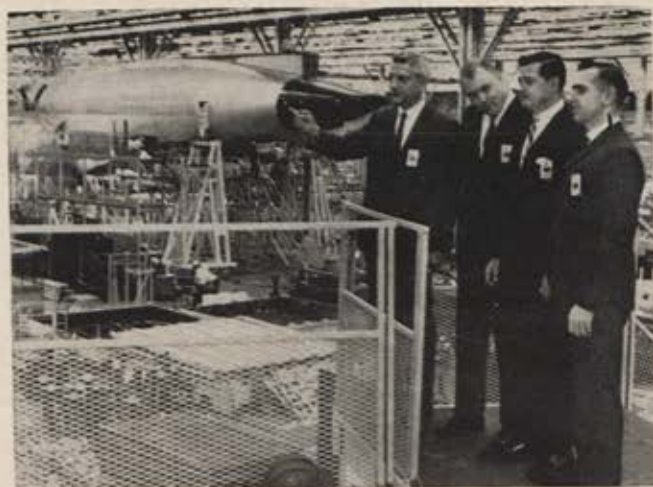
Understandably, current weapon-systems developments require extremely close working relationships between the armed forces and industry. Advances in science and technology have been made with such rapidity that it is not at all unusual to discover that an entire weapon system complex can fade into obsolescence before it leaves the drawing board. These rapid advances and the need for close military-industry relationships are the factors which most significantly contributed to the reestablishment in 1957 of the then relatively dormant Training with Industry program. The emphasis on the academic features of the program dictated a change in the philosophy from Training to Education. The term Education with Industry—officially adopted in the past academic year—more appropriately describes the major portion of the program as it is pursued throughout the nation's industries.

Each company's EWI curriculum is unique, as each company is unique. In this manner, the individual company coordinators have been able to establish company-oriented programs unencumbered by Air Force-dictated course content. In its thin brochure to EWI representatives, the Air Force Institute of Technology spells out this general objective: "To develop management qualities and technical leadership abilities in select officers and to provide them with industrial comprehension, and knowledge of methods used in research, development, manufacture, and procurement of Air Force hardware." Coordinators do this most frequently by guiding their students through a broad spectrum of dynamic industrial experiences that provide the student with a special knowledge which would normally require many years of job-related employment to obtain.

Air University wants the EWI course to approximate a company management development program. When the defense industry provides this development opportunity, and at no charge, then the Air Force must ensure that the officers selected are of the highest quality. Understandably, they must also have a career potential which points to eventual utilization of the knowledge



Maj. Robert Oyama and Capt. Oran Mise look over a model at an EWI meeting. Both officers were assigned to study planning and procurement at North American Rockwell.



C-5A production at Lockheed-Georgia was an important inspection point for Captains Strange, Popp, and Neaton, who toured the line with EWI coordinator Donald Johnson.

gained. Selection is made through an extensive screening process (after the officer has applied in accordance with Air Force Regulation 53-11). The successful applicant must be among the top level in officer effectiveness. He must meet the criteria for educational and military attainment. And his record must bear the careful scrutiny of special boards established by the Air Force. Finally, the company reviews the applicant's credentials and decides upon acceptance or rejection.

Air Force treats EWI students as real assets. The knowledge and experience gained in the EWI program today by our middle management officers promise to pay handsome dividends in the Air Force of tomorrow. Education with Industry provides the Air Force with a vast source of management and engineering educational experience not obtainable any other way.

The EWI program is perhaps best summarized by the man who was responsible for its ultimate direction and control during the past three years—Lt. Gen. John W. Carpenter, III, former Air University Commander who is now the USAF Deputy Chief of Staff for Personnel.

"Education with Industry is an opportunity for selected Air Force officers to observe, firsthand, ongoing management practices of industry at all levels. The Air Force benefits from the EWI program by assigning graduates to key jobs where new approaches to management, learned from industry, are employed by the graduate. And a thorough understanding of industry becomes a basis for future Air Force-industry relationships."—END



Major Apple has had a long affiliation with Air University. He received his commission through the AFROTC program at the University of Southern California and served two years as an assistant professor of aerospace studies with the AFROTC unit at Brown University. This fall he returns to USC as an AFIT student in the Graduate School of Journalism. His other assignments have included editorship of the Interceptor Weapons Newsletter at Tyndall AFB, Fla., and information officer and armed forces radio station manager at Tainan AS, Taiwan.

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- (1) conversion of punch cards to magnetic tape, (2) conversion of punched paper tape to magnetic tape, (3) off-line high-speed print-out, (4) typewriter print-out, (5) linkage with an adding machine to provide total detail listing as data is encoded, and (6) use of a controller to combine data from two machines onto one tape.

To add to the NCR 735's versatility and usefulness, any unit can be equipped with a telephone subset so that data can be transmitted from one 735 to another over voice-grade wires.

For complete information on the NCR 735 family, contact your NCR man or write NCR, Dayton, Ohio 45409.



NCR



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TRW INC. (Formerly Thompson Ramo Wooldridge Inc.) is more than 70,000 people at over 250 locations around the world who are applying advanced technology to electronics, space, defense, automotive, aircraft and selected commercial and industrial markets.

The Air Force's year-long low-altitude clear air turbulence (LO-LOCAT) project has now been completed with 300 missions flown at altitudes under 1,000 feet by men in C-131s who went out of their way to find trouble. They spent their time on the deck, grubbing around at a couple hundred miles an hour looking for rough-and-tumble air. They found it, too—and learned some things that may help all pilots . . .

It's Sock-It-to-Me Time —Western Style

By Ed Mack Miller

SIX years ago this summer, I was captain on a Boeing 707 crossing the Atlantic. It was a westbound trip, and we couldn't see a cloud—but just coming up on Labrador, flat-out through a spanking clean sky, we suddenly hit a Niagara of turbulence.

I pulled the power off, tried to slow down with speed brake—but we took a pasting for what seemed like an hour—actually only a minute or so—in which we rattled around the cockpit like dice in a box. In back the passengers, hostesses, and stewards had their problems, too. No one got hurt, but drinks, food, and silver service were all over the cabin.

More recently, I took off from Stapleton Field in Denver in a 727. As soon as we were off the deck, we hit a different type of clear air turbulence (CAT), a high-frequency chop that felt for all the world as though we were driving at some mad speed down a corduroy road.

This was as severe as any of us in the cockpit had ever felt, and it stayed with us all the way up to 15,000 feet when we popped out into still air. But in the meantime we had broken a rudder hinge. It took what seemed an interminable time to get my left hand to the pendant mike button, and when I did punch it to ask for a vector out of the wild air, my voice box was bouncing so I could hardly get the message out.

A bad CAT-strike only happens to the average air-

line crew once a year or less . . . but it does get one's attention.

Turbulence in clouds can be worse, and it used to be in the preradar days. But the scope solved the turbulence-in-weather problem pretty nicely. Now with your little X-ray machine, you peek into the cloud's guts. If it contours, look out, man. If you got 6s or 9s, that's tornado trouble, fella. . . . Here come de judge!

CAT has always been a problem, but has become an especially aching one with the advent of high-speed aircraft.

The answer? No one knows.

But there are lots of people trying to dig out the solution. A few years ago the interested parties in aviation got together on a massive program, called "ALL-CAT" to run exhaustive tests in three arbitrarily selected layers of the atmosphere (high, using F-106s and U-2s; medium, using B-52s; and low, using C-131B Convairs).

In an early test, a B-52, out looking for turbulence trouble, lost almost all of its vertical tail assembly just east of the Rockies and then staggered a third of the way across the country to find a suitable landing field while its heroic pilots fought to keep control of the "beast."

Recently, the Air Force completed Phase II of its LO-LOCAT project in Colorado—LO-LOCAT standing
(Continued on following page)



On a low-level test mission to obtain dynamic structural load data, this B-52H bomber lost a major part of its vertical stabilizer, but its four-man Boeing experimental test crew was able to land it safely at Blytheville AFB, Ark.



Specially instrumented B-52 with a fourteen-foot nose probe logged data on gusts faced in low-level flights.

for Low Altitude Clear Air Turbulence with an extra "LO" in it because this part of the testing was done under 1,000 feet. Three other areas in the US were also involved in LO-LOCAT under the joint direction of the Air Force Flight Dynamics Laboratory and Aeronautical Systems Division at Wright-Patterson AFB, Ohio. Testing was done in California, out of Edwards AFB; in Kansas, from McConnell AFB; and in New York, staging from Griffiss AFB.

The Colorado phase, important because of the severe turbulence often reported by pilots in the vicinity of the Rockies, was run out of Peterson Field at Colorado Springs, with operations conducted by personnel from the cargo branch of the aircraft and missile test directorate of the Air Force Missile Development Center at

Holloman AFB, N. M., part of AF Systems Command.

Pikes Peak routes, according to Lt. Col. Roy L. Maddox, chief of the cargo branch, were plotted to cover all types of terrain and yet to avoid heavily populated areas.

Maj. Ward A. Meyer, project officer, veteran of nearly eighteen years in the Air Force, flew most of the missions. His Convair, easily distinguished by a large cat (the "CAT cat") painted on the tail and a ten-foot-long "whisker" probe jutting from its nose, was flown three times daily (at sunrise, in midmorning, and in midafternoon) on terrain-hugging missions, skimming flatlands, canyons, and mountains.

The boom-probe contained seven sensors on its tip to measure pitch and yaw and angles of attack with

Before taking off on LO-LOCAT mission in a C-131B, Maj. Ward Meyer and Lt. Col. Ward Maddox, center, are being briefed on turbulence forecast by 1st Lt. Harley Jobe, Holloman AFB, N.M., meteorologist. The pilots flew numerous test missions in the Pikes Peak area of Colorado to check effects of severe turbulence often encountered on the eastern slopes of the Rockies.





Convair C-131Bs, like this one at Holloman AFB, N. M., were employed by USAF pilots in searching out LO-LOCAT conditions. G-forces were recorded on visicorders, tape recorders, and digital computers installed in the cabin.

reference to a horizontal plane. Any G forces caused by turbulence were recorded on visicorders, tape recorders, and digital computers installed in the cabin. In addition to the pilot, copilot, and flight engineer, one or more of the project personnel rode in back to monitor the recording instruments. Some twenty-one pilots from Holloman were involved in the project. Ground support was supplied from the Air Force Missile Development Center, with specialist maintenance support from Peterson Field personnel.

"Pilots followed a preplanned route consisting of eight twenty-five-mile legs," according to Major Meyer. "About 2,400 legs were flown in the year of tests."

It will take a long time to correlate and evaluate, compare and weigh, all the informational factors gleaned in the low, medium, and high-altitude tests conducted over four years by the Air Force and other civilian and governmental agencies.

"Are there any clues as to the answer?" we asked Major Meyer.

"It might be a visual scope the pilot can have in the cockpit that will evaluate an air mass that has no visible moisture the way present radar equipment does clouds," Major Meyer says. "Or it might be a piece of electronic gear that would sample air in the flight path for certain values—and ring a bell or light a light by way of warning so the pilot could slow down or take evasive action."



Rough terrain in Oklahoma was the site of earlier tests conducted by Boeing personnel aboard B-52s. Computers are now assimilating data acquired over a four-year period.

"Our tests," he noted, "have shown one thing for sure—that the worst thing a pilot can do is fight the turbulence by reacting with quick, stern corrections every time a wing drops or an updraft sends him soaring. The best pilot technique is to let the plane alone, to ride with the turbulence—'fly it loose.'"

LO-LOCAT patterns were flown part of the time at only 250 feet above the ground (alternately at 750 feet). "It got interesting at times," Meyer says, smiling. "Sometimes we got into downdrafts close to the ground that we could hardly claw our way out of. We're not too sure that the old 'cushion' next to the earth that pilots have always talked about is really there. On one occasion we were skimming along, pretty relaxed, when we heard a tremendous whistling. Then it hit. The nose of the plane swung almost ninety degrees. . . . We were going sideways at better than 200 knots. The instruments showed we sustained a lateral G-load that turned out to be far greater than the Convair people or anyone else had ever anticipated. The plane hung together fine, and we got back into Peterson in good shape. We did feel, however, that the T-39 Sabreliner would have been a better plane for the tests."

One clue that could have great significance became apparent to the pilots involved in the tests. That was the fact that humidity seemed to be linked to turbulence.

"Perhaps this won't prove to be a factor in medium and high-altitude flight," Major Meyer says. "But, in our testing, even if the winds were very strong—and the humidity was low—the chop wasn't severe. But if the humidity was up there . . . forty to sixty percent . . . we learned that we were going to have a fun ride."

"We're looking forward to what eventually comes out of the computers in the way of answers after all the testing," he concluded.

And so are all the other pilots—and passengers—who would rather enjoy "sock-it-to-me time" in front of a TV set on the ground . . . instead of in flight.—END

The author, Ed Mack Miller, a regular contributor to this magazine, is a rare blend of aviation writer, Air Guardsman, and pilot for United Air Lines. He has written three books and more than 1,200 articles and stories. His most recent offerings for us have been April issue's "Interview with Snoopy" and, in May, "Falcon One . . . Up and Away."



By Irving Stone

WEST COAST EDITOR, AIR FORCE/SPACE DIGEST

The Nightingale, the USAF's new C-9A "flying hospital ward," named after the famed nurse, makes its debut. Twelve of the twin-jets, built by the McDonnell Douglas Corp., are scheduled for delivery.



C-9A to Enter Service

Next month the Air Force plans to begin operation of its modernized service for fast, domestic transport of military patients with its new aeromedical evacuation aircraft—the 520-mph twin-jet McDonnell Douglas C-9A.

The inventory of these flying hospitals, recently boosted from an initial order of eight to twelve, will be operated by the Military Airlift Command's 375th Aeromedical Airlift Wing, Scott AFB, Ill. It will replace the slower, piston-powered C-118 Liftmasters and C-131 Samaritans now in use for aeromedical transfer. In addition to the Scott AFB location, the 375th has squadrons at McGuire AFB, N. J.; Travis AFB, Calif.; and Kelly AFB, Tex.

Ahead of schedule, the C-9A was accepted in June from McDonnell Douglas' Douglas Aircraft Division, Long Beach, Calif., by Maj. Gen. Harry E. Goldsworthy, Commander of the Air Force Systems Command's Aeronautical Systems Division, Wright-Patterson AFB, Ohio. First of the flight-tested C-9As is scheduled for delivery to the 375th Aeromedical Wing this month for the preparatory phase of training crew members before going into operational service.

The aircraft, named the Nightingale, was christened with water from the Sea of Galilee at the acceptance ceremony by Mrs. Elsie Ott Mandot. As Army 2d Lt. Elsie S. Ott she participated in the first intercontinental movement of military patients by air twenty-five years ago, from Karachi, India, to Andrews AFB, Md., in a 6½-day transport run using a Douglas DC-3. For this air-evacuation role she received the Air Medal.

The C-9A basically is a standard DC-9-30 commercial transport, with its cabin area specifically designed for flexible accommodation of more than forty ambulatory patients, thirty to forty litter patients, or a combination of the two.

Superhard Silo Siting Starts

The tedious, conventional, ground-team geological survey is being bypassed initially as the Air Force Systems Command's Space and Missile Systems Organization (SAMSO) at Norton AFB, San Bernardino, Calif., steps up its hard-rock silo program for housing Minuteman III and advanced intercontinental ballistic missiles.

As an advanced-technology effort, potential sites for the hard-rock silos will be scouted at first with airborne equipment and sensors, in what promises to be a year-long survey covering perhaps ten to twelve areas in the continental

US for possible locations of complexes for superhard silos.

The aerial survey, probably including a color camera, radar, and infrared sensor, will likely be employed at first in relatively rugged terrain in one of the northwestern states. The aerial sensing will be coordinated with analysis of existing aerial photographs and geological maps. Whether aerial surveys with remote sensing will be applied to all potential sites has not been determined.

It's unlikely that the Air Force will build any operational-type silo before it thoroughly evaluates the characteristics it needs for blast-resistance and the capability for missile launch following detonation of high-power explosives above the surface to create the desired overpressure. In a hard-rock area already tentatively selected, the Air Force is scheduled to build a prototype silo in which it would deploy a Minuteman ICBM. This missile would be an off-loaded configuration with only enough propellant to fire it to a height of approximately 300 feet. Such a test, which could come sometime next year, would provide experimental data on silo dynamics and post-blast missile response.

Earth-Resources Satellite

The technique of sensing potential earth resources from orbital altitudes for worldwide coverage and the rapid return of data will be advanced in an upcoming effort by the National Aeronautics and Space Administration. NASA's Goddard Space Flight Center is readying requirements, which should be issued this fall for industry bids, for program definition and the preliminary design of a first-generation earth-resources satellite.

This is somewhat an advanced phase for the initiation of a program, but NASA has performed substantial in-house feasibility and conceptual analyses on the subject. These have been complemented by unfunded, independent analyses by industry members in preparation for just such an effort, which NASA's Goddard Center is scheduled to support. Companies that have performed these in-house studies include General Electric, Hughes Aircraft Co., Radio Corporation of America, and TRW Systems.

The NASA earth-resources program's hardware is expected to emerge as a 650- to 900-pound satellite, which would be targeted for launch probably in 1971. Equipment would include a Vidicon camera, a radar scatterometer for indicating surface roughness and snow depths, and a radiometer for sensing in the microwave region through clouds

and provide data on ground cover. Succeeding generations of resources satellites would be larger for greater experiment capacity and would be able to carry more sophisticated equipment.

The Air Force is expected to follow resources-satellite developments for possible military applications with keen interest.

Hurdles Ahead for SST

It was necessary to return the US supersonic design (SST) to the drawing boards earlier this year because it did not show sufficient performance to be a solid foundation for a successful production version.

"We were fortunate enough to make this decision before committing the expensive part of the program—that is, actual manufacturing and construction of the prototype airplanes," declared Air Force Maj. Gen. J. C. Maxwell, who heads the country's SST program for the Federal Aviation Administration, when he addressed the recent Annual Aviation and Space Conference of the American Society of Mechanical Engineers in Beverly Hills, Calif.

Weight is a critical factor with the SST. At the aircraft's design range of 4,000 miles, its payload fraction (ratio of payload to gross takeoff weight) is less than half that of today's subsonic aircraft. General Maxwell pointed out that this is the state of the art, but did not specify the overweight condition of the SST, which may run as high as 50,000 pounds.

Commenting on the technical challenge to the SST of the sonic boom and airport noise problems, General Maxwell said that in neither case do fully satisfactory solutions exist. If the sonic boom problem could be eliminated, the potential additional market for the SST would be more than double—the estimate is an additional market of about \$28 billion by 1990 if this problem can be solved, General Maxwell declared.

Meanwhile, reacting to the situation that the SST may require an additional year of design effort before the prototype SST can be started, the House Appropriations Com-

mittee has eliminated the \$223 million funding requested by President Johnson for Fiscal 1969 for the SST, and also has rescinded an additional \$30 million of previously appropriated funds.

Communications Satellites Orbiting

The last group of eight satellites in the Air Force's initial defense satellite communications system (IDSCS) program has been boosted into a near-synchronous, equatorial orbit by a Titan IIIC launch vehicle. The satellites are being used to transmit military communications between Southeast Asia and the US.

The follow-on effort, designated the Defense Satellite Communications Program, Phase 2, at USAF's Space and Missile Systems Organization, which has cognizance of the program, has been approved by the Defense Department and will result in competitive industry bidding for the contract task. These Phase 2 satellites will be designed to accommodate 1,500 to 2,000 communication channels (about 300 times that of the IDSCS units), and thus would require only a relatively small number—perhaps eight to twelve—of the equatorial satellites for global coverage. The Phase 2 system probably will include "station-keeping" devices to maintain the precise positions of the satellites in orbit, rather than having a random array. The Phase 2 satellites won't be launched before 1971.

Predicted characteristics of the near-circular orbital path for the last IDSCS group of eight satellites was an 18,200-nautical-mile apogee and 18,154-nautical-mile perigee. The attained orbit had an 18,203-nautical-mile apogee and 18,114-nautical-mile perigee.

The eight satellites, ejected from a dispenser on the Titan IIIC's transtage one at a time and at slightly different speeds for a random pattern, augmented seventeen operative satellites of eighteen previously orbited in the program, providing a total of twenty-five functioning units. The first group—seven—of IDSCS satellites was launched in June 1966.

Lunar Flyer Coming

Aerospace industry members anticipate that a competition will take place for the mission analysis, design, and full-scale mockup of a "lunar flyer" by National Aeronautics and Space Administration's Manned Spacecraft Center. This lunar-hopper would be stowed in the lunar module (the lander from the orbiting Apollo) and erected after the landing on the lunar surface. A throttleable engine would provide a range capability of, perhaps, up to fifty miles to facilitate exploration by an astronaut beyond the walking distance limits. Fuel for the vehicle would be the residual propellant from the lunar module's descent engine.

The lunar flyer isn't expected to be introduced before the fourth lunar landing. Primarily it would be a one-man vehicle with the ability to haul some scientific payload for application to the lunar surface. But provisions for carrying a second astronaut on the lunar flyer or inclusion of a second vehicle in the lunar module seem advisable for coping with a rescue situation on the lunar surface.

The lunar flyer's structure probably would be a tubular framework on which the astronaut would ride exposed, carrying a portable life-support system providing an approximately four-hour supply of oxygen and weighing about thirty-five pounds.

Control of the lunar flyer might be achieved with a gyro system for automatic stabilization, or conceivably the vehicle could be controlled by astronaut body action.

Two parallel contracts for the mission analysis, design, and mockup effort for the lunar flyer may be funded at about \$500,000 each.—END



The inverted perforated dish shown above is a one-tenth scale model prototype of the advanced design array radar (ADAR) being built for USAF's Rome Air Development Center. The high-resolution ADAR under construction at Rome is designed to be a sensor for satellite identification and as a ballistic missile defense system designation/discrimination sensor. The ADAR in Rome will have a dish eighty feet in diameter and will be fitted with 16,000 rods (two are shown in the picture of the model) that will channel radio-frequency energy. The Rome ADAR is being constructed for the Air Force by Hughes Aircraft Co., Fullerton, Calif.



By Jackson V. Rambeau

AFA DIRECTOR OF MILITARY RELATIONS

'Iron Mike' Massad—Top DoD Reserve Chief

Ernest L. Massad, an Oklahoma oilman and retired major general in the Army Reserve, has been appointed to the position of Deputy Assistant Secretary of Defense for Reserve Affairs, newly created by PL 90-168, the Reserve Bill of Rights.

General Massad is a 1932 graduate of the University of Oklahoma. He was an All-American in football, where he acquired his "Iron Mike" nickname.

Medical Council Actions

The Medical Council of the Air Force Association, at its recent meeting in Washington, noted that there had been a fifty percent increase in the retention of medical officers since the implementation of two laws passed in the last session; namely, a doctors' bonus and a speed-up in medi-

Ernest L. Massad is DoD's first Deputy Assistant Secretary for Reserve Affairs, a new post created by Public Law 90-168, the Reserve Bill of Rights. A former All-American from Oklahoma, he recently retired as a major general in the Army Reserve, having commanded the 95th (Training) Division.



cal officer promotion. Officials reported that eighty-five percent of those medical officers offered the new doctors' bonus had elected to accept it. To the man in uniform and his family, this is good news. It means that the service hospitals will be able to provide more and better care in the future.

The Council heard Dr. Louis M. Rousselot, Deputy Assistant Secretary of Defense (Health and Medical), outline a change in DoD thinking regarding a National Medical School which DoD had opposed for the past sixteen years. Plans are being considered to locate such a school in the Washington area in order to take advantage of the many fine medical facilities located there, such as the National Institutes of Health, Walter Reed Hospital, and the Armed Forces Institute of Pathology. The Council later adopted a resolution favoring an Armed Forces Medical Academy.

In other recommendations the Council urged the Department of Defense to speed up Reserve medical officer promotions on a "running mate" system tied to the active force and to reestablish the Office of the Deputy Assistant

Secretary of Defense for Health and Medical Affairs at the Assistant Secretary level.

On the latter, as we went to press, the House Armed Services Committee had attached this item to the Defense Authorization Bill and passed it 35-0. The joker in this action is that the rider does not increase the number of Assistant Secretaries in the Defense Department, but by statute sets up this new position. The effect of this, if passed by the Senate and signed by the President, is that DoD must reduce one of the current Assistant Secretaries to a Deputy Assistant Secretary in order to live under its over-all limitations. Two possible offices for reduction, both long-time targets of congressional criticism, are the Assistant Secretaries for Systems Analysis and Public Affairs.

Latest on the 'Plucking Board'

The special board, set up by the Air Force to "select out" of the inactive-duty Reserves some 4,500 lieutenant colonels and majors, recently completed its action at the Air Reserve Personnel Center. Some 1,300 majors and lieutenant colonels elected to volunteer to go on the retired roster, cutting down the board workload to approximately 3,200 selection outs. There is a considerable amount of official concern about having to take such action, but under the dictates of the Congress they had no other alternative. As an example of the type of concern being evidenced by the Air Force, we have obtained a copy of the opening statement to the "plucking board" by the Chief of the Office of Air Force Reserve, Maj. Gen. Tom E. Marchbanks, Jr. Excerpts from his remarks follow:

"I cannot think of any greater responsibility that can be given a person than to be asked to sit in judgment of his fellow men. This is the unenviable responsibility each of you now faces as you take on the job of reviewing the records of thousands of fellow military associates to determine which of them will be recommended for transfer from the active program to the retired list. . . . There is a sincere interest, and rightly so, over the assignment in which you are about to engage in carrying out one of the provisions of the new law. [Ed: PL 90-168, "Reserve Bill of Rights."] I have personally encountered this interest in the Congress of the United States, the Department of Defense, and Hq. USAF. I am certain you are aware of the interest, as well, on the part of the individual Reservists throughout the nation.

"Each record you see will represent an Air Force Reservist who has devoted at least twenty years of his life to the Air Force both on active duty and in a Reserve assignment. During those twenty-plus years each has contributed in some manner to the over-all value of the Air Force Reserve and has helped to maintain a Reserve resource available to the nation in times of military stress. . . .

"We presently have an overage in our ranks of majors and lieutenant colonels. It is now necessary for us to reduce our excess in these grades to conform to the legal limits established. Those not selected for retention, but whom you select for retirement, will represent a reduction in numbers, and in no way will reflect upon the individual's ability or dedication. . . .

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"Since the greatest resource we possess in the Air Force Reserve is people, and our treasure is vested in the talents of these Reservists, our concern must be to retain that resource. Fortunately, the Retired Reserve does not destroy a resource nor its availability in the event of national emergency. Should the need arise, the Congress of the United States can call upon a Retired Reserve to once again bring this variety of talents into the operating structure of the Air Force.

"I would like to express my personal appreciation and the appreciation of the Office of Air Force Reserve to those thousands of Air Force Reservists who, as individuals, have contributed much toward strengthening our Reserve structure. They have helped us produce a capability to respond to national defense needs immediately at those times when our military strength required boosting. I know that many of our individuals contributed to this at great personal sacrifice and without hesitation..."

Councils Named

President Bob Smart has appointed the following additional advisory councils for the current AFA year:

Air National Guard Council: Chairman, MAJ. GEN. BENJAMIN J. WEBSTER, Adjutant General of the State of Hawaii, Honolulu; 1ST LT. CECIL G. BRENDLE, Alabama ANG, Montgomery; CAPT. HARVEY T. CASBARIAN, JR., Maryland ANG, Baltimore; COL. SAMUEL L. FINKLEA, JR., South Carolina ANG, Columbia; COL. EUGENE G. GALLANT, Rhode Island ANG, Providence; MAJ. ROBERT R. HALL, Maine ANG, Dow AFB; and MAJ. GEN. DONALD J. STRAIT, New Jersey ANG, McGuire AFB.

Air Reserve Council: Chairman, MAJ. GEN. R. E. L. EATON, USAF (Ret.), Washington, D. C.; COL. WILLIAM

F. HARRISON, USAF (Ret.), Annandale, Va.; BRIG. GEN. JOHN W. HOFF, Carswell AFB, Tex.; BRIG. GEN. JOSEPH J. LINGLE, Milwaukee, Wis.; COL. ARTHUR T. OUSLEY, Huntsville, Ala.; CAPT. WILLIAM C. RAPP, Buffalo, N. Y.; and BRIG. GEN. EVELLE J. YOUNGER, Los Angeles, Calif.

Junior Officers Advisory Council: Chairman, MAJ. THOMAS F. SEEBODE, Langley AFB, Va.; CAPT. VERNON G. ASH, Reese AFB, Tex.; CAPT. GENE H. DAVIS, Dover AFB, Del.; CAPT. DAVID L. HOSLEY, Maxwell AFB, Ala.; CAPT. FREDERICK L. METCALF, USAF Academy, Colo.; CAPT. LARRY D. THOMPSON, Robins AFB, Ga.; and CAPT. ARTHUR W. VOGAN, Andrews AFB, Md.

Airmen Council Hears Good News

At its June meeting in Washington, AFA's Airmen Council heard Air Force officials outline for the first time the new weighted-criteria promotion system. Details of the plan will be made public shortly. The Council greeted the new plan with favorable comment and were further encouraged about promotion opportunities for FY '69 and '70. It is worth noting that airmen promotions have increased from 60,000 in FY 1967 to 215,000 in FY 1969. The time to make sergeant has dropped to an average of forty to forty-four months and staff sergeant from eight to five years. First-term retention has shown some small, but perceptible, gain with this new promotion opportunity.

Assistant Secretary of the Air Force (Manpower and Reserve Affairs) J. William Doolittle addressed the group during lunch and emphasized the Air Force's awareness of the ever-increasing workload being carried out by the airman force.

The Council, after deliberation, made a number of rec-

(Continued on following page)

MEMBERSHIP OF AFA'S JUNIOR OFFICER COUNCIL



Seebode

Ash

Davis

Hosley

Metcalfe

Thompson

Vogan



Dr. Louis M. Rousselot, Deputy Assistant Secretary of Defense (Health & Medical), second from right, addressed AFA Medical Council at recent meeting. With him are, from left, Dr. Maurice Marks, Council Chairman; Jack Rambeau, AFA Military Affairs Director; and Vernon McKenzie, Assistant to Dr. Rousselot for Legislative Affairs.

commendations which they felt would improve the status and stature of the airmen force. Among those it asked establishment of a Senior Noncommissioned Officers School at a professional level, somewhat comparable to the Squadron Officers School located at the Air University; the creation at each major command of the office of Senior Airman Adviser, or command Chief Master Sergeant; concluded that the service club concept in today's world is outmoded and urged that service clubs be set up as Airmen Open Messes and be allowed to serve beer; encouraged the Secretary of Defense to increase the quarters and subsistence allowances of single airmen forced to live off base; asked the Air Force to establish an NCO Academy at the Air University to serve those smaller commands that do not have the capability of operating an NCO Academy program; and urged the Air Force to make it possible for selected senior noncoms to be commissioned in appropriate grades between their tenth and twentieth years of service without a baccalaureate degree. The Council noted that the Air Force is the only service that does not have such a program.

Parting Shots

- Congratulations to Gen. John P. McConnell on extension of his tour as Chief of Staff to August 1, 1969.
- The first comprehensive anthropometric survey of the Air Force female population since 1952 is now taking place. Some 2,500 Air Force women will be measured in 135 different directions in order to come up with data for procurement of military clothing and to obtain information on work space required for jobs handled primarily by women.
- Maj. Gen. Rollin B. Moore, recently confirmed by the Senate, was slated to assume command of the new Headquarters Air Force Reserve, at Robins AFB, Ga., in August. Continental Air Command is to be phased out at that time. Plans, however, are to retain most of the CAC personnel in the new headquarters.
- A study now going on in the Pentagon may, after a lapse of many years, put the Air Force Reserve back into the fighter, and possibly reconnaissance, business.
- The Air Force has asked DoD for authority to train a limited number of pilots next year for direct input into the Air Force Reserve flying program. While the program is badly needed, the probability of DoD approval is very poor. See next item.



Participants at AFA's Airmen Council meeting in Washington in June included, from left, Robert W. Noland, National Executive Secretary, Fleet Reserve Assn.; Joseph D. Brosnan, Executive Director, AF Sergeants Assn.; CMSgt. Paul Airey, Chief Master Sergeant of the Air Force; and MSgt. Richard J. Norman, AFRes, Airmen Council chief.

- President Johnson, in order to get his long-sought-after ten percent surtax increase, has been forced to agree to a \$6 billion reduction in government spending for the coming year. \$3 billion is now slated to come out of the Defense budget to meet this reduction. The Air Force share of the cut is \$700 million. A lot of needed and favorite projects will undoubtedly go by the wayside.
- As a part of the tax increase package and the \$6 billion spending cut for FY '69, 300,000 Civil Service positions will be eliminated. This drastic cut will seriously affect many government agencies. Officials predict that the Air Force will be forced to absorb 30,000 of this number.
- As we went to press, and with time running out, the National Guard Technician retirement plan was still in a highly confused state. The Senate Armed Services Committee has resumed hearings on the matter, but arrived at no conclusions. While Sen. John C. Stennis had promised there would be a bill this year, Congress has less than a month in which to act before adjournment.
- Starting in September, the Air Force will have 4,000 ROTC scholarships in 176 colleges and universities. These scholarships include board, tuition, books, and laboratory and incidental expenses, plus \$50 a month spending money.
- The House has passed and sent to the Senate a bill which would grant members of the Reserve Forces serving for thirty days or less substantially the same hospitalization and medical care, pay and allowances, burial and other benefits as are now provided for members ordered to active duty for more than thirty days.
- The Iron Gate Chapter of the Air Force Association, which annually sponsors an Air Force Ball in New York City, has just made its fifth substantial contribution to the Air Force Aid Society. In the past five years they have donated a total of \$184,000 to AFAS (see also p. 26).
- The Hubbell Compensation Study Group, now working on a new retirement plan, is exploring some interesting areas. One is a two-step retired pay system in which the individual would receive a reduced amount from the time he retires, when he might be expected to take up another career, to age sixty, and a greatly increased amount after age sixty when normal full retirement takes place. Another is to authorize up to one full year preretirement transition for training in a new occupation. Inactive-duty Reservists, who now draw retirement pay on reaching age sixty, might be allowed to retire earlier on a reduced annuity.

(Continued on page 89)

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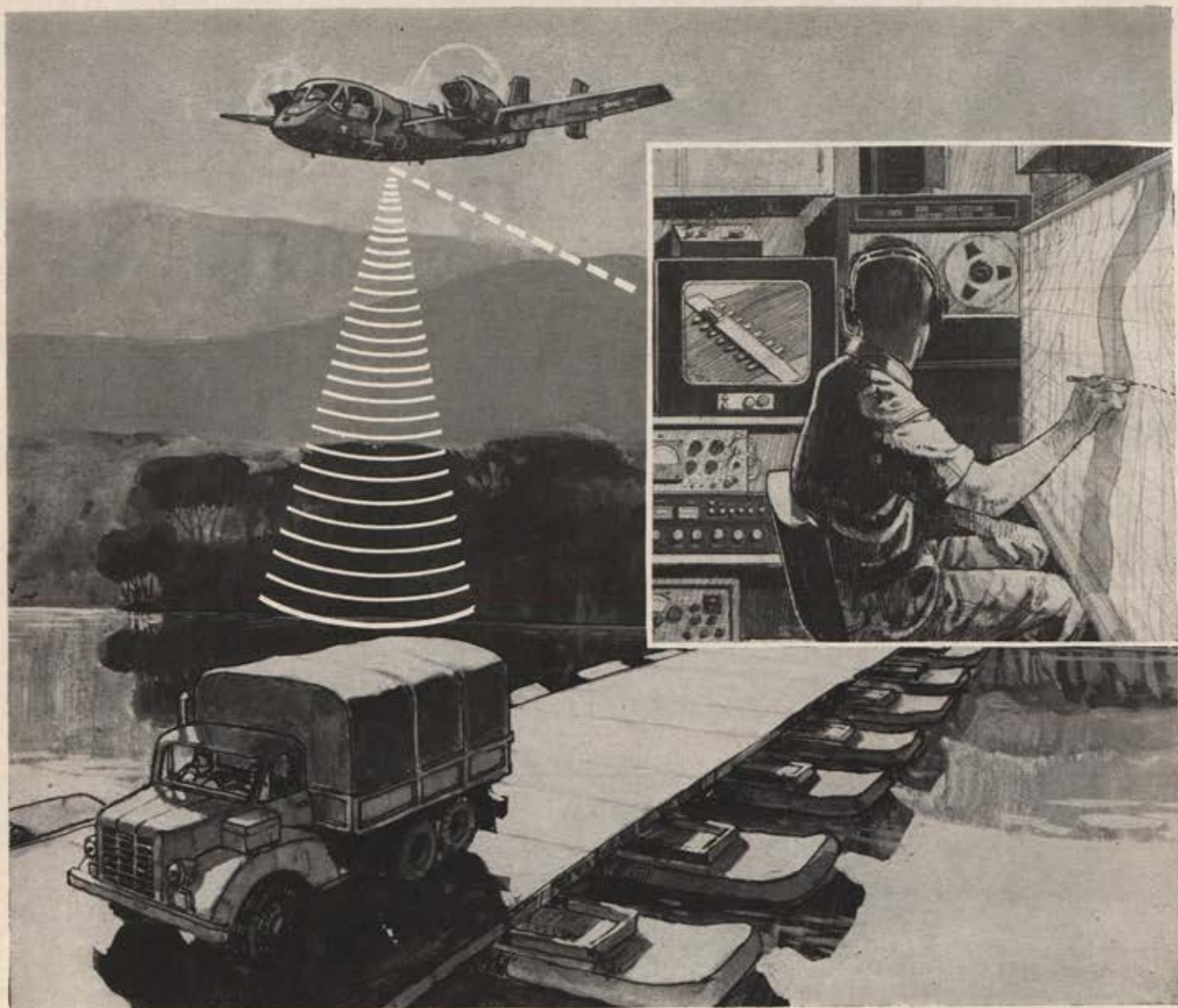
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Cubic's Data Links have proven they can eliminate the 2 to 4 hour delay in getting reconnaissance data to the commander. Climaxing years of extensive research and development, Cubic is now a prime contractor to produce operational Data Link systems. Cubic's second generation hardware is now being modularized to meet the multi-sensor, multi-aircraft requirements of all branches of the armed forces. Recce aircraft in forward areas now gather data with

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Cubic's Data Link transmits it instantly to instrumented portable ground stations or shipboard terminals where it is processed for viewing in near real time. With appropriate equipment, aircraft can relay data several hundred miles.

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now being applied to the requirements of all four services. Today, Cubic has the overall ability to design the equipment modules, solve interface and systems integration problems, and produce a joint-services Data Link system that works with the new sensors and aircraft used by all branches of the Armed Forces. For details, write Cubic Corporation, Systems Division, Dept. G-213, 9233 Balboa, San Diego, California 92123.

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SYSTEMS DIVISION



Col. Daniel "Chappie" James, Jr., Vice Commander of the 33d Tactical Fighter Wing, Eglin AFB, Fla., pins bars of second lieutenant on his son, Daniel, III, commissioned through AFROTC at the University of Arizona. Lieutenant James is entering pilot training at Williams AFB, Ariz.

- Col. George R. Bickell has assumed command of the 1st Air Force Reserve Region, Andrews AFB, Md., upon retirement of Col. Adam K. Breckenridge. Colonel Bickell has charge of all Air Force Reserve activities in fifteen northeastern states and the District of Columbia.

- As of May 31, 1968, the Air Force retired rolls totaled 186,169, compared to 184,597 on April 30, 1968. The end of May retired strength consisted of 59,253 officers and 126,916 airmen. This reflects an increase of 24,351 retirees during the past twelve months.

- The never-popular twenty-year active-service career program for Reserve officers has been all but killed by the Vietnam War. All further Board action to screen Reservists out after twenty years of active duty has been deferred indefinitely.

Senior Staff Changes

M/G Milton B. Adams, from Cmdr., HEDCOM, USAF, to C/S, PACAF, Hickam AFB, Hawaii, replacing M/G Jay T. Robbins . . . M/G Royal N. Baker, from ACS/Plans, J-5, USMACV, to Vice Cmdr., 7th AF, PACAF, Vietnam, replacing M/G Robert F. Worley . . . M/G John H. Bell, from Dir. of Pers. Planning, to Asst. DCS/P, Hq. USAF . . . B/G Sterling P. Bettinger, from Dir., Plans & Policy, J-5, to ACS, NORAD (CONAD), Ent AFB, Colo. . . . M/G Robert W. Burns, from Cmdr., 19th AF, TAC, Seymour-Johnson AFB, N. C., to Cmdr., 4th AF, ADC, Hamilton AFB, Calif.

B/G Chester J. Butcher, from Cmdr., 3560th Pilot Trng. Wg., ATC, Webb AFB, Tex., to Dep. Dir. for Concepts and Op Readiness, Defense Comm. Planning Gp., DCA, Washington, D. C. . . . B/G Maurice F. Casey, from Cmdr., 60th Mil. Airlift Wg., MAC, Travis AFB, Calif., to Dir. of Transportation, DCS/S&L, Hq. USAF, replacing B/G Adriel N. Williams . . . M/G Leo P. Dusard, from Dir., Pers. Trng. & Educ., DCS/P, Hq. USAF, to Vice Cmdr., ATC, Randolph AFB, Tex., replacing M/G Nils O. Ohman . . . B/G Edmund B. Edwards, from Cmdr., 20th Tac Ftr. Wg., USAFE, Weathersfield, England, to IG, USAFE, Wiesbaden, Germany, replacing B/G William R. MacDonald . . . M/G Gordon M. Graham, from Cmdr., 9th AF, TAC, Shaw AFB, S. C., to Vice Cmdr., Hq. TAC, Langley AFB, Va., and nominated for L/G.

B/G James F. Hackler, Jr., from Dep. Dir., SAFOI, to Dir. of Pers. Planning, DCS/P, Hq. USAF, replacing M/G John H. Bell . . . B/G John W. Harrell, Jr., from Cmdr., 314th Air Div., PACAF, Osan AB, Korea, to Vice Cmdr., 21st AF, MAC, Mc-

Maj. Gen. Nils Ohman has succeeded Maj. Gen. Milton Adams as Commander of Headquarters Command, Bolling AFB, D. C. A 1937 West Point graduate, General Ohman was formerly Vice Commander of the Air Training Command. General Adams moves to Hawaii as PACAF Chief of Staff.



Guire AFB, N. J. . . . Dr. Ulrich K. Heidelauf, from Technical Advisor (Recon) to Technical Advisor (Weapons Systems), DCS/Systems, AFSC, Andrews AFB, Md. . . . B/G John H. Herring, Jr., from Dep. ACS/Studies & Analysis, USAF, to Cmdr., 438th Mil. Airlift Wg., MAC, McGuire AFB, N. J. . . . B/G Robert J. Holbury, from Cmdr., 460th Tac Recon Wg., PACAF, Vietnam, to Dir., Combat Ops, 7th AF, PACAF, Vietnam, replacing B/G Dale S. Sweat . . . B/G Spencer S. Hunn, from Vice Cmdr., Electronic Systems Div., AFSC, Hanscom Field, Mass., to Dir., Systems Dev., J-5, NORAD (CONAD), Ent AFB, Colo.

B/G Earl L. Johnson, from Cmdr., 823d Air Div., SAC, Homestead AFB, Fla., to Vice Cmdr., 3d Air Div., SAC, Andersen AB, Guam, replacing B/G John W. Kline . . . B/G John W. Kline, from Vice Cmdr., 3d Air Div., SAC, Andersen AB, Guam, to Asst. DCS/Ops, Hq. SAC, Offutt AFB, Neb. . . . M/G Joseph J. Kruzel, from DCS/Ops, PACAF, Hickam AFB, Hawaii, to Vice Cmdr., 5th AF, PACAF, Fuchu AS, Japan, replacing M/G Timothy F. O'Keefe . . . B/G William R. MacDonald, from IG, USAFE, Wiesbaden, Germany, to C/S, USAFE, Wiesbaden, Germany, replacing M/G Richard F. Shaefer . . . B/G Frank M. Madsen, Jr., from Cmdr., 3510th Pilot Training Wg., ATC, Randolph AFB, Tex., to C/S, ATC, replacing B/G Lester F. Miller . . . M/G Nils O. Ohman, from Vice Cmdr., ATC, Randolph AFB, Tex., to Cmdr., HEDCOM, USAF, replacing M/G Milton B. Adams . . . M/G Timothy F. O'Keefe, from Vice Cmdr., 5th AF, PACAF, Fuchu AS, Japan, to Cmdr., 9th AF, Shaw AFB, S. C., replacing M/G Gordon M. Graham.

M/G Jay T. Robbins, from C/S, PACAF, Hickam AFB, Hawaii, to Cmdr., 12th AF, TAC, Bergstrom AFB, Tex. . . . M/G Richard F. Shaefer, from C/S, USAFE, Wiesbaden, Germany, to ACS/Plans, J-5, USMACV, Vietnam, replacing M/G Royal N. Baker . . . B/G Pete C. Sianis, from Dep. Dir. for Logistics, to Dep. Dir., Joint Staff, JCS . . . B/G Dale S. Sweat, from Dir., Combat Ops, 7th AF, PACAF, Vietnam, to Asst. DCS/Ops, USAFE, Wiesbaden, Germany . . . M/G Henry G. Thorne, Jr., from Vice Cmdr., CAC, Robins AFB, Ga., to Cmdr., 19th AF, TAC, Seymour-Johnson AFB, N. C., replacing M/G Robert W. Burns . . . M/G Robert H. Warren, from Asst. DCS/P, Hq. USAF, to Dir. of Mil. Assistance, Office Asst. Sec. of Defense (ISA) and nominated for promotion to L/G . . . M/G William W. Wisman, from Dep. Dir. for Ops, National Military Cmd. System, J-3, Joint Staff, JCS, to DCS/Plans & Programs, NORAD (CONAD), Ent AFB, Colo. . . . M/G Robert F. Worley, from Vice Cmdr., 7th AF, PACAF, Vietnam, to DCS/Ops, PACAF, Hickam AFB, Hawaii, replacing M/G Joseph J. Kruzel.

NOMINATIONS FOR PROMOTION: To Lieutenant General: Gordon M. Graham, Bertram C. Harrison, Robert H. Warren.

Air National Guard: To Major General: Reginald M. Cram. To Brigadier General: Robert W. Akin, Robert F. King, Billy J. Shoulders.

RETIREMENTS: M/G John B. Bestic, M/G William E. Creer, L/G William K. Martin, B/G Robert F. McDermott, B/G Roy W. Nelson, Jr., M/G Harry J. Sands, M/G Woodrow P. Swancutt, L/G Henry Viccellio, B/G Adriel N. Williams.—END

Plan now to attend...

AFA's 1968 BRIEFINGS & DISPLAYS

September 16-17-18 • Sheraton-Park Hotel • Washington, D.C.



Vice President Hubert H. Humphrey attended the 1966 Briefings & Displays (above), and personally elected to attend again in 1967 (below) so that he could be brought up to date.



A total of 4,514 key government, military, and industry personnel and educators attended AFA's 1967 Briefings & Displays.

Some forty-seven major aerospace/defense firms will present their latest equipment and make formal presentations to top audiences of military and government personnel at the Air Force Association's 1968 Aerospace Development Briefings and Displays at the Sheraton-Park Hotel in Washington, D. C., September 16-17-18. These companies will occupy some 60,000 square feet of exhibit space at the hotel, all of which was reserved more than five months in advance of the event.

The Briefing and Display Program was conceived and pioneered by AFA five years ago. It combines displays of equipment with formal, ten-minute company presentations in the booth, followed by three-minute question periods. During each morning of the three-day event, the attendees are assembled into parties of fifteen to twenty persons each and escorted to each of the six or seven briefings in the group they select. In the afternoons, attendees may select any of the forty to fifty briefings offered. Morning attendees are guests of the Air Force Association for lunch at the hotel, and afternoon attendees are guests at a daily reception.

Registration is required for attendance at the Briefings and Displays, but there is no registration fee and no charge for attendance at the daily luncheons and receptions. Since attendance quotas are established for each military and government office, advance registration is necessary. This can be accomplished right in the attendee's duty office, where special forms and instructions will be available around August 1. Special Project Officers will be assigned to coordinate registration and attendance. Those desiring to attend should be on the lookout for bulletins on this event and inquire as to the availability of registration forms.

This program is officially approved for attendance by military and government personnel, and transportation to and from the Sheraton-Park Hotel is provided at the Pentagon and major installations in the Washington area. More than 4,000 persons attend the briefings each year. The quality and value of this program is best demonstrated by the fact that Vice President Hubert Humphrey has attended the past two years and praised both the displays and the presentations.

The Briefings and Displays Program is held in conjunction with AFA's Annual Fall Meeting, which includes an Aerospace Seminar and Industry-Air Force Luncheon; and the annual Air Force Anniversary Dinner Dance. Mark the dates of September 16-17-18 on your appointment calendar now and watch for additional details on the Fall Meeting and the Aerospace Development Briefings and Displays. Last year some eighty-seven percent of the attendees stated that they found the Briefings and Displays informative and helpful in their work. You are invited this year!

Register Now

AFA's 4th ANNUAL FALL MEETING

HIGHLIGHTS:

Aerospace Development Briefings: 60,000 square feet of display space filled with the nation's most advanced aerospace hardware, all demonstrated to our guests in special conducted tours complete with detailed briefings. Participants are guests for luncheon or afternoon reception following the Briefings.

Aerospace Management Seminars: Seminars each morning will study the future national requirements for aerospace progress, analyze the nation's potential in the world market, and evaluate the technical, economic, and geopolitical factors relating to supersonic aviation in the 1970s.

Air Force Anniversary Dinner Dance: The twenty-first anniversary of the US Air Force will be appropriately observed with a reception and dinner dance, the latter featuring a reunion atmosphere by elimination of the traditional head table and lengthy speeches.

PROGRAM:

MONDAY, SEPTEMBER 16

- 9:00 a.m. Aerospace Management Seminar:
"Aerospace Test Facilities"
- 9:30 a.m. Escorted Industry Briefings
- 11:30 a.m. Briefing Participants Luncheon
- 1:30 p.m. Unescorted Industry Briefings
- 4:00 p.m. Briefing Participants Reception
- 6:00 p.m. Fall Meeting Reception

TUESDAY, SEPTEMBER 17

- 9:00 a.m. Aerospace Management Seminar:
"International Aerospace Market"
- 9:30 a.m. Escorted Industry Briefings
- 11:30 a.m. Briefing Participants Luncheon
- 1:00 p.m. Unescorted Industry Briefings
- 2:00 p.m. AFA Board of Directors Meeting
- 4:00 p.m. Briefing Participants Reception
- 7:00 p.m. Air Force Anniversary Reception &
Dinner Dance

WEDNESDAY, SEPTEMBER 18

- 9:00 a.m. Aerospace Management Seminar:
"Commercial Supersonic Flight"
- 9:30 a.m. Escorted Industry Briefings
- 11:30 a.m. Briefing Participants Luncheon
- 12:30 p.m. Air Force-Industry Luncheon
- 1:00 p.m. Unescorted Industry Briefings
- 4:00 p.m. Briefing Participants Reception

REGISTRATION FORM FOR AIR FORCE ASSOCIATION'S 1968 FALL MEETING

SEPTEMBER 16-18, 1968—WASHINGTON, D. C.

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Mark the appropriate spaces; make checks payable to Air Force Association, and mail to 1750 Pennsylvania Ave., N. W., Washington, D. C. 20006.

() REGULAR REGISTRATION\$20.00

Includes credentials to attend the Seminar sessions; the Fall Meeting Reception on Monday evening; and the Industry-Air Force Luncheon on Wednesday.

() MILITARY REGISTRATION\$10.00

Includes credentials to attend the Seminar sessions and the Fall Meeting Reception.

() AIR FORCE ANNIVERSARY RECEPTION &
DINNER DANCE

\$25.00

Not included in either of the above Registration plans. All seating is reserved. Dress is black tie.

DO NOT MAIL THIS FORM AFTER SEPTEMBER 1—PRESENT AT REGISTRATION DESK



UTE CHAPTER, UTAH

cited for extremely effective programming supporting the missions of both the Air Force Association and the Aerospace Education Foundation.

The Third Annual Logistics 70 Symposium, cosponsored by AFA's Ute Chapter, the Utah Chapter of the Defense Supply Association (DSA), and the Utah Chapter of the Society of Logistics Engineers (SOLE), was recently held at Hill AFB, Utah.

The purpose of the Symposium was to obtain national recognition of the need for specialized education in the field of logistics and to identify the specific facets of logistics that may require specialized education. A further purpose was to explore the desirability and need for establishing logistics courses as electives to current curricula in the schools of engineering and/or business in the universities, colleges, and technical institutions.

The first day of the two-day program was devoted to panel presentations that were moderated by Dr. Merle E. Allen, Director, Coordinating Council of Higher Education, State of Utah. The panel included Lt. Col. Donald F. Ford, USAF, Director of Research, School of Systems and Logistics, AF Institute of Technology (AU), Wright-Patterson AFB, Ohio; Paul W. Albrow, Manager, Product Support and Logistics Laboratory, TRW Systems Group, Redondo Beach, Calif.; Wolsey Semple, Assistant Professor and Supervisor of the Computer Laboratory, School of Engineer-



During Ute, Utah, Chapter banquet, AFA Executive Director James H. Straubel, left, presents citation to Dr. Merle E. Allen, center, Director of Utah Coordinating Council for Higher Education, recognizing his many contributions. AFA's Rocky Mountain Regional V-P, Nathan H. Mazer, looks on.

ing and Architecture, Howard University, Washington, D. C.; Edmund A. Waters, Manager, Minuteman Logistics Engineering Department, the Boeing Co., Seattle, Wash.

Also, Dr. Melvin B. Kline, partner, Lifson-Kline Associates, Los Angeles, Calif.; Dr. Donald I. Stewart, Senior Associate, Planning Research Corporation, Los Angeles, Calif.; Leo Rachmel, Chairman, Education Committee, Society of Logistics Engineers, US Army Logistics Management Center, Fort Lee, Va.; and Dr. Murray A. Geisler, Head, Logistics Department,

The RAND Corp., Santa Monica, Calif.

The second day, a Reaction Panel responded to the panel's presentations. This panel was comprised of James L. Carpenter, President, SOLE, Ellicott City, Md.; James H. Straubel, Executive Director, Aerospace Education Foundation, Washington, D. C.; Paul A. Simmons, Chief, Management Engineering Division, OAMA; James O. Murcklin, Jr., Chief, Advanced Logistics Support Systems, TRW Systems, Inc., Washington, D. C.; Professor Leland M. Olsen, Mechanical



More than 100 Olmsted, Pa., Chapter members attended a recent dinner honoring ten young men about to enter the Air Force Academy. Here future cadet Harold Brandt, left, of Hershey, accepts plaque from Col. William Etchberger, right, Academy liaison officer for Pennsylvania. Others, from left, are Chapter President Gilbert Petrino; AFA's National Treasurer Jack B. Gross; and Maj. Richard A. Mason, Academy grad and Vietnam returnee, who spoke.



Lt. Gen. Ira Eaker, USAF (Ret.), right, guest speaker at Air Force Appreciation Day luncheon given by AFA's Tucson, Ariz., Chapter, looks on as Barry Goldwater, center, welcomes the Thunderbirds, USAF's aerial demonstration team, who are, from left, Capt. Doyle Ruff; Maj. Neil Edkins, team leader; Capt. Mack Angel; and Capt. Stan Musser. Luncheon preceded Aerospace and Arizona Days weekend cosponsored with Tucson Chamber of Commerce.

Engineering, College of Engineering, University of Utah, Salt Lake City, Utah.

Also, Col. Morris Burkhardt, USAF, Chief, Service Engineering Division, OOAMA; Dr. Helmut Hofmann, Academic Vice President, Weber State College, Ogden, Utah; Dr. Calvin G. Clyde, Assistant Director, Water Research Laboratory, Utah State University, Logan, Utah; Dr. Leon McCarrey, Associate Director for Academic Affairs, Utah Coordinating Council of Higher Education, Salt Lake City, Utah; and George H. Van Leeuwen, Deputy Director, Directorate of Materiel Management, OOAMA.

The Hon. Robert H. Charles, Assistant Secretary of the Air Force (I&L), was the featured speaker at the Symposium Banquet. Nathan H. Mazer, AFA's Rocky Mountain Regional Vice President, served as Master of Ceremonies; the invocation was delivered by David H. Whitesides, Immediate Past President of the Utah AFA. Janice Johansen provided dinner music.

The Military Host, Maj. Gen. Robert H. McCutcheon, Commander, OOAMA, welcomed visitors to Hill and spoke briefly during the program on behalf of the Rocky Mountain Region. Mr. Straubel presented a citation to Dr. Merle Allen, "In recognition of his enthusiastic support and sincere efforts in the development of programs to meet the logistic training and education requirements of government and industry in Utah."

Mr. Van Leeuwen served as General Chairman of the Symposium and Max K. Kennedy, Deputy Director, Maintenance Directorate, OOAMA, served as Program Chairman. They were assisted by Mr. Mazer; Nolan Manfull and Jack Price, State AFA President and Vice President, respectively; Harry I. Cleveland, President, Ute Chapter, AFA; Kenneth R. Young, Chairman, Utah Chapter #1, SOLE; and Lynn A. Richardson, President, Utah Chapter, DSA.

The most effective Symposium concluded with a Command Briefing and tour of Hill AFB facilities.

Undersecretary of the Air Force Townsend Hoopes was the principal speaker at a picnic sponsored by AFA's Central Florida Chapter for Orlando AFB personnel. The fun-packed event, held at Orlando AFB and attended by more than 2,000 base personnel and their families and guests, was staged as a farewell to the Air Force as they relinquished command of the Orlando AFB to the US Navy, effective July 1.

Secretary Hoopes was introduced by Central Florida Chapter President Taylor Drysdale. In his address,



Distinguished guests at a recent Dining-In sponsored by AFA's Pease, N. H., Chapter include, from left, Col. Joseph V. Adams, Jr., Vice Commander, 509th Bomb Wing; Brig. Gen. Morgan S. Tyler, Jr., Commander, 817th Air Div.; Chapter President Stuart N. Shaines; John McConnell, President, University of New Hampshire; the Hon. John A. Lang, Jr., Administrative Assistant to the AF Secretary; and Lt. Col. Bud Barbee, Professor of Aerospace Studies at the University of New Hampshire. Program honored the commissioning of the AFROTC class.

Secretary Hoopes thanked the communities of Orlando and Winter Park for supplying "a good life" for personnel of the Air Force during the past twenty-eight years. "Orlando," he said, "has undoubtedly made its own distinctive contribution to the high professionalism of the US Air Force today. We could not have had a nicer place to call home, as I'm sure the Navy will soon find out."

Under the sponsorship of AFA's Shreveport, La., Chapter, the Air University Aerospace Presentations Team, comprised of Captains D. L. Frederick and K. C. Sorenson, made fifteen appearances at Shreveport schools and colleges and reached more than 10,000 persons with their presentation on the US space program.

Highlight of the Team's visit was a presentation for the general public in the Shreveport Civic Theater. More than 400 attended this presentation which featured the Air University Presentations Team and, also, a presentation on "The US Apollo Space Mission" by Dr. Jerry L. Modisette, chief of the Space Physics Department of NASA's Manned Space Craft Center in Houston, Tex.

During the evening, large displays of space hardware furnished by NASA's Space Flight Center in Huntsville, Ala., were exhibited in the theater's lobby.

General Chairman for the week-long program was H. John McGaffigan, Louisiana AFA Vice President. Excellent newspaper, radio, and TV coverage was arranged by Chapter President Toulmin H. Brown. AFA's South Central Regional Vice President, Jack T. Gilstrap, from Huntsville, Ala., attended the Civic Theater program.

AFA's Badger State Chapter of Milwaukee, Wis., and the 440th Tac-

tical Airlift Wing, USAF Reserve, recently cosponsored their Fourth Annual Girl Scout Aviation Badge Clinic at General Billy Mitchell Field.

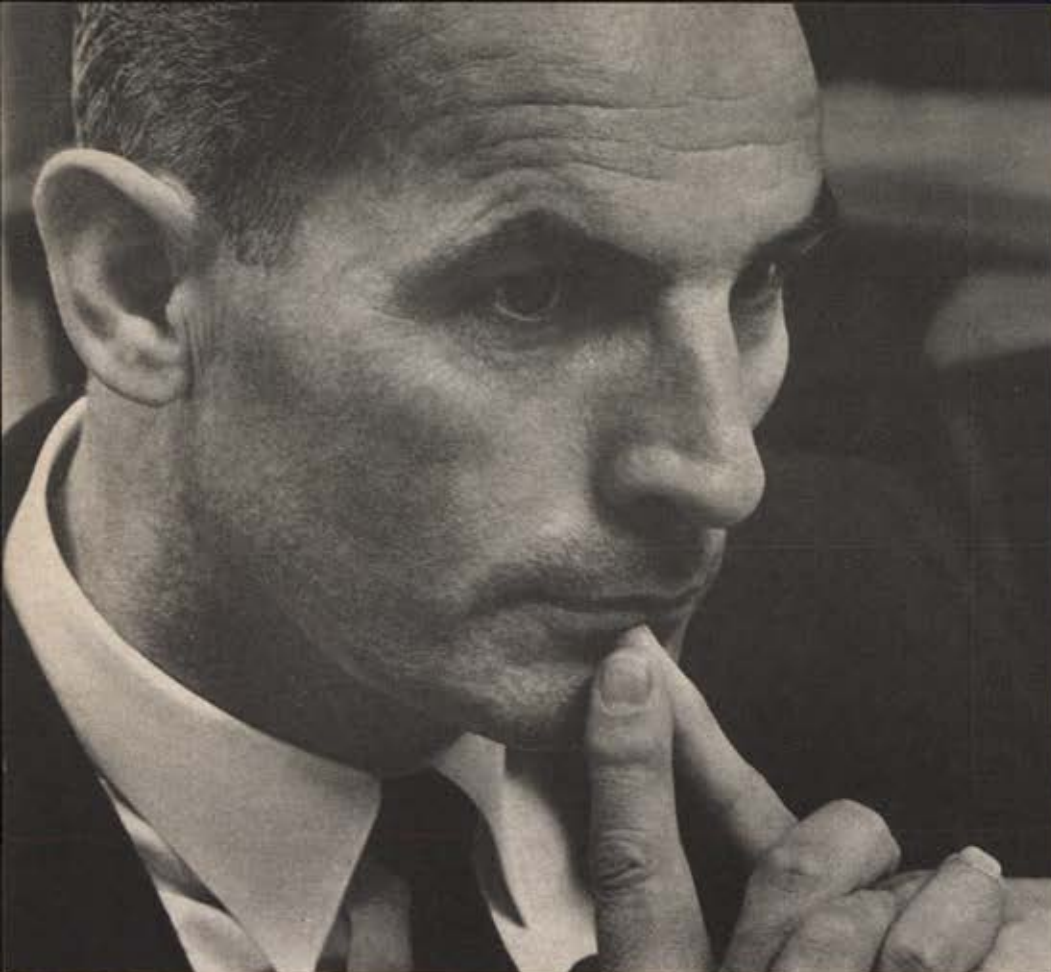
More than 350 Girl Scouts and leaders from the Milwaukee area attended the Clinic. The program, entitled "The Airman's World," included welcoming remarks by Col. Leonard Dereszynski, Vice Commander of the Reserve Wing; a demonstration of the use of parachute and tropical survival equipment; presentations on aerospace evacuation, the history of aviation and space exploration, aircraft structure, uses of airplanes and helicopters, weather information, navigation instruments and techniques; and a film on amateur-built aircraft of the Experimental Aircraft Association.

Static displays included a C-119 Flying Boxcar, a KC-97 Stratotanker, a helicopter, and fire-fighting equipment. The program closed with remarks from Chapter President Gordon S. Dombrowski.

The Reserve Wing is commanded by Brig. Gen. Joseph J. Lingle, USAFR, who is also an AFA National Director. CMSgt. John W. Downey of the Reserve Wing Headquarters served as Program Chairman. Program participants included Captains James C. Wahleithner, Kenneth Schaefer, and Louise Tremblay (USAF nurse); and TSgt. Anthony Martinez.

The San Diego, Calif., Chapter recently sponsored an "extravaganza of entertainment" for more than 800 patients and staff members of the Naval Hospital in San Diego.

The one and one-half hour show included entertainment by the Bordermen Band under the direction of Barry Farrar, vocalists Faith Black and Delila Brown, and the NROTC Angel
(Continued on following page)



What do you do when your customer tells you: "Give us a low-cost propulsion system that can be throttled in flight"?

You come up with a hybrid propulsion system: the first of its kind designed for operational use. □ The parameters for such a system are complex and challenging: in-flight throttling from 50 to 500 lb thrust; operation in air-launch environment involving ignition at 50,000 feet or higher; ambient temperatures from -65° to $+165^{\circ}$ F; high vibration levels; burn-time of at least 5 minutes; and safe handling in the field. □ Solution? A hybrid rocket propulsion system using a common plastic as the solid fuel, a combination of nitric oxides as the liquid oxidizer, and a simple numerical dial for programming boost and sustain thrusts. □ The proof was the successful series of flight tests under the direction of the Air Force at Eglin AFB. The tests used a modified Beech Aircraft target missile as a test bed. Work is now proceeding at UTC to establish this propulsion system as on-the-shelf hardware for use by the armed forces.

In addition to its leadership in hybrid rockets, UTC has proven capabilities covering the entire spectrum of rocket propulsion technology. This is reflected in such reliable products as Stage Zero for the Titan III-C, and the FW-4 upper-stage solid rocket for the Scout, Thor, and Delta space-launch vehicles.



United Technology Center

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DIVISION OF UNITED AIRCRAFT CORPORATION

SUNNYVALE, CALIFORNIA

AFA NEWS CONTINUED

Flight from San Diego State College. Chapter President Edward Philbin said the Chapter is now planning to take the same show to Vietnam to play for the troops there.

CROSS COUNTRY... The Greater Pittsburgh, Pa., Chapter recently presented the North Hills CAP Cadet Squadron an American flag for parade use, a stand for their meeting flag, and covers for all the Unit's flags and banners... The twentieth anniversary of Women in the Air Force (WAF) was recently celebrated at a tea sponsored by AFA's Mount Clemens, Mich., Chapter. Held in the home of Chapter President Marjorie O. Hunt, the guests of honor were the members of the 1st WAF Squadron, Selfridge AFB... AFA National Director Judge John G. Brosky was the guest speaker at a recent meeting of AFA's Cape Canaveral, Fla., Chapter. Judge Brosky is also to be congratulated on his recent appointment as a member of the Airport Advisory Board at the Greater Pittsburgh Airport.

During "change of command" ceremonies at a reception following the Hoyt S. Vandenberg Chapter's ROTC Awards Banquet, Great Lakes Regional Vice President W. M. Whitney, Jr., presented a trophy and camera to AFA National Secretary Glenn D. Mishler in appreciation of his dedicated service to the Region during his three-year tenure as Great Lakes Regional Vice President... Akron, Ohio, Chapter President Jack Cherry was the guest speaker at the recent observance of the twenty-fifth anniversary of the Women's Air Service Group.

Coming events: New York State AFA Convention at The Beeches, Rome, August 24; Gen. Raymond J. Reeves, Commander in Chief, NORAD, will be the principal speaker... AFA's Fall Meeting and Aerospace Development Briefings, Washington, D. C., September 16-18... Alabama State AFA Convention, Mobile, September 27-28... New Jersey State AFA Convention, McGuire AFB, October 12... California State AFA Convention, Fresno, October 18-20... Massachusetts State AFA Convention, Hanscom Field, October 26... Ohio State AFA Convention, Hueston Woods State Park, November 2-3... Virginia State AFA Convention, Langley AFB, November 16... Aerospace Education Foundation Symposium, Washington, D. C., November 18-20... Florida State AFA Convention, St. Petersburg, November 22-23... Idaho State AFA Convention, Boise, December 7.

—DON STEELE

THIS IS AFA



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

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 (nonvoting, nonofficeholding): US citizens on extended active duty with any branch of the United States armed forces—\$7 per year.

Cadet Members (nonvoting, nonofficeholding): US citizens enrolled as Air Force ROTC Cadets, Civil Air Patrol Cadets, Cadets of the United States Air Force Academy, or a USAF Officer Trainee—\$3.50 per year.

Associate Members (nonvoting, nonofficeholding): Non-US citizens who

support the aims and objectives of the Air Force Association whose application for membership meets AFA constitutional requirements—\$7 per year.

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.



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- **FLIGHT PAY INSURANCE**
- **COMPREHENSIVE ACCIDENT INSURANCE**
(Coverage Up to \$100,000)

MILITARY GROUP LIFE INSURANCE

AFA's low-cost Military Group Life Insurance features equal coverage, up to \$20,000, for flying and nonflying personnel at the same low premium.

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

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

The only exception to these provisions is that a flat sum of \$15,000, regardless of age, will be paid for death caused by aviation accident while the insured is serving as pilot or crew member of the aircraft involved.

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

Policyholders may also keep their insurance in force at

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

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

Other benefits include guaranteed conversion privilege, waiver of premium for disability, choice of settlement options, and a choice of convenient payment plans, including payment by allotment for those on active duty.

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

More than 17,500 participants carrying over a quarter of a billion dollars life insurance in force have selected this unique program—truly the best protection available for all service families.

CIVILIAN GROUP LIFE INSURANCE

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

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

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

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

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

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

Complete Information by Return Mail!
No Cost! No Obligation!

FLIGHT PAY INSURANCE

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

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

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

The plan assures members of no loss of income if they are returned to flying status within the benefit period. And, if grounding is permanent, they are given sufficient time to adjust their expenses to a lower-income level.

COMPREHENSIVE ACCIDENT INSURANCE

This unique accident insurance coverage, available to *all* AFA members regardless of age, offers worldwide, full-time protection against all accidents except those involving crew members in aircraft accidents.

It is available in units of \$5,000, to a maximum of \$100,000, and may be purchased for individual protection, or for complete family protection under the popular Family Plan (including all children under age 21)—both at remarkably low rates.

In addition to the basic coverage, policyholders receive an automatic five percent increase in the face value of their coverage each year for the first five years their insurance is in force. There is no extra premium cost for this automatic benefit increase.

Insurance is also provided for nonreimbursed medical expenses of over \$50, up to a maximum of \$500. Under the Family Plan, every family member receives this valuable extra coverage.

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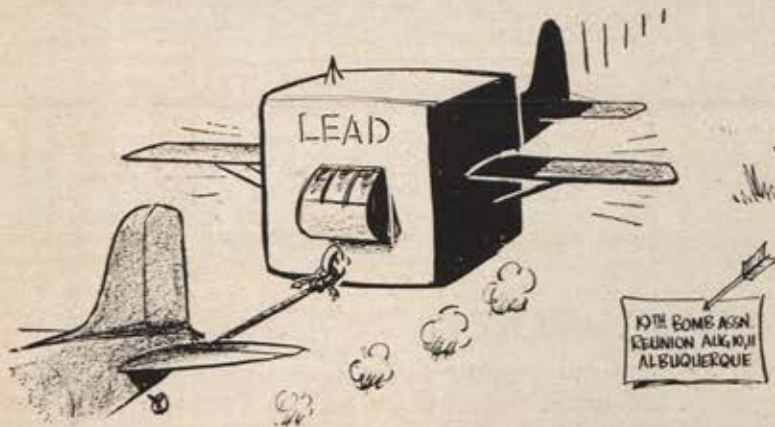
8-68

Bob Stevens' "There I Was..."

If you can remember Jackie Coogan, you may also recall the Army Air Forces' glider fleets that delivered airborne troops in the Burmese jungles as well as behind the Normandy beaches on D-Day. Who's Coogan? Before becoming a USAAF glider pilot, he once played "The Kid" opposite Charlie Chaplin. Now, who's Chaplin?

THOSE 'BAMBOO BOMBERS' - THE GLIDERS - AS SEEN BY:

- THE TOW SHIP CREW



- GLIDER PILOTS THEMSELVES



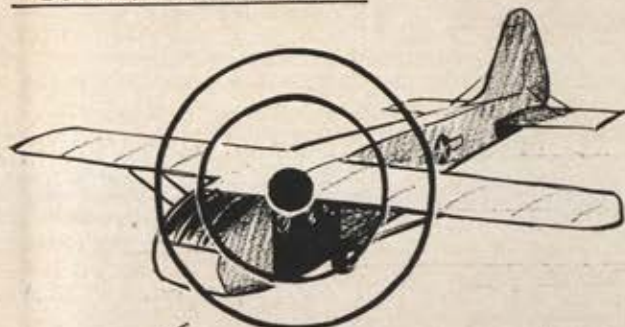
- THE AIRBORNE TROOPS



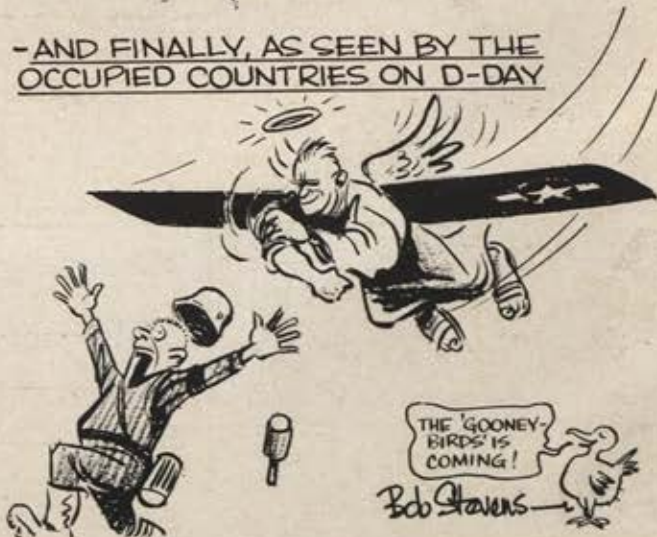
- SECOND & THIRD WAVE GLIDER PILOTS



- GERMAN GUNNERS



- AND FINALLY, AS SEEN BY THE OCCUPIED COUNTRIES ON D-DAY



What Happened?

"You get only one opportunity to record the unexpected. Unless you're prepared, you'll never know what really happened."

Hank McCard, Manager,
Telemetry & Instrumentation Department

Something happens. How do we reconstruct this event for analysis? It takes considerable expertise in data acquisition, reduction and analysis.

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In developing these advances in data-gathering and interpreting we've built up a lot of momentum. The kind that can be applied to the toughest problems in ground and flight tests of weapons systems, nuclear weapons testing, or oceanographic, meteorological and planetary scientific data systems. The kind that calls for our dynamic combination of management, experience and skilled people with unusual expertise in data acquisition, reduction and analysis.

Our kind of momentum.

Technical Momentum.

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TECHNICAL MOMENTUM



Life-saving news from McDonnell Douglas: the Aeromedical C-9A is now flying.

On May 31, 1968, a new era in aeromedical airlift was introduced with the maiden flight of the C-9A "jet hospital ward."

Designed for uncompromised patient care and comfort, it will move litter and ambulatory patients to major

medical centers with jet speed and smoothness, and in an environment which rivals that of any hospital.

A modified version of the McDonnell Douglas DC-9 commercial jetliner, the Aeromedical C-9A made its first

flight five weeks ahead of schedule.

The C-9A, the first pure jet ever to be used within the United States solely for mercy missions, will soon be in service with the USAF Military Airlift Command.

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