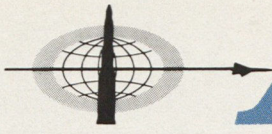


DECEMBER 1966



Aerospace International

PUBLISHED FOR THE LEADERS OF THE FREE WORLD BY THE UNITED STATES AIR FORCE ASSOCIATION



An F-4 Phantom II answers a call for air support in Vietnam.

THE UNITED STATES AIR FORCE...
Its Missions, Weapons, and Organization



We give every F-5A pilot a punch in the nose.

Every F-5A carries two 20-mm automatic cannon.
Built in.

The gun muzzles are ahead of the pilot and in his line of sight to the target. Pilots tell us this helps them refine their shooting.

That may help explain why F-5 pilots have been able to outshoot everybody else in air-to-ground exercises. But the main reason is that the F-5 can be maneuvered precisely and held rock-steady while firing.

The cannon aren't put there just to aim at the ground either. When the F-5A is carrying Sidewinders, the cannon give it a one-two punch in air-to-air combat.

Even when it's loaded with external stores for ground support, an F-5A won't have to run. If attacked from the air it can dump its load and fight back.

With an F-5A on his tail, the attacker better look out for a punch in the nose.

NORTHROP F-5
NORTHROP CORPORATION, BEVERLY HILLS, CALIFORNIA, USA

Aerospace International



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DECEMBER 1966

MEMORANDUM TO OUR READERS

By John F. Loosbrock 4

PEOPLE—USAF'S KEY COMPONENTS

By Claude Witze, Senior Editor 7

As the complexity and cost of the hardware—airplanes, missiles, electronic systems—of the U.S. Air Force have increased, so has the demand for high-quality, expensively trained people to operate these worldwide systems.

Au fur et à mesure qu'ont augmenté la complexité et le coût des engins—avions, missiles et systèmes électroniques—de la Force Aérienne américaine, le besoin de personnel hautement qualifié, ayant subi un entraînement coûteux, est devenue de plus en plus urgent pour opérer ces systèmes qui s'étendent sur le monde entier.

Mit steigenden Anforderungen und Kosten des Materials—Flugzeuge, Raketen, elektronische Austrüstungen—wächst auch die Nachfrage nach hochqualifiziertem Personal mit kostspieliger Ausbildung, um die weltumspannende Organisation der U.S. Luftwaffe im Einsatz zu halten.

Al mismo tiempo que ha aumentado la complejidad de los materiales—aeroplanos, cohetes, sistemas electrónicos—de las Fuerzas Aéreas de los Estados Unidos, así ha aumentado también la demanda de personal altamente calificado y costosamente entrenado para operar estos sistemas mundiales.

USAF'S GLOBAL AIRPOWER—ITS MISSIONS AND ORGANIZATION

By Flint DuPre 10

Here is a special report on the organization and capabilities of the United States Air Force, which, with its array of manned aircraft, missiles, and complex air defense and command and control systems, is a worldwide operation with tasks that range from deterrence of general war, to fighting a hot war in Southeast Asia, to the exploration of space. Including its Reserve Forces and civilian support teams, the U.S. Air Force numbers more than a million people.

Voici un rapport spécial sur l'organisation de la Force Aérienne des Etats-Unis et sur ses possibilités qui, grâce à la variété de ses avions et de leurs équipages, de ses missiles, de ses systèmes complexes de défense, de commandement et de contrôle aérien, étend son action sur le monde entier, avec des objectifs divers: empêcher la guerre générale, mener une guerre difficile en Asie du Sud-Est, en même temps qu'explorer l'espace. Si l'on tient compte de ses forces de réserve et de ses équipes civiles de support, l'Armée de l'Air américaine compte plus d'un million de personnes.

Dies ist ein Sonderbericht ueber den Aufbau und die Faehigkeiten der U.S. Luftwaffe. Bemannte Flugzeuge, Raketen, und ein umfassendes Kommando und Kontrollsystem bilden ein weltweites Unternehmen, dessen Anforderungen von der allgemeinen Abschreckung bis zum "heissen Krieg" in Suedostasien und der Weltraumforschung reichen. Einschliesslich der Reserve und Zivilbeschaeftigten zaehlt die Luftwaffe der Vereinigten Staaten mehr als eine Million Menschen.

Presentamos un informe especial sobre la organización y capacidad de las Fuerzas Aéreas de los Estados Unidos que, con su gran variedad de aviones, tripulados, cohetes y compleja defensa aérea y sistemas de mando y control, representa una operación mundial destinada tanto a evitar una guerra mundial como a luchar una guerra encarnizada en Sudasia, así como encargada de la exploración del espacio. Incluyendo sus fuerzas de reserva y equipos de ayuda civil, las Fuerzas Aéreas de los Estados Unidos comprende más de un millón de personas.

ORGANIZATION OF THE U.S. AIR FORCE

An AEROSPACE INTERNATIONAL Chart. 24

BPA AUDIT APPLIED FOR

AIRCRAFT AND MISSILES OF THE U.S. AIR FORCE

By Allan R. Scholin, Associate Editor 27

Easily the most powerful and widely ranging striking force the world has ever known, the U.S. Air Force is also mankind's most potent instrument for safeguarding world peace. Its operational inventory totals 12,400 planes of more than 60 varieties, from the 2,400-pound (1,089 kg) O-1 Bird Dog to the 488,000-pound (221,360 kg) B-52 Stratofort, plus a thousand intercontinental missiles. Its pilots operate the highest-flying and fastest aircraft in the world and by far the world's largest airline, equally capable of delivering fighting men and their weapons quickly to any battle zone, or speeding food and medical aid to a stricken nation.

Mit der staerksten und weitestreichenden Schlagkraft, die die Welt je gekannt hat, stellt die U.S. Luftwaffe der Menschheit wirksamstes Mittel zur Sicherung des Weltfriedens dar. Ihr einsatzbereites Inventar zaehlt 12.400 Flugzeuge in 60 verschiedenen Ausfuehrungen, von der 1.089 kg O-1 Fliegender Hund (Bird Dog) bis zur 221.360 kg B-52 Stratofort, dazu etwa eintausend Interkontinental-Raketen. Ihre Piloten fliegen die am hoechsten und schnellsten fliegenden Maschinen von der groessten Fluglinie der Welt, gleich faehig, Truppen und Waffen in Kampfgebiete zu befoerdern wie betroffene Nationen schnellstens mit Nahrungs- und Heilmitteln zu versorgen.

USAF AND NASA IN SPACE: A TIME OF PAUSE

By William Leavitt, Senior Editor/Science and Education 41

Because of the pressures of the Vietnamese War, there has been a slowdown in funding and decision-making in the U.S. civilian and military space efforts. But, in and out of uniform, planning and progress toward new goals continue.

Der Druck des Vietnamkrieges hat zivile wie militaerische Weltraumanstrengungen der U.S.A. in den Hintergrund gerueckt. Aber Planung und Fortschritt zu neuen Zielen haelt an—in Uniform und Zivil.

UFOs AND U-TAPAO

By Judith Dawson and Carole Klemm, Editorial Assistants 44

U.S. commercial airlines are luring pilots away from the military services . . . XC-142A V/STOL aircraft makes a successful rescue . . . U.S. Air Force begins investigation into unidentified flying objects (UFOs) . . . Listening posts help voyagers to the moon keep contact with earth . . . Australian Air Minister praises F-111 . . . Air Force purchases OV-10As in major policy shift . . . Thailand gets a new air base . . . New helicopter travels on ground like an automobile . . . and other developments round out this month's report.

L'Armée de l'Air américaine qui est sans aucun doute la force de choc la plus puissante et avec le plus vaste rayon d'action que le monde ait jamais connu est également l'instrument le plus efficace à la disposition de l'humanité pour sauvegarder la paix mondiale. Son inventaire opérationnel se compose au total de 12,400 avions offrant plus de 60 modèles; du O-1 Bird Dog qui pèse 2,400 livres (1,089 kg) au B-52 Stratofort (488,000 livres, 221,360 kg) sans compter un millier de missiles intercontinentaux. Ses pilotes conduisent les appareils les plus rapides et volant à l'altitude la plus haute sur les lignes aériennes qui sont de loin les plus longues du monde. Ils sont en mesure de transporter en un temps très court aussi bien des troupes et leurs armements dans des zones de combat situées n'importe où que des aliments et de l'aide médicale dont aurait besoin une nation en cas d'urgence.

Las Fuerzas Aéreas de los Estados Unidos constituyen, sin duda alguna, la fuerza de ataque más poderosa y de mayor alcance que se haya conocido jamás. Esta fuerza constituye al mismo tiempo el instrumento más potente con que cuenta la humanidad para asegurar la paz mundial. Su inventario operacional asciende a 12.400 aviones de más de 60 variedades, desde el modelo O-1 Bird Dog de 1.089 kg. hasta el B-52 Stratofort de 221.360 kg., además de un millar de proyectiles intercontinentales. Sus pilotos operan los aviones de mayor altura y más rápidos del mundo, y su flota es la más vasta del mundo entero, capaz de transportar soldados con su armamento rápidamente a cualquier zona de batalla y de enviar con toda rapidez alimentos y ayuda médica a una nación objeto de ataque.

En raison des charges causées par la guerre au Vietnam, il y a eu un ralentissement dans le financement et dans les décisions sur l'effort américain dans l'espace, tant dans le domaine civil que militaire. Cependant, au civil comme au militaire, la planification et les progrès vers de nouveaux objectifs continuent.

Debido a la presión ejercida por la guerra en Vietnam, ha habido un retraso en la obtención de fondos y formulación de decisiones en los esfuerzos espaciales civiles y militares de los Estados Unidos. Pero, tanto en el campo civil como en el militar, en planeamiento y progreso hacia nuevas metas sigue adelante.

Les compagnies d'aviation commerciales des Etats-Unis s'efforcent d'attirer les pilotes de l'aviation militaire . . . L'avion XC-142A V/STOL réussit à faire un sauvetage . . . L'Armée de l'Air américaine ouvre une enquête sur les soupçons volants . . . Des postes écouteurs aident les astronautes en route vers la lune à se tenir en contact avec la terre . . . Le Ministre de l'Air de l'Australie fait la louange de l'avion F-111 . . . Par suite d'un changement dans ses objectifs, l'Armée de l'Air achète des appareils OV-10As . . . La Thaïlande installe une nouvelle base aérienne . . . Un nouvel hélicoptère peut circuler sur le sol comme une automobile . . . et d'autres événements complètent le présent rapport mensuel.

Amerikas Luftverkehrsgesellschaften locken Piloten aus dem Militaerdienst . . . XC-142A V/STOL Maschine vollbringt erfolgreiches Rettungsmanöver . . . U.S. Luftwaffe leitet Untersuchung ueber unbekannte Flugobjekte (UFO) ein . . . Abhörstellen helfen Reisenden zum Mond den Kontakt der Erde aufrecht zu erhalten . . . Australiens Luftfahrtminister lobt die F-111 . . . Luftwaffe erhaelt OV-10A im Zuge groesserer Umplanung . . . Thailand bekommt einen neuen Luftstuetzpunkt . . . Neuartiger Hubschrauber kann wie ein Auto fahren . . . und andere Entwicklungen runden den Bericht dieses Monats ab.

Los pilotos militares están siendo atraídos por las compañías aéreas comerciales de los Estados Unidos . . . El avión XC-142A V/STOL ha efectuado felizmente una operación de rescate . . . Las Fuerzas Aéreas de los Estados Unidos comienzan la investigación de objetos volantes no identificados (UFO) . . . Puestos de escucha ayudan a astronautas enviados a la luna a mantener contacto con la tierra . . . El Ministro del Aire de Australia alaba al F-111 . . . Las Fuerzas Aéreas compran aparatos OV-10A, lo que representa un importante cambio de política . . . Tailandia obtiene una nueva base aérea . . . Un nuevo helicóptero viaja por tierra como un automóvil . . . estos y otros adelantos completan el informe de este mes.

A WORD ABOUT THE PURPOSE OF AEROSPACE INTERNATIONAL

AEROSPACE INTERNATIONAL is distributed, upon request only, to a selected list of top-level executives in the governments, the scientific communities, and aerospace industries of Free World countries, as a service of the United States Air Force Association and the aerospace advertisers who appear in the magazine. AEROSPACE INTERNATIONAL is edited specifically for this select circulation, which includes ministers of defense; ministers of civil aviation; chiefs of staff and leading flag-grade officers, Army, Navy, and Air Force; heads of national and international civilian aviation agencies; and industrial executives. AEROSPACE INTERNATIONAL is not offered to the public.

AEROSPACE INTERNATIONAL n'est distribué que sur demande à un nombre limité de hauts fonctionnaires du gouvernement, de dirigeants des organismes scientifiques et des industries astronautiques des pays du monde libre. C'est un service de l'Association de la Force Aérienne des Etats-Unis et des compagnies d'aéronautique qui font de la publicité dans cette revue. AEROSPACE INTERNATIONAL est diffusé spécifiquement dans un groupe de personnalités sélectionnées qui comprend des ministres de la Défense, des ministres de l'Aviation Civile, des chefs d'Etat-Major ainsi que les principaux officiers généraux de l'Armée, de la Marine, et de la Force Aérienne, des représentants des compagnies d'aviation nationales et internationales et des directeurs d'industries. AEROSPACE INTERNATIONAL n'est pas destiné au public.

AEROSPACE INTERNATIONAL ist eine Veroeffentlichung der United States Air Force Association in Zusammenarbeit mit den Inserenten dieses Heftes, das nur auf Anfrage an eine Auswahl von Fuehrungskraeften auf hoechster Ebene, in Regierungen, Wissenschaft und Welt-raumindustrie der freien Welt zugeleitet wird. AEROSPACE INTERNATIONAL wird nur fuer folgend ausgewaehlten Personenkreis herausgegeben: Verteidigungsminister; Unternehmer im zivilen Flugwesen; Stabchefs und leitende Offiziere von Heer, Marine und Luftwaffe; Leiter von nationalen und internationalen Zivilflugunternehmen sowie industrielle Fuehrungskraefte. AEROSPACE INTERNATIONAL wird nicht oeffentlich angeboten.

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MEMORANDUM

To: Readers of AEROSPACE INTERNATIONAL

From: John F. Loosbrock, Editor

Last month your publication got a new name—AEROSPACE INTERNATIONAL—a title in keeping with the broad coverage of aerospace technology that is our prime editorial mission.

This month, as part of our continuing effort to serve you, our busy readers in diverse nations of the Free World, we institute what we sincerely hope will be a useful new service. This is the translation into French, German, and Spanish of the summary descriptions of our articles that appear on the contents page. Our decision to offer this extra editorial service was based on our belief that the busy reader who may not have a full command of English might find it convenient to determine, by examining the translated article summaries, which articles are of particular interest to him. Once having done this, he can then order their translation for himself and his professional colleagues and subordinates. Beyond that, the translated articles will of course be valuable additions to the readers' files for future ready reference.

We were prompted to offer the summary translations by our own experience in our Washington offices. Quite often, publications arrive in our office which seem of obvious interest to us. And although various members of our staff are conversant with languages other than English, usually the article published in a foreign language that seems of interest does not match the particular fluency of the staff person interested in the article. Yet in those cases where summary translations have been offered, we note, we are usually persuaded to order full translation of the article.

We hope that our new service will be similarly helpful to our select inter-

national audience and that you will let us know your reactions. It might be possible even to expand the service, if readers desire. Hearing from you, our readers, is most important to us as—month by month—we endeavor to provide the reportage and analysis of the aerospace scene we believe will be useful to you.

The Global USAF

This is an especially important issue of AEROSPACE INTERNATIONAL that we think will be not only of immediate interest but also a significant future reference source for you. We provide this month an in-depth report on the global United States Air Force—its missions, weaponry, and organization.

From modest beginnings the U.S. Air Force has evolved into a vast force, with a broad array of skills and missions ranging from the deterrence of nuclear war to advanced research and development.

This huge complex continues to face a broad set of challenges encompassing the maintenance of its deterrent strength and the requirements for fighting a limited war for limited objectives halfway around the world. And as the reader will note, there is no shortage of problems for the various commanders of the U.S. Air Force, whether they are working in the combat environment of Vietnam, training the pilots and missile crews, running the airlift, directing advanced technological exploration, or keeping the financial accounts that are a crucial support of military forces everywhere.

In addition to the reports on the global USAF, we publish this month a gallery of USAF aircraft and missiles, and a specially prepared chart

of the major commands of the U.S. Air Force and their commanders. The chart depicts as well the structures of the USAF Secretariat and the Air Force Headquarters in the Pentagon.

The Military Balance

In our nearly two years of publication, we have been heartened by the warm response of our readers across the Free World. This response has strengthened our determination to continue providing each month useful information about the ever-expanding aerospace world. We continue to believe that communication is the key to understanding and progress in an increasingly complex era.

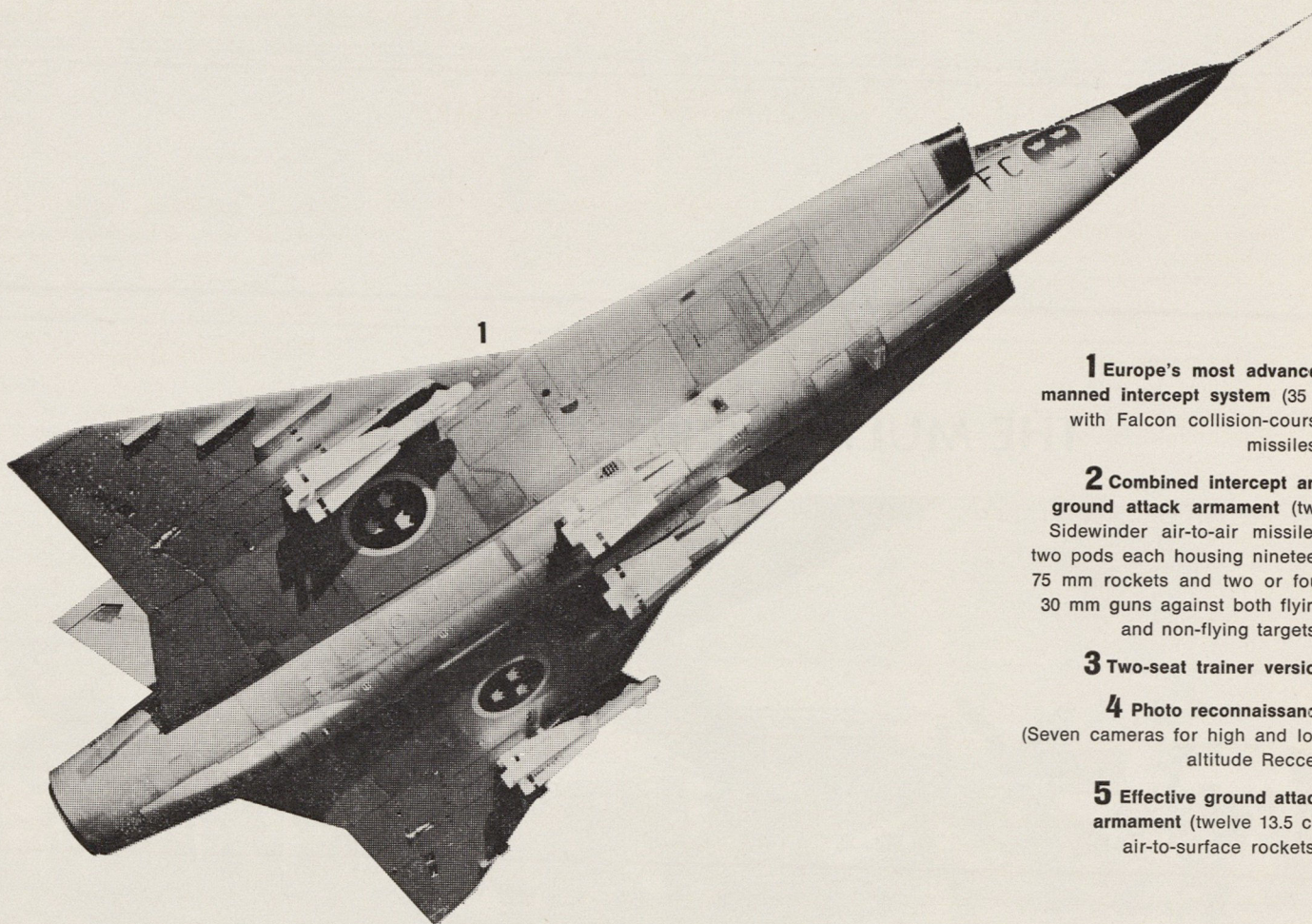
Next month, we are pleased to report, AEROSPACE INTERNATIONAL will offer a unique and, we are confident, exceedingly useful service. This will be the publication in full of the report of the respected and authoritative London-based Institute for Strategic Studies on "The Military Balance, 1966-1967."

This always widely quoted Institute document, published in full on these pages for the readers of AEROSPACE INTERNATIONAL, will for the first time be made available to a readership much broader than the Institute's usual audience. To accommodate this lengthy but highly useful "Military Balance" report, the coming issue of AEROSPACE INTERNATIONAL will be a double January-February number. We will resume publication on our regular schedule in March 1967.

In the meantime, we want to thank you again for your continuing response to AEROSPACE INTERNATIONAL and to renew our invitation to each of you to continue your welcome comments and communications. ☆☆☆

Decisive advantages of the Draken

Sweden's Saab 35 Draken multi-purpose, all-weather combat aircraft, offers many advantages of utmost importance for costconscious nations in need of a carefully balanced air defence: • The Draken combines the advanced performance required for effective interception with the weapon-carrying capability needed for ground attack missions. • The Draken airborne radar and fire control system increases many times the possibilities for contact and weapon delivery in interception. • The Draken carries heavy attack armament without appreciable increase of take-off distances. • The Draken is designed from the outset to clearly defined requirement for effective air defence against flying and non-flying targets under all weather conditions. • The Draken has proved to be a safe and reliable aircraft in service, protecting Sweden's neutrality in peace-time. In war-time the aircraft offers optimum all-weather defence against aggressor aircraft, as well as ability to carry a heavy load of effective weapons against ground targets. Special photo reconnaissance and trainer versions are adding to the versatility of the Draken system.



1 Europe's most advanced manned intercept system (35 F with Falcon collision-course missiles).

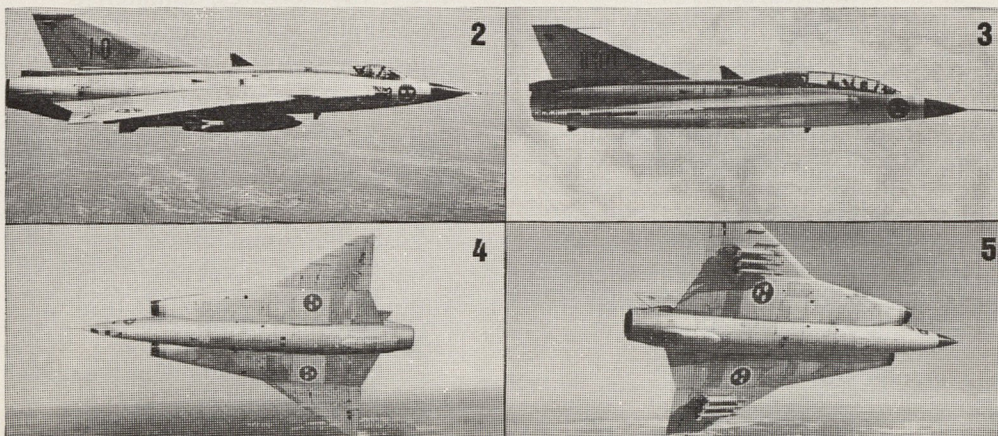
2 Combined intercept and ground attack armament (two Sidewinder air-to-air missiles, two pods each housing nineteen 75 mm rockets and two or four 30 mm guns against both flying and non-flying targets).

3 Two-seat trainer version

4 Photo reconnaissance (Seven cameras for high and low altitude Recce).

5 Effective ground attack armament (twelve 13.5 cm air-to-surface rockets).

PROVEN DRAKEN VERSATILITY

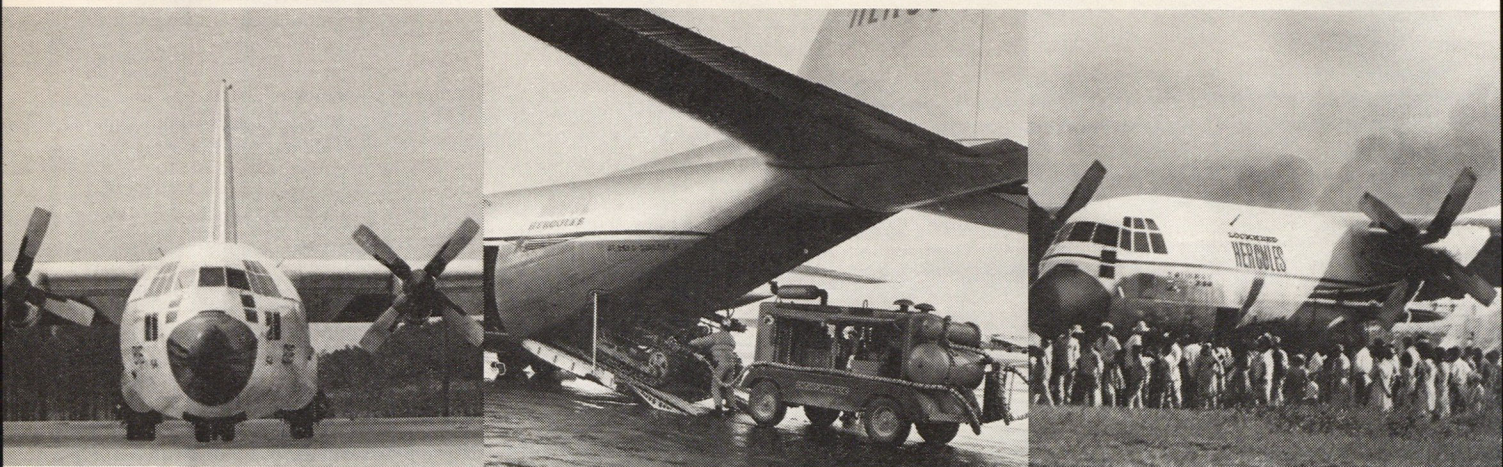


**SAAB
AKTIEBOLAG**

(SAAB AIRCRAFT COMPANY)
LINKÖPING • SWEDEN

C-130 HERCULES

THE MULTI-PURPOSE AIRLIFTER



The Military C-130 Hercules can fulfill a broad range of missions—from dramatic in-flight rescue pickup to troop support, in and out of the most inaccessible areas.

In Latin America, a Hercules made air history by climbing 23,500 feet over the Andes to make the first landing of its kind on the short and narrow jungle strip at Rodriguez de Mendoza in Peru. In its out-size cargo hold: two large bulldozers and a heavy compressor. Forming a cargo or personnel airbridge to remote areas is just part of the Hercules story.

The C-130 Hercules, unmatched in versatility and economy, is just one of a family of famous airlifters designed and developed by Lockheed-Georgia. Others are the utility personnel/cargo C-140 JetStar transport; today's largest operational military cargo fanjet, the C-141 StarLifter; and tomorrow's giant C-5A, the largest plane in the world.

LOCKHEED

LOCKHEED-GEORGIA COMPANY, MARIETTA, GEORGIA, U.S.A.
A DIVISION OF LOCKHEED AIRCRAFT CORPORATION

As the complexity and cost of the hardware—airplanes, missiles, electronic systems—of the U.S. Air Force have increased, so has the demand for high-quality, expensively trained people to operate these worldwide systems. In the space age, the Air Force emphasis is on . . .

People—USAF's Key Components

BY CLAUDE WITZE
Senior Editor

The history of the United States Air Force is not an obscure subject for either America's allies or the nations behind the Iron Curtain. No one needs to be told what American airpower did in World War II, or much about what it has done since.

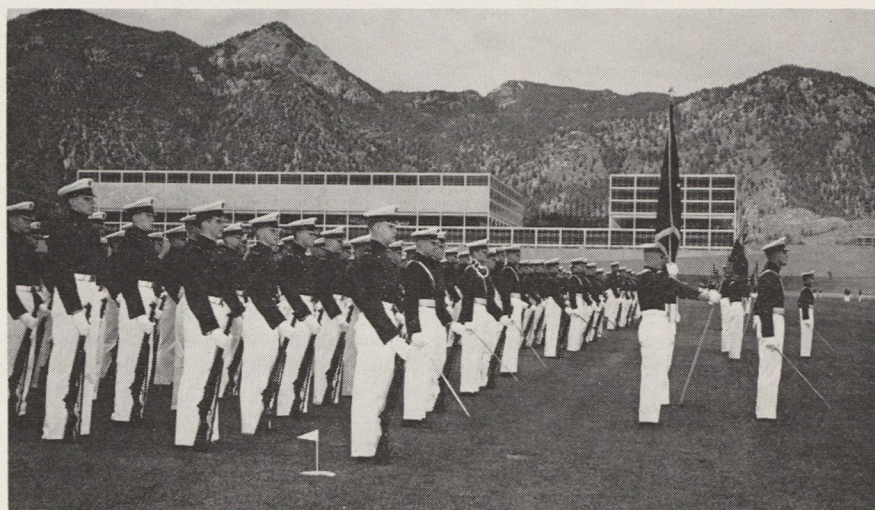
The impact has been felt. Probably the Berlin Airlift is the most striking example, and not a bomb was dropped. We can suggest other spots on the map—Lebanon, Suez, the Congo, Korea, Cuba, and now the agony in Vietnam. USAF has faced many challenges since it became separated from the U.S. Army in 1947 to fly from its own runways and missile pads.

It was called the Army Air Forces in World War II. The commanding general was H. H. "Hap" Arnold, and his actual leadership, starting as Chief of the Air Corps, went back to 1938. General Arnold died in 1950.

The story is told that General Arnold was concerned about the future of American airpower even before the end of World War II. In early 1945 he assembled his entire Pentagon staff to give them "something to think about." There is no record of his exact words, but the substance of the message has been relayed down the years.

"The pilot will not always be the key to airpower," General Arnold is credited with saying. "For the present, yes. For the immediate future, yes. But even now mechanical gadgets are fast encroaching on the pilot's domain. We are entering the era of the guided missile. Someday, perhaps in your time, the man holding my job will meet here with a headquarters staff composed of scientists, both the long-haired and short-haired variety, and they will wear no wings on their chests. The pilot's wings will have ceased to be the yardstick of Air Force achievement. That's something for you to think about."

History has proven that General



At the U.S. Air Force Academy, the 2,500-man Cadet Wing stands at parade rest. Sabres are carried by First Classmen, who will be the next to graduate and win commissions. In background are classroom buildings and barracks, topped by the Rampart Range of the Rocky Mountains. There are maneuver areas on the grounds, used for training.

Arnold was right, but not entirely right. The missiles are here, indeed, but the airplane, with a man in the cockpit, is far from gone. USAF Headquarters leans heavily on scientists. But it is also buying airplanes and the pilot-training program is being accelerated. And the role of the scientist has not been confined to improving missile technology. Airplane technology gets its share of attention.

The turning point in this situation was thrust upon USAF by the Communists. Between 1945, when General Arnold made his prediction, and 1950, when the Korean War started, USAF had been in decline. It is estimated that the Air Force budget in 1946 was \$4,276,000,000. By 1949 it was down to \$1,059,000,000. In 1950 it went back up to \$3,600,000,000.

General Nathan F. Twining, a former

USAF Chief of Staff, has written that "Korea was a strategic blunder of the first magnitude on the part of the U.S.S.R." The budget figures for USAF, just quoted, actually marked the start of a new military policy for the United States. Between 1945 and 1950 this country fully recognized the cold war with communism while it unilaterally let its military establishment go into fast decline.

Korea proved that Russia and other Communist nations would be willing at least to sponsor "brush-fire" wars wherever they might cause the most trouble. The United States, by limiting its military strength, did not help hold the peace, but encouraged the use of war as an instrument of policy.

"The final recognition of this fact by the American people," said De- (Continued on following page)

fense Secretary George C. Marshall, "made it possible to start the rebuilding of the Armed Forces to the minimum strength required for the security of the United States."

The most striking result of this recognition was reflected in the new budget and activity of the Air Force. At the start of the Korean War there were 42 combat-effective wings and 416,314 officers and men. By 1951 expansion was authorized to 95 wings and more than 1,000,000 personnel.

It took time to get the airplane production lines rolling again, but it was not long until the Strategic Air Command, the Tactical Air Command, the Air Defense Command, and the Air Training Command emerged with new stature. Perhaps equally important as these organizations with assignments in the air, there was established the Air Research and Development Command, eventually to take charge of the missile development program in addition to advanced aircraft effort.

Commented the official Air Force history:

"For the United States, the sudden shock of naked Communist aggression in Korea may have been providential. The American people could now clearly see that world peace would come through strength and not through weakness."

Ten years after this renaissance General Curtis E. LeMay, one of the great commanders of World War II, was USAF Chief of Staff. The man who had made the Strategic Air Command the most respected military power in the world looked at what he had in the entire Air Force in 1961 and concluded that his most critical requirement was **people**.

There was, and still continues, a great discussion on the priorities that should be given to space, missiles, manned aircraft, basic research, and other essentials. But, General LeMay concluded, the technical complexity of new systems and the speed with which frontiers were being broken made manpower his main concern.

"Despite the current fascination with computers and automation," General LeMay said, "the greatest computer devised is still the human brain."

The place for the human brain seemed obvious to him. There was the necessity to provide USAF operational units with the best equipment as fast as possible. Trained men were needed all the way from concept to operational readiness.

There was new stress placed on management. The Air Force conducted seminars on management techniques; there were required readings on the subject, conferences with management specialists from industry. Air



Henry H. (Hap) Arnold, Commanding General of the U.S. Army Air Forces in World War II, predicted early in 1945 that missiles might soon replace the airplane, and that scientists, rather than pilots, would someday run the Air Force. He was right in many respects, but the pilot today continues to fulfill a key role in the world's Armed Forces.

Force officers were sent to the Harvard School of Business Administration for graduate studies. Equal challenges and opportunities appeared for USAF's enlisted men. They, too, needed more skills and were given the chance to develop them.

None of this is exactly what Hap Arnold had in mind when he lectured his staff in 1945 about the future decline of the pilot's wings as a sign of prestige in the Air Force. But it was the necessary result of the technological revolution that Hap Arnold knew was coming.

The need for high-quality manpower had to grow as USAF reached for new frontiers in both the air and space. This meant that recruiting had to become more selective; the men going into uniform had to have the best education and skills that could be found. More specialization was needed.

Because training became more expensive, complicated, and time-consuming, the Air Force career had to be made more attractive. USAF cannot afford to mobilize this kind of talent for short terms of military service. There have been efforts to increase pay, provide better military housing, bonuses for reenlistment, and faster promotion. The problem has not been solved, but it has been eased.

While these problems are faced every day in every Air Force command, from the laboratories to the maintenance line at some remote USAF base, they probably are most critical for the Air Force Systems Command. AFSC is responsible for

the weapon system from research and development to its delivery to the operational commands. For several years it was commanded by General B. A. Schriever, the man credited with making a success of the ballistic missile program.

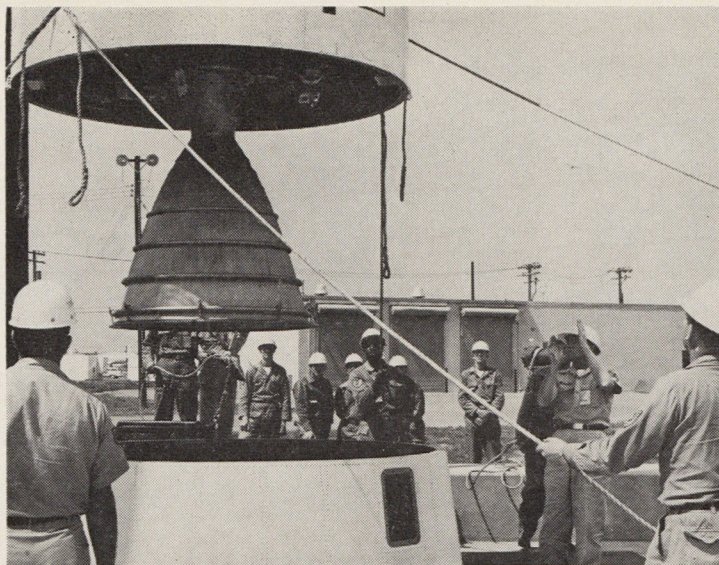
General Schriever retired last summer, but not without giving his opinion of the Air Force's personnel problem, with emphasis on motivation.

The General said that AFSC provides good educational opportunities for young officers, along with experience in technology and the management of technical programs. He also believes that USAF loses more good people, through early retirement and resignations, than is healthy for the long-term future of the service. He continued:

"One of the problems is that it is difficult, in a military organization, to provide adequate recognition, through promotion or pay, to some of this top talent. Research and development and management of systems are not the standard kind of military job.

"The whole military organization is built around operational units and training and logistical support. The age of technological explosion has brought about a new breed and a new type of organization in the military...."

Like General Hap Arnold, General Schriever is a man who went into the service (in 1931) because he wanted to fly. He did, and even spent some time as an airline pilot before settling on USAF for a career. He thinks there still are many men who will join USAF



The advent of sophisticated aerospace weapon systems has made it necessary to develop improved procedures in the selection and training of men to operate and maintain them. Here instructors at the Air Training Command Center at Sheppard Air Force Base, Texas, demonstrate to student airmen the techniques of mating stages of the Titan missile.

for the flying, but the pilot will remain a "special breed." The interest of the Air Force in tomorrow's technology, he says, and the challenging tasks it will have in that area, will motivate the technical officer. General Schriever finds evidence that the nonrated officer—the one without a pilot's wings on his uniform—is losing his fear that he does not have equal opportunity with his flying colleagues.

The fact remains that aircrew duties, in the cockpit or out, claim the attention of more USAF officers than any other activity. A year ago, the count was 46,300 officers and 19,600 airmen taking care of and operating airplanes. Another 5,000 officers and airmen are involved in missile operations.

All of these people work on Air Force bases. To operate and maintain these bases, to provide the "house-keeping" that is needed by USAF units all over the world, takes the time and talent of about 25,000 officers, 280,000 airmen, and well over 100,000 civilians.

The job of weapons maintenance, the people with skill and know-how to keep everything combat-ready, takes another large contingent—more than 7,000 officers, close to 240,000 non-commissioned officers and airmen, and 100,000 civilians.

USAF technical services—communications, medical, engineering, education, etc.—demand about 29,000 officers, 140,000 airmen, and 67,000 civilians.

For research, development, and procurement, where high competence and

wise decisions are essential, the responsibility is heavy. In 1965 there were 9,000 officers, 1,300 airmen, and nearly 12,000 civilians working on these problems.

The uniformed men on these rosters come from sources where the Air Force can control their training and their quality. Some of the principal sources are:

- The Air Training Command. Now more than 23 years old, ATC provides both officers and enlisted men prepared to do their jobs. For reasons already made clear, at least three out of every four men going through USAF basic training today are moved on into technical training. There are 1,100 technical training courses offered to prepare airmen to support and maintain the modern weapon systems. ATC is responsible for USAF recruiting. It also teaches the chosen officer cadre how to fly, and to navigate, in a dozen training wings scattered over the United States from Texas to Washington. Last year, ATC turned out 700,000 men from its five technical training centers, and more than 2,000 new pilots. The figures will be higher this year.

- The Air Force Academy. Newest of the U.S. military academies, AFA graduated its eighth class last June, providing 462 new second lieutenants. Located at the edge of the Rocky Mountains in Colorado, the Academy is a college providing a four-year course. By 1971 there will be nearly 4,500 cadets. So far, more than 90 percent of those physically qualified have taken flying training from ATC.

- The Air Force Reserve Officer Training Corps. It is called AFROTC. It provides a flow of junior officers from the nation's colleges. These men attend AFROTC classes during their regular college years and a summer field program where they can see the Air Force in operation. They are paid for their duty, and scholarships are available. The program is in effect at approximately 175 colleges and universities.

Mention also must be made of the Air University. This, in effect, is USAF's graduate school, with most of its activity centered at Maxwell Air Force Base, in Alabama. There is an Air War College, Air Command and Staff College, Squadron Officer School, Warfare Systems School, and an Institute of Technology. Officers are assigned to attend the university, usually at the point in their career where they show promise of advancing to positions of command and responsibility.

All of these help contribute the right kind of people to the USAF arsenal, to help fill what General LeMay said was his most critical requirement.

The fact that today's Chief of Staff is not meeting daily with a staff of scientists, as predicted by Hap Arnold, is an accident of history, probably caused by the strange nature of the threat. General Arnold had no reason to anticipate Korea or Vietnam, where pilots are essential. The modern, unmanned weapons are here, too, in a deterrent position. The scientists are not on the staff in great numbers, but they have molded the talents and skills of the aerospace force. ☆☆☆



USAF trains its navigators in a "Flying Classroom." It is a transport, fitted with periscope sextants in ceiling. Here a student takes fix on stars as exercise.

Here is a special report on the organization and capabilities of the United States Air Force, which, with its array of manned aircraft, missiles, complex air defense, and command and control systems, is a worldwide operation with tasks that range from deterrence of general war, to fighting a hot war in Southeast Asia, to the exploration of space. Including its Reserve Forces and civilian support teams, the U.S. Air Force numbers nearly two million people . . .

USAF's Global Airpower— Its Missions and Organization

BY FLINT DUPRE

The U.S. Air Force is composed of about 890,000 men and women in uniform. About 131,000 are officers, the rest enlisted men. In addition, there are approximately 340,000 civilian employees, and some 491,000 members of the Air Reserve Forces, civilian airmen who can be called upon in times of emergency.

The Air Force job consists of nine major functions, and three additional ones. It supplies the U.S. with the capabilities to:

- Maintain general aerospace supremacy and thus support U.S. policy of deterring conflicts of any intensity.
- Defend the United States against aerospace attack.
- Control vital aerospace areas.
- Conduct strategic and tactical aerospace warfare against selected enemy targets, if deterrence fails.
- Furnish tactical air support for the ground forces.
- Provide logistical support, including airlift, and support and resupply of airborne operations.
- Conduct combat support operations such as strategic and tactical reconnaissance and meteorological study.
- Meet the major space requirements of the Department of Defense.
- Provide research, development, test, and engineering of satellites, boosters, space probes, and associated systems necessary to support specific National Aeronautics and

Space Administration (NASA) projects and programs arising under basic agreements between the Department of Defense and NASA.

In its additional assignments USAF trains forces to help the U.S. Navy to:

- Interdict enemy seapower through air operations.
- Conduct antisubmarine warfare and protect shipping.
- Conduct aerial mine-laying operations.

The strategic, tactical, and defense roles of the Air Force are of primary importance. But recently airlift has been added to the list of most important Air Force missions. The volume of cargo and passengers now being flown between the United States and Southeast Asia by the Air Force makes it seem like a walk across the street compared to earlier operations. Yet the distance is a third of the way around the globe.

Airlift and other air support missions are varied.

For example:

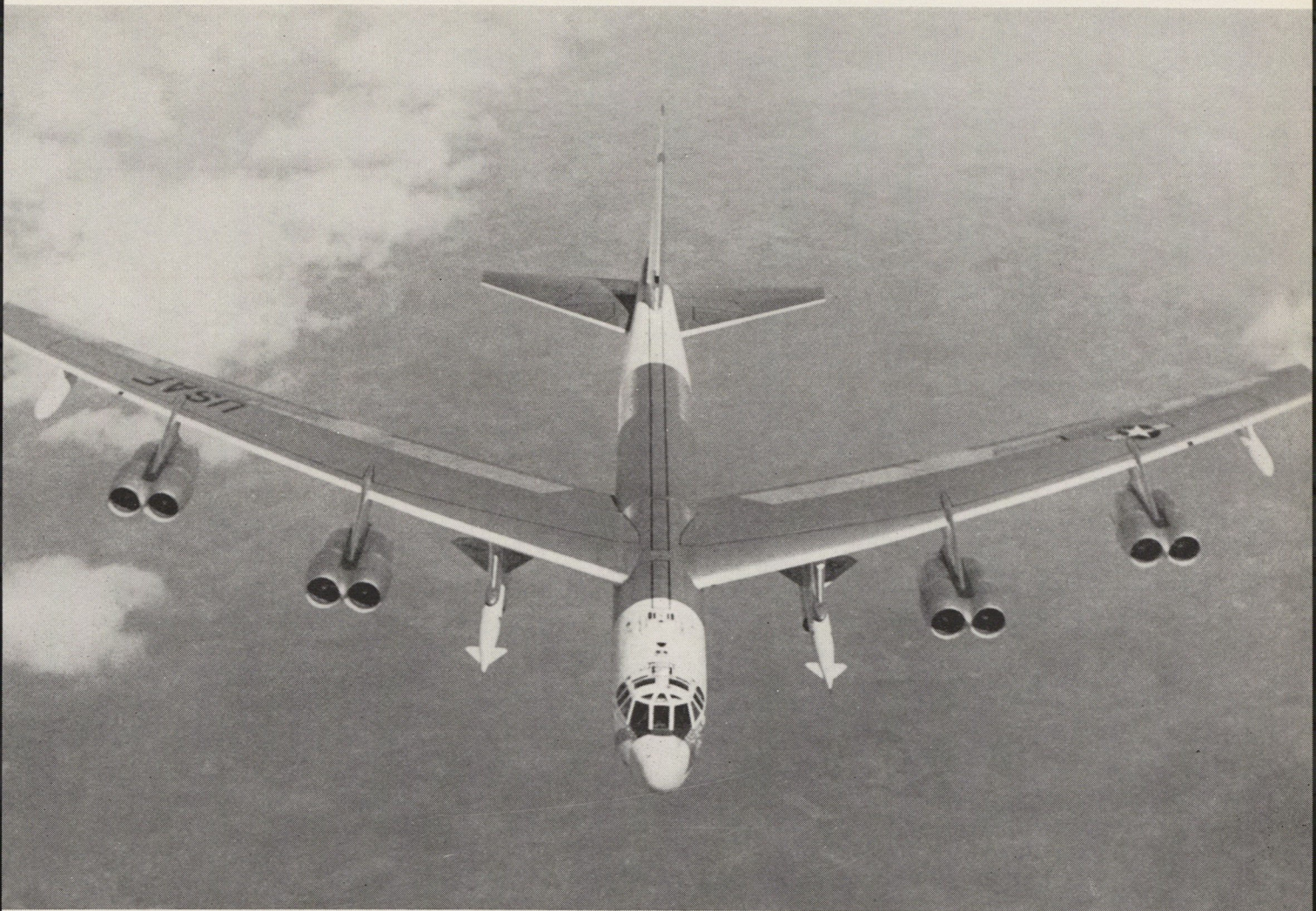
The Air Force provides long-range airlift into new battle areas for Army spearhead units and Air Force tactical-air-force deployments, following this with continuing large-scale resupply airlifts to sustain and augment these combat units. It also furnishes aeromedical evacuation; support and resupply of airborne operations; aerial photography; and tactical reconnaissance.

It provides rescue services for any military or civilian personnel in disasters anywhere in the Free World; furnishes rescue and recovery service to astronauts of the U.S. space program; provides long- and short-range weather forecasts; provides aerial electronic surveys leading to constant upgrading of maps and charts for all users.

The U.S. Air Force is the air arm of the Department of Defense, the air spe-



Gen. Maximo Errazuriz, Chilean AF Chief of Staff, presents Chilean Great Star of Military Merit to Gen. John P. McConnell, the USAF Chief of Staff.



The manned mainstay of the U.S. Air Force's strategic nuclear airfleet is the Boeing-built B-52 intercontinental bomber, shown above in flight carrying two Hound Dog nuclear missiles, which can be fired at strategic targets from airborne standoff positions.

cialist on call to the Joint Chiefs of Staff, the air component of specified and unified commands, and the air military organization that helps provide air support to such world organizations as NATO, SEATO, and others. It has air attachés in several dozen countries assigned in various duties of mutual military and civilian cooperation.

In command of the U.S. Air Force, under the President of the U.S. and his Secretary of Defense, are the Secretary of the Air Force and the Air Force Chief of Staff.

The Secretary of the Air Force is 39-year-old Harold Brown. He is assisted by a civilian staff that includes an Undersecretary with two deputies, for international affairs and manpower; three Assistant Secretaries, for financial management, research and development, and installations and logistics; an Administrative Assistant; a General Counsel; three Directors, for information, legislative liaison, and space systems; a Chairman of the Air Reserve Forces Policy Committee; and a Direc-

tor for the Manned Orbiting Laboratory program.

The USAF Command and Staff is headed by 58-year-old General John P. McConnell, Chief of Staff. He has a Vice Chief and Assistant Vice Chief in his immediate office, and assistants for intelligence, Reserve Forces, operations analysis, and administrative services. He also has The Inspector General, Judge Advocate General, Surgeon General, Chief of Chaplains, Chief Scientist, Chairman of the Scientific Advisory Board, and a Secretariat that includes a secretary, director, and three executive secretaries, for designated systems management, the Air Force Council, and the Air Staff Board.

The Comptroller of the Air Force and five Deputy Chiefs of Staff—for personnel, plans and operations, programs and resources, research and development, and systems and logistics—are the ranking officers for a large Air Staff that covers all military functions. Included in some of these specialties not already mentioned are budget; data automation; training; edu-

cation; aerospace programs; civil and maintenance engineering; command, control, and communications; weather; science and technology; foreign development; reconnaissance; transportation; military assistance; and WAF (Women of the Air Force).

The Air Force Secretary and the Chief of Staff use all people assigned to their two offices as they see fit in order to run the worldwide organization the most competent way possible. They confer each day on policy matters.

Headquarters USAF directs a field organization consisting of 20 major air commands and almost 200 bases and installations in the United States and 24 other countries. In terms of sheer size and assets, the USAF is larger than the ten largest corporations in the United States taken together. It has 1,700,000 people, assets of about \$80,000,000,000, and an annual budget of more than \$22,000,000,000. In fact, the Air Force is larger in scope, responsibilities, and expenditures than many countries of the world.

(Continued on following page)

THE UNITED STATES AIR FORCE MAJOR COMMANDS

The 20 major commands of the U.S. Air Force can be classified in some respects: Strategic, Tactical, Defense, and Airlift for combat; Systems, Logistics, and Training for major support; Europe, Pacific, Southern, and Alaskan for overseas; Air University and Air Force Academy for education; Continental, for Reserve Forces units; Communications, Security, Accounting and Finance, Aeronautical Chart and Information, and Aerospace Research for technical support; and Headquarters Command.

The following is a brief description of each of the commands.

Strategic Air Command

Strategic Air Command (SAC) is the U.S. long-range strike force, comprised of a mixture of combat aircraft and intercontinental ballistic missiles. It is responsible for the delivery over enemy targets of between 80 and 90 percent of the Free World's nuclear firepower, if the need arises. SAC's primary mission is to prevent nuclear war through its ability to deliver this nuclear firepower to any part of the globe, even if subjected to surprise attack.

SAC also has the capability of

delivering conventional (nonnuclear) weapons with its large force of B-52 and B-58 bombers. SAC's blend of missiles and aircraft is continually maintained at the highest level of alert of any military force in history. Within the warning time provided by the new over-the-horizon radars and BMEWS, SAC's ground alert of bombers and tankers can be airborne and safe from an enemy attack. In addition, a small percentage of SAC's B-52 strength is in the air, within range of possible targets, on airborne alert, 24 hours a day. SAC maintains a strategic aerial reconnaissance force, which includes long-range, high-altitude, supersonic reconnaissance aircraft.

SAC's major commands are the Second Air Force at Barksdale Air Force Base, Louisiana; the Eighth Air Force at Westover Air Force Base, Massachusetts; the Fifteenth Air Force at March Air Force Base, California; the 1st Strategic Aerospace Division at Vandenberg Air Force Base, California; and the 3d Air Division at Andersen Air Force Base, Guam.

SAC not only is a major command of the U.S. Air Force, but also is a specified command of DoD, which

(Continued on page 14)



Strategic Air Command's manned aircraft strike forces are augmented by advanced missiles such as this Minuteman solid-fueled weapon here blasting off in a test.



Although basically designed for strategic-nuclear roles, Air Force's B-52s have shown their limited-war abilities in the Vietnamese War. Based on Guam, the huge aircraft, carrying conventional bomb loads, have wrought havoc on the Viet Cong and have provided air support to allied forces on the ground. The aircraft carry dozens of 750-pound (340 kg) bombs, totaling more than 60,000 pounds (27,000 kg) of destructive power.

SCIENCE/SCOPE

Five years of useful orbit life is close to maximum for a satellite powered by a hydrogen-peroxide reaction system. Now Hughes is developing a propulsion system that promises to have a 20-year lifetime. New system uses the power available to the satellite to electrolyze water into hydrogen and oxygen, which are burned in a rocket to maintain proper station position.

Hughes 10,000-channel high-frequency single sideband Manpack radio, which the U.S. Army is employing successfully in Viet Nam, is now being tested by the U.S. Air Force and U.S. Marines. The two services are conducting operational suitability tests here and abroad on this man-portable, lightweight set that will communicate reliably in jungle-type terrain.

A 16-month-long test of Japan's BADGE system was successfully completed recently by Hughes. BADGE (Base Air Defense Ground Environment) is the first of the Tactical Air Weapons Controls Systems Hughes is developing for many Free World nations. Equipment delivery to Japan is scheduled for completion this month. When it goes operational, Japan and the surrounding Pacific area will be covered with an electronic network that will automatically detect, track, and identify supersonic airborne targets.

Two laser units for commercial use were introduced recently by Hughes. They're suitable for spectroscopy, stress analysis, holography, optical pumping and instrumentation. The completely packaged pulsed lasers use singly-ionized argon gas, can produce six wavelengths simultaneously in the blue-green portion of the visible spectrum. Both are air-cooled, use normal 115-volt, 60-cycle power. Laser heads are self-contained, include discharge tube, mirrors, pulse forming network, trigger transformer, cooling fan. Power supply contains cathode heater supply, internal trigger oscillator, controls and indicators.

When England's EMI Electronics acquired a 49 percent interest in Hughes International (UK) Ltd. recently, the Hughes subsidiary changed its name to Emihus Microcomponents Ltd. New partnership will expand product areas across the entire components field, and will exploit the marriage of complementary technologies so vital for advanced microelectronics products.

The TV-guided Condor missile's data-link system is being developed by Hughes under a multi-million-dollar contract with North American Aviation's Columbus Division. Hughes is building the complete electronic systems and antennae for both the missile and the Navy aircraft that will launch it. The Condor is expected to give carrier-based aircraft a standoff capability and greatly increased bombing accuracy.

A millimeter-wave amplifier tube with an average CW power output in excess of five kilowatts has been developed by Hughes Research Laboratories. Previous upper limit was a one-kilowatt Hughes tube. New tube, developed under contract to Union Carbide Corporation for the U.S. Atomic Energy Commission, will be used at Oak Ridge for heating magnetically-confined plasma in experiments directed toward controlled thermonuclear fusion.

HUGHES INTERNATIONAL
HUGHES AIRCRAFT COMPANY

CULVER CITY, CALIFORNIA, U.S.A.

means it reports directly to the Joint Chiefs of Staff. Personnel: approximately 200,000 military and 22,000 civilians. Headquarters: Offutt Air Force Base, Nebraska (near Omaha).

Tactical Air Command

Tactical Air Command (TAC) is charged with organizing, equipping, training, administering, and operating assigned and attached forces to maintain combat-ready forces capable of conducting worldwide tactical air operations. As a component of the U.S. Strike Command, TAC conducts, controls, and coordinates tactical air operations according to tasks assigned by Commander in Chief, Strike Command. In addition, when designated by the Joint Chiefs of Staff, TAC provides forces for the Air Force component of the U.S. Atlantic Command (USLANTCOM), as was done in the 1965 Dominican Republic operation. TAC is ready on a moment's notice to deploy powerful, tailored packages of airpower nonstop to any spot on the globe.

Support of the U.S. Army is a vital responsibility of TAC. It has a versatile array of aircraft ranging from supersonic jets through modern cargo aircraft, to propeller-driven light aircraft for conducting its missions of air superiority, close air support, interdiction, reconnaissance, tactical airlift, and special air warfare. TAC trains personnel for the tactical air forces overseas and supervises the training of 70 percent of all U.S. Air Reserve Forces.



SAC is the Air Force's manager for in-flight refueling. The usefulness and importance of the process is illustrated by this photograph of a flight of Northrop F-5 fighter-bombers being refueled by a KC-135, preparatory to F-5 air strikes against North Vietnam.

TAC's major commands are the Ninth Air Force at Shaw Air Force Base, South Carolina; the Twelfth Air Force at Waco, Texas; and the Nineteenth Air Force at Seymour Johnson Air Force Base, North Carolina. TAC also has a Tactical Air Warfare Center at Eglin Air Force Base, Florida; a Tactical Air Reconnaissance Center at Shaw Air Force Base; an Air-Ground Operations School and Special Air Warfare Center at Hurlburt Field, Florida; a Tactical Airlift Center at

Pope Air Force Base, North Carolina; and a Tactical Fighter Weapons Center at Nellis Air Force Base, Nevada. In addition, TAC operates the 1st Air Commando Wing at England Air Force Base, Louisiana.

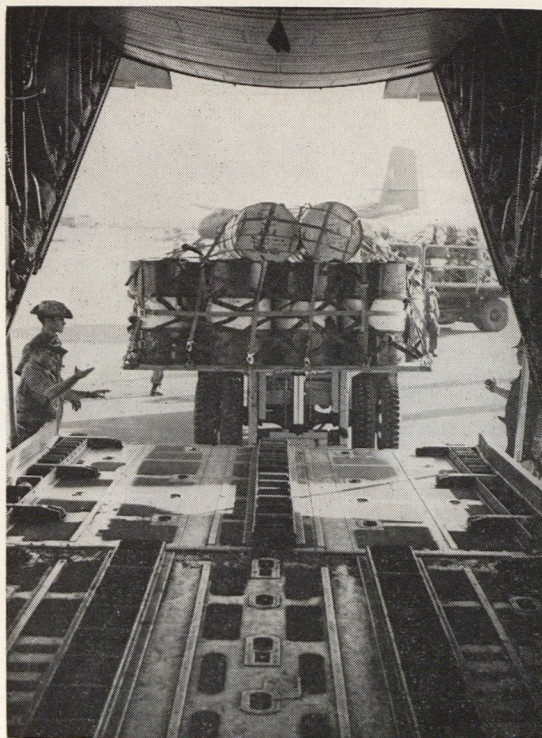
Personnel: approximately 75,000 military, 10,500 civilian. Headquarters: Langley Air Force Base, Virginia (near Norfolk).

Air Defense Command

Air Defense Command (ADC) is the U.S. Air Force component of the joint United States-Canadian North American Air Defense Command (NORAD), which has the function of detection, identification, interception, and destruction of any aerospace attack on the North American continent. ADC provides more than 70 percent of the personnel and equipment used by NORAD.

ADC administers, trains, and equips Air Force aerospace defense forces for battle readiness, responsive to the operational requirements of the Commander in Chief, NORAD. ADC operates for NORAD the Ballistic Missile Early Warning System (BMEWS) to detect and identify any intercontinental ballistic-missile attack. ADC operates the Spacetrack System, the U.S. Air Force element of NORAD's Space Detection and Tracking System (SPADATS), which monitors all man-made objects in space.

ADC's major commands are the First Air Force at Stewart Air Force Base, New York; the Fourth Air Force at Hamilton Air Force Base, California; the Tenth Air Force at Richards-Gebaur Air Force Base, Missouri; and the



These are palletized loaders used to put fuel drums aboard a Lockheed C-130 transport at Tan Son Nhut Air Base near Saigon. Airlift of troops and supplies has played a vital role in the prosecution of the Southeast Asian conflict, both in terms of the long logistical pipeline from the United States to South Vietnam and the movement of men and materials within the war-torn land.



The Air Force's huge new transport, the jet-powered Lockheed C-141 StarLifter, is now in service on Military Airlift Command's air supply routes from the United States to Vietnam. Until the arrival of the giant C-5A, the C-141 will be the top USAF transport craft.

Fourteenth Air Force at Gunter Air Force Base, Alabama. ADC also has the 9th Aerospace Defense Division at Ent Air Force Base, Colorado.

Personnel: approximately 94,000 military and civilians. Headquarters: Ent Air Force Base, Colorado (in Colorado Springs).

Military Airlift Command

Military Airlift Command (MAC) operates a global airlift and transport system, including air rescue, air weather, air photographic and geodetic services, and an aeromedical evacuation system throughout the world for

the Department of Defense, in accordance with wartime requirements established by the Joint Chiefs of Staff. MAC maintains a force of about 1,100 aircraft, half of which are used for airlift, and has units in about 60 countries to maintain and control its aircraft and crews wherever they may be directed.

To maintain a ready capability, MAC trains daily in accomplishing routine and special airlift missions, and conducts frequent mobility training exercises, troop deployments, combat air-drops of troops and heavy equipment, contingency and humanitarian airlifts. MAC has two major commands, the Twenty-first Air Force at McGuire Air

Force Base, New Jersey, and the Twenty-second Air Force at Travis Air Force Base, California. It has three services, Aerospace Rescue and Recovery Service at Orlando Air Force Base, Florida; Air Weather Service at Scott Air Force Base, Illinois; and Aerospace Audio-Visual Service at Orlando. In addition to operational airlift wings under the two numbered Air Forces, MAC operates four specialized airlift wings—the 443d at Tinker Air Force Base, Oklahoma, for crew training; the 375th Aeromedical Airlift Wing, Scott Air Force Base, Illinois; the 1370th Photo Mapping Wing, Turner Air Force Base, Georgia; and the 89th Military Airlift Wing, Andrews Air Force Base, Maryland, which provides air transportation for the President and other high Government officials.

Heavily committed in support of Vietnam, MAC anticipates increasing requirements will raise command strength to 100,000 in future months.

Personnel: approximately 72,000 military and 13,000 civilians. Headquarters: Scott Air Force Base, Illinois (across the Mississippi River from St. Louis, Missouri).

Air Force Systems Command

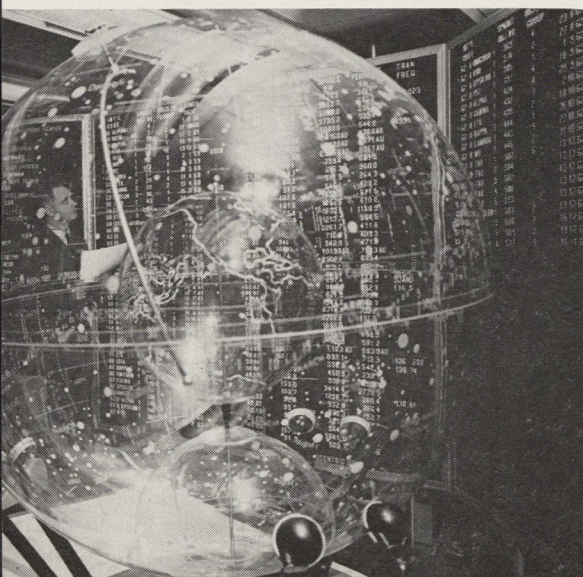
Air Force Systems Command (AFSC) is organized to provide the most up-to-date and effective management of the U.S. Air Force scientific and technical resources, and is the single manager of all phases of acquisition of new aerospace systems. Its mission is to accomplish the rapid advancement of aerospace technology and its adaptation into qualitatively superior operational aerospace systems. It enables the Air Force to meet the major space requirements of the Department of Defense, and provides research, development, test, and engineering of satellites, boosters, space probes, and associated systems necessary to support specific NASA projects and programs conducted jointly by DoD and NASA.

The Commander of AFSC, with headquarters near Washington, directs the operations of eight divisions, five development and test centers, two test ranges, and a contract management division.

Personnel: approximately 29,300 military and 32,000 civilians. Headquarters: Andrews Air Force Base, Maryland (near Washington, D. C.).

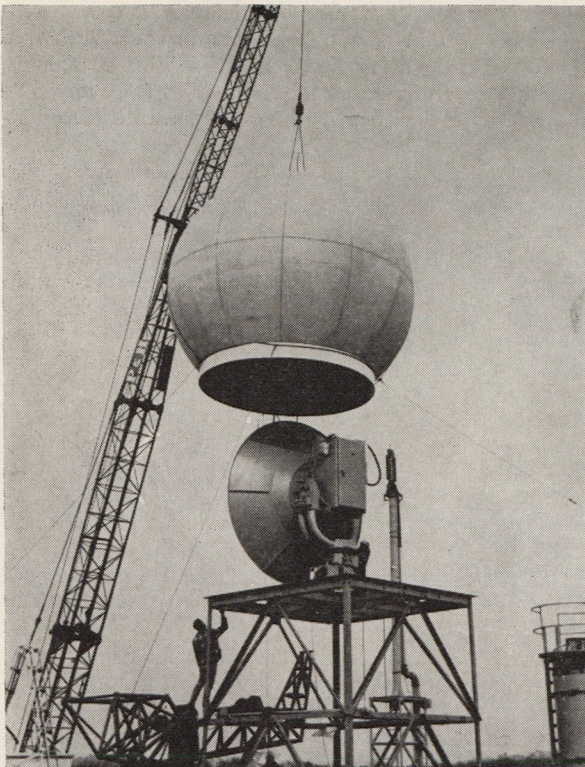
Air Force Logistics Command

The Air Force Logistics Command's (AFLC) primary mission is to keep every weapon system in the USAF inventory in good operating condition at the least possible cost to the taxpayer. AFLC has nine industrial-type (Continued on following page)



Keeping track of all man-made objects in space orbit is the job of the North American Air Defense Command's Space Detection and Tracking System, the multiservice SPADATS center at NORAD's Combat Operations Center, Colorado Springs, Colorado.

Computers aid specialists in the complex astronomical accounting and logging operation.



New long-range weather radar systems scheduled for use in Southeast Asia are readied for testing by AFSC. Three systems form triangle for coverage of several hundred thousand square miles for weather forecast teams.



A damaged nose section of an F-100 gets rapid on-site repair job from Air Force Logistics Rapid Area Maintenance (RAM) team in Vietnam. AFLC field teams are composed mostly of civilians. They expedite the removal, recovery, and repair of crash- and battle-damaged aircraft.

complexes called Air Materiel Areas (AMA). Within these AMAs there is a System Support Manager for each of the 276 types of USAF missile and aircraft systems, as well as the most complicated of communications-electronics systems.

Ogden (Utah) AMA manages the Minuteman missile; San Bernardino (California) AMA, the Atlas and Titan missiles; Oklahoma City (Oklahoma) AMA, the B-52 bomber; San Antonio

(Texas) AMA, the B-58 bomber; Mobile (Alabama) AMA, the F-105 fighter-bomber; Warner Robins (Georgia) AMA, the C-133 transport; and so on. Through such specialized logistic management AFLC keeps its procurement, maintenance, supply, and transportation functions attuned to the instant needs of its customers—the operational commands at home and overseas. AFLC is unique in that nearly 90 percent of its people are civilians, occu-

pying more than 835 different kinds of highly skilled jobs, all aimed at keeping the Air Force ready for instantaneous action at any time.

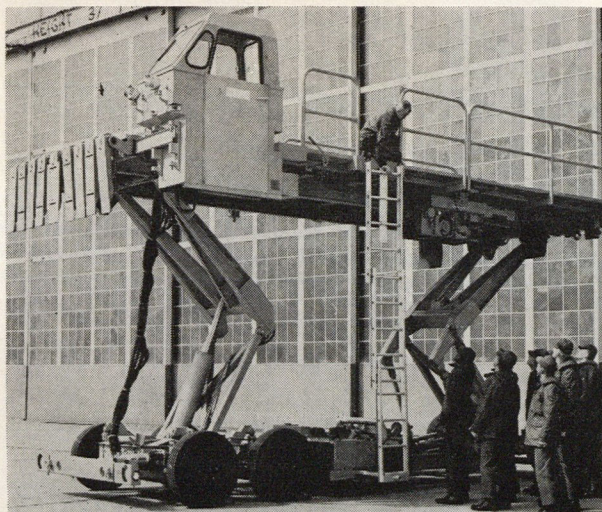
Personnel: approximately 16,500 military and 125,250 civilians. Headquarters: Wright-Patterson Air Force Base, Ohio (near Dayton).

Air Training Command

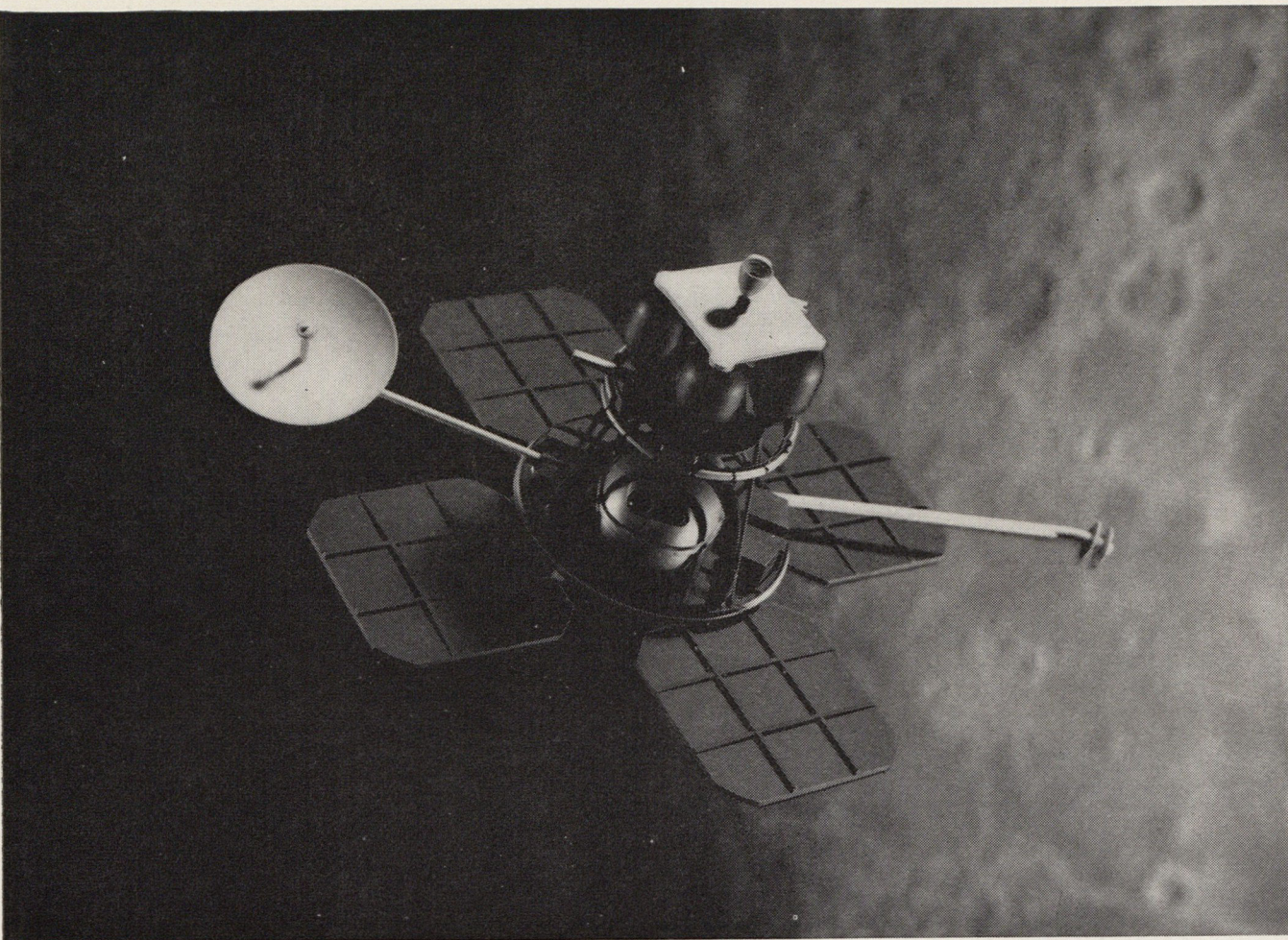
Air Training Command (ATC) is responsible for recruiting and training. In the real sense of academic classroom instruction, followed by graduation from a formalized course of study, more than 600,000 students, representing more than half of the strength of the Air Force, are trained by ATC each year. Basic military training is under way for more than 150,000 enlisted men and 6,000 officer trainees in Fiscal Year 1967, due to a buildup in Air Force strength. More than 500,000 students enter more than 2,800 different technical training courses each year.

Some 2,264 new pilots were trained in Fiscal Year 1966. This figure will increase to 3,000 in FY 1967. In addition, about 800 new navigators are trained annually. About 2,100 foreign students are graduated each year from ATC Military Assistance Program courses.

Personnel: approximately 78,000 military. (Continued on page 18)



This is part of the Air Force's versatile 436L aircraft loading and unloading system, a vehicle which, with various attachments, can be converted into a bulldozer, crane, and forklift. Here Air Force personnel are being taught operation of the system by Training Command instructor. It is already in use in Vietnam.



FIRST U.S. spacecraft to orbit the moon, to photograph earth from the moon and to photograph far side of moon, was NASA's Boeing-built Lunar Orbiter, shown above. Orbiter flew and maneuvered flawlessly throughout its mission. It photographed thousands of square miles along moon's equator to help NASA select level, safe landing sites for America's Apollo

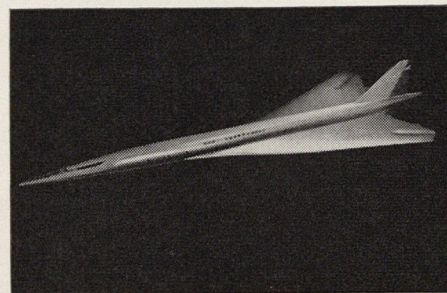
astronauts. In addition, Orbiter data revealed exact shape of moon and its gravitational characteristics. Astronomers report Orbiter sent back more moon information than had been learned in the past 50 years. Designed and built by Boeing for NASA, Orbiter's first flight began 28 months, 15 days after contract signing, shortest span ever for a major U.S. spacecraft.

Capability has many faces at Boeing



DASH, torpedo-carrying anti-submarine helicopter, operational with U.S. Navy, is powered by Boeing T50 gas turbine engine.

CH-47A, Boeing Chinook helicopters are deployed to Vietnam with 1st Cavalry Division (Airmobile). In its 30-foot payload compartment, the Chinook can transport a fully-equipped combat platoon, combat vehicles, infantry support weapons, or, as in recent rescue operation, 170 refugees.



SST. Boeing supersonic transport design features variable-sweep wing. Retracted, as shown above, wing and horizontal tail form integrated surface for maximum efficiency at supersonic speeds. Extended, wing provides added span and high-lift devices for maximum stability and control during low-speed approaches and landings.

BOEING

1916 * 50th Anniversary Year * 1966

itary and 22,000 civilians. Headquarters: Randolph Air Force Base, Texas (near San Antonio).

United States Air Forces in Europe

U.S. Air Forces in Europe (USAFE), a powerful U.S. overseas air arm, is a primary instrument in the western line of defense. Its responsibility extends from the United Kingdom to Pakistan. USAFE is the air arm of the unified U.S. European Command. In time of war, command functions would be directed by SHAPE (Supreme Headquarters, Allied Powers Europe). The command's weapon systems are ready for strike, defense, and reconnaissance operations. They include Europe's only combat missile wing, strategically placed along the Iron Curtain.

Logistic and tactical airlift are provided under a joint USAFE-MAC plan of coordinated control. USAFE aircraft earmarked for use in NATO constitute the largest single air contribution of any nation in the alliance.

USAFE's major commands are the Third Air Force at South Ruislip, England; the Sixteenth Air Force at Torrejon Air Base, Spain; and the Seventeenth Air Force at Ramstein Air Base, Germany. It has two air divisions, the 86th at Ramstein, and the 322d at High Wycombe Air Station, England, and the U.S. Logistics Group (TUSLOG) at Ankara, Turkey.

Personnel: approximately 63,000 military and 33,000 civilians. Headquarters: Lindsey Air Station, Germany (in Wiesbaden).

Pacific Air Forces

Pacific Air Forces (PACAF), the U.S. Air Force air arm in the Pacific-Far East, is responsible, in conjunction



Exchange visits between allied personnel in Europe are occasion for "shop talk" about aircraft maintenance problems. Here some USAFE noncommissioned officers and their Federal Republic of Germany military counterparts talk over their mutual problems.

with U.S. allies, for maintaining control of the air over the western Pacific Far East. PACAF is the air component of the unified U.S. Pacific Command.

Operating over more than one-third of the earth's surface, PACAF is prepared to react swiftly to any aggression with both defensive and offensive forces. Its forces are composed of nuclear and conventionally equipped tactical bombers; supersonic fighter bombers; Mace tactical missiles; reconnaissance aircraft; heavy cargo aircraft; and the light conventional strafing and bombing aircraft most effective in waging special air warfare operations. Responsibility for air defense of the land areas of the Pacific Command is assigned to Commander in Chief, PACAF.

PACAF also assists in the training of friendly air forces, including the

Vietnamese, in offensive and defensive air tactics and techniques.

PACAF's major commands are the Fifth Air Force at Fuchu Air Station, Japan; Seventh Air Force at Tan Son Nhut Air Base, Vietnam; and the Thirteenth Air Force at Clark Air Base, Philippine Islands. Also under its direct command is the 315th Air Division based at Tachikawa Air Base, Japan, which provides combat cargo airlift throughout the PACAF area, including Vietnam.

Personnel: approximately 110,000 military and 35,000 civilians. Headquarters: Hickam Air Force Base, Hawaii (near Honolulu).

U.S. Air Forces Southern Command

U.S. Air Forces Southern Command (USAFSO) is the air component of the unified Southern Command operated under the Joint Chiefs of Staff, and is the major USAF instrument outside the United States directed toward the development of the capabilities of the air forces of Latin America.

USAFSO's specific mission responsibilities as a component command include: advising and assisting in the implementation of military assistance plans and programs in Latin America; exercising command of six U.S. military groups in Chile, Argentina, Peru, Paraguay, Uruguay, and Colombia; providing special air operations training for Latin American air forces with appropriate emphasis on potential civic action projects; conducting and coordinating search-and-rescue operations in the USSOUTHCOM area; carrying out contingency and operational planning; and providing for the air defense of the Canal Zone.

Fresh meat on the hoof is flown to outposts scattered throughout the Republic of Vietnam by USAF transports. Right, a Montagnard tribesman leads a cow from a C-123 at a U.S. Army Special Forces camp. With roads frequently blocked by Viet Cong, air transport is vital to economy of Vietnam.





USAF Southern Command operates the Inter-American Air Forces Academy for Latin American Air Force personnel to learn technology with bilingual instruction. Here the lectures are on electrical system of T-33 aircraft. More than 20 courses are offered at the school.

As a major air command under Headquarters USAF, USAFSO missions include: providing logistic and administrative support of all USAF missions throughout Latin America; providing tropic survival and evasion training; conducting the Inter-American Air Force Academy; commanding all U.S. Air Force resources within the USSOUTHCOM area, and developing and exploiting sources of air intelligence information.

Implementation of the objectives of the command are oriented toward securing maximum benefits for the United States in good will, hemispheric solidarity, and mutual respect.

Personnel: approximately 2,500 military and 1,015 civilians. Headquarters: Albrook Air Force Base, Canal Zone (near Panama).

Alaskan Air Command

Alaskan Air Command (AAC), with its far-reaching warning system and an extra-strength General Dynamics/Convair F-102 Delta Dagger fighter squadron supplemented by General Dynamics/Convair F-106 Delta Darts, polices the 586,000 square miles (1,510,000 km²) of Alaska, some 50 miles (80 km), at the closest point, from the Soviet Union. The AAC electronic alerting system is maintained by 16 aircraft control and warning squadrons and 33 "White Alice" communications installations.

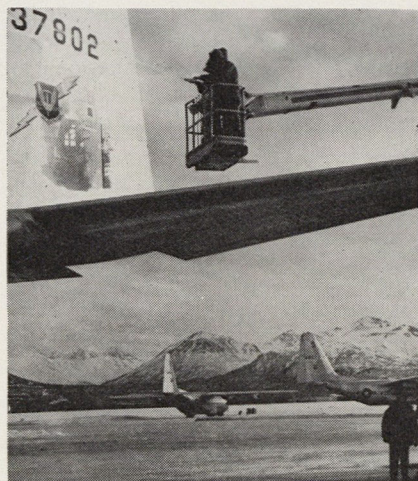
AAC is the air arm of the unified Alaskan Command and provides base facilities for the Strategic Air Command. It provides the major strength of the Alaskan NORAD region, the watchdog of the northernmost approaches to the continental United States. Several types of transport aircraft are used for resupplying the Alaskan Air Command's remote installations.

Personnel: approximately 10,630 military and 1,800 civilians. Headquarters:

Elmendorf Air Force Base, Alaska (near Anchorage).

Air University

Air University (AU) conducts advanced professional military education programs for more than 5,000 Air Force officers annually. Substantial numbers of U.S. Army and Navy officers and those from other Free World countries also attend AU professional education schools. It graduates some 2,000 officers and airmen annually from resident- and civilian-accredited courses in the arts and social sciences, biological and physical sciences, and management, medicine, and engineering. Another 5,500 officers and civilians complete special short courses in these fields, conducted both in residence and at civilian schools. The Air Force Reserve Officers Training Corps program, commissioning approximately 4,500 graduates a year in 182 U.S. col-



A Tactical Air Command C-130 gets sprayed with deicing solution prior to participation in winter exercises out of Elmendorf Air Force Base in Alaska.

leges and universities, is one of the primary sources of Air Force officers.

AU operates courses in the doctrine of employing aerospace vehicles and weapon systems, a modest research program related to its courses of instruction, and provides over 100 correspondence courses for more than 300,000 students.

Personnel: approximately 5,100 military and 2,300 civilians. Headquarters: Maxwell Air Force Base, Alabama (near Montgomery).

U.S. Air Force Academy

The U.S. Air Force Academy (US-AFA), a source of newly commissioned officers, provides instruction, motivation, and experience to all Cadets so that upon graduation they will have the knowledge and qualities of leadership that will enable them to take on increasing responsibilities throughout a lifetime of service to their country and the Air Force.

Toward this end, the Academy strives to attain certain minimum objectives: a basic four-year education in the sciences, the humanities, and other broadening disciplines; an understanding of aerospace power with all its capabilities, and the significant role it plays in national defense; high ideals of individual integrity, patriotism, loyalty, and home; a sense of responsibility and dedication to selfless and honorable service.

Personnel: approximately 1,700 officers and airmen, 3,200 Cadets, and 1,800 civilians. Headquarters: Colorado Springs, Colorado.

Continental Air Command

Continental Air Command (CAC) provides the active-duty Air Force with ready units and ready individuals of the U.S. Air Force Reserve to meet emergency requirements. These include 14 military airlift and troop carrier wings, 40 military airlift and troop carrier groups with supporting elements, and more than 500 aircraft, five aerospace rescue and recovery squadrons, and over 175 support-type units—military airlift support squadrons (mobile en route), maintenance squadrons (mobile), supply squadrons (mobile), communications flights (support), medical units, postal units, air terminal squadrons, and other contingency squadrons. These, plus many other units and individuals, constitute approximately 400,000 members of the Air Force Reserve.

Air Reservists have performed about one-third of the Air Force contribution to Army airborne training. Medical units can provide care for some 12,000 patients.

(Continued on following page)

Personnel: approximately 1,700 military and 8,500 civilians. Headquarters: Robins Air Force Base, Georgia (near Macon).

Air Force Communications Service

Air Force Communications Service (AFCS) provides two prime services vital to the efficient operation and command and control of U.S. defense forces: (1) long-distance and short-distance communications, and (2) air traffic control and navigational aids, both fixed and mobile.

Operating and maintaining a global network of communications, and a worldwide system of more than 1,500 electronic air navigational aids and air traffic control facilities, AFCS helps provide commanders at all levels with the means to operate, control, supply, administer, coordinate, and manage U.S. aerospace forces.

AFCS operates data and voice networks on USAF bases and over long distances for Air Force commands. Long-haul circuitry constitutes a major portion of the Defense Communications System (DCS) operated in support of the Department of Defense.

Personnel: approximately 45,000 military and 7,500 civilians. Headquarters: Scott Air Force Base, Illinois (see MAC).

Air Force Security Service

Air Force Security Service (AFSS) provides communications security services for U.S. aerospace forces to ensure that information transmitted by electrical means by these forces is safeguarded en route. Its functions include the collection and analysis of all types of unclassified, electrical Air Force communications to determine the effectiveness of communications security measures used, and meeting all the requirements of the U.S. aerospace forces for cryptographic materials and equipment. Additionally, USAF Security Service occasionally conducts research in communications phenomena in support of various elements of the U. S. Government.

Personnel: approximately 24,000 military and 3,400 civilians. Headquarters: Kelly Air Force Base, Texas (near San Antonio).

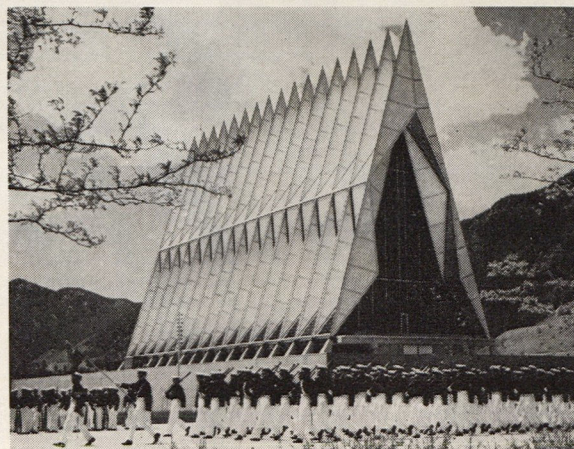
Air Force Accounting and Finance Center

Air Force Accounting and Finance Center (AFAFC) accomplishes centralized Air Force accounting and finance operational functions and provides technical supervision, advice, and guidance to Air Force accounting and fi-



The Air University Squadron Officer School, one of several schools at Maxwell Air Force Base, Alabama, gives Air Force people an opportunity to engage in seminars to help prepare them for staff assignments they will fill as junior officers.

The U.S. Air Force Academy at Colorado Springs, Colorado, newest of the American military academies, is located near the Rampart Range of the spectacular Rocky Mountains. The Academy is a prime source of today's desired "whole man" Air Force officer.



nance field activities. Centralized activities include issuing 450,000 checks to more than 1,000,000 allotment and retired-pay customers located in some 90 countries and possessions of the U.S., and making over 300 financial status reports each month to many different agencies of the U.S. Government.

Personnel: approximately 120 military and 1,700 civilians. Headquarters: Denver, Colorado.

Aeronautical Chart and Information Center

Aeronautical Chart and Information Center (ACIC) is the Air Force agency responsible for the production of aeronautical charts, air target materials, flight information publications, geodetic missile data, astronomical and geophysical charts, and reference materials. These products are furnished not only to Air Force organizations, but to all DoD Commands operating in aerospace and to U.S. Government agencies such as the Federal Aviation Agency and the National Aeronautics and Space Administration. It distributes from 90,000,000 to 110,000,000 copies of its publications each year to satisfy the requirements of all users.

ACIC is charting the moon for NASA, and provides specially designed space charts which are used by U.S. astronauts.

Personnel: approximately 270 mili-

tary and 3,800 civilians. Headquarters: St. Louis, Missouri.

Office of Aerospace Research

The Office of Aerospace Research (OAR) is the Air Force agency responsible for planning, programming, and managing the USAF research program. This research is accomplished by Air Force laboratories and through the use of contracts and/or grants with colleges, universities, and industrial laboratories; abroad through offices in Brussels, Belgium, and Rio de Janeiro, Brazil.

Research results are made available to U.S. Government agencies and the civilian scientific community.

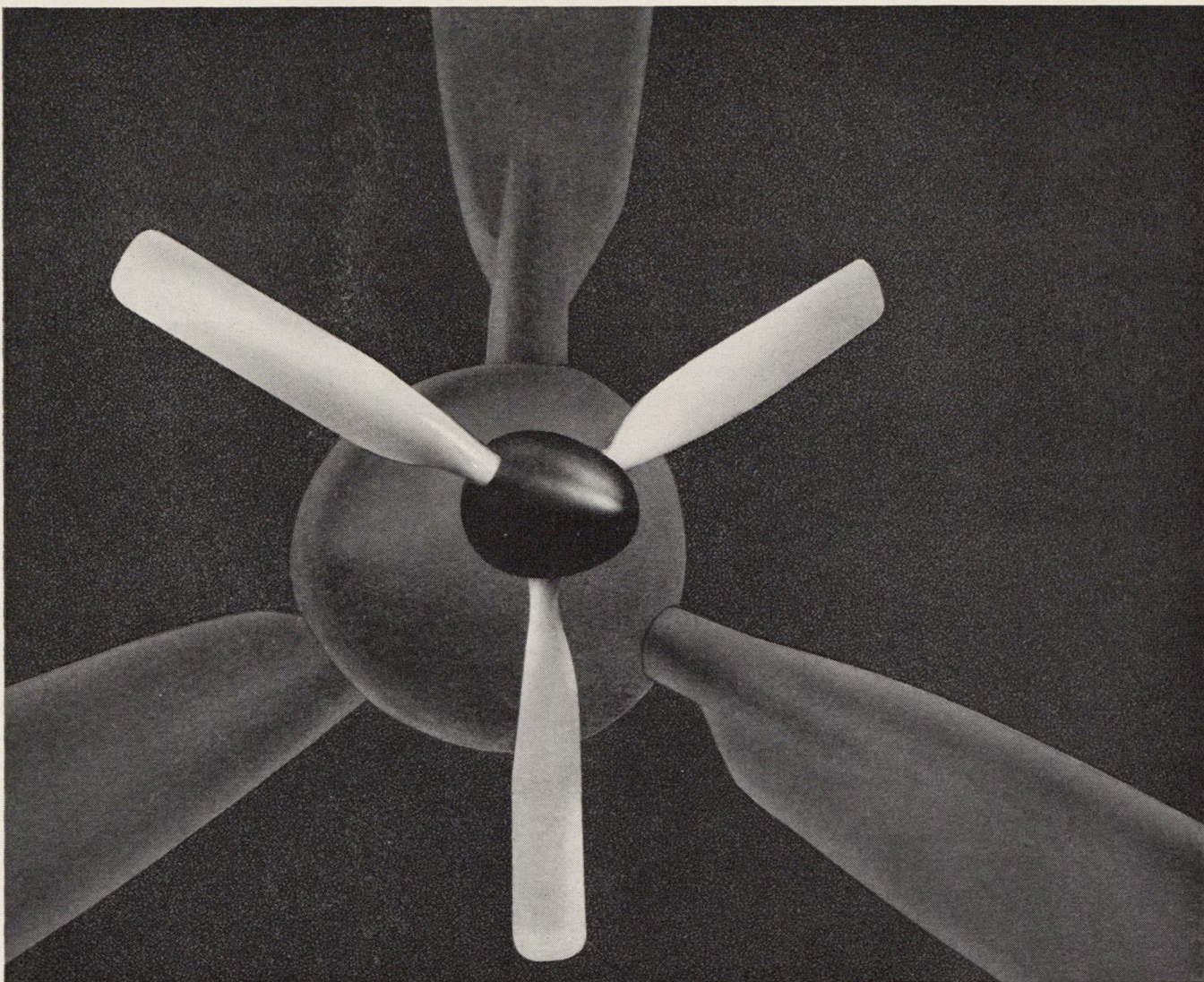
OAR provides a high-latitude launch capability at Fort Churchill, Canada, for research by DoD, NASA, and Canadian agencies. In conjunction with AFSC, OAR approves programs and allocates payload space on sounding rockets, deep space probes, and satellite vehicles for the Air Force Research and Exploratory Development Program.

Personnel: approximately 500 military and 1,400 civilians. Headquarters: Washington, D. C.

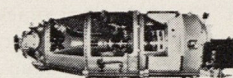
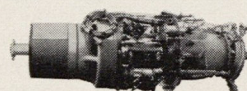
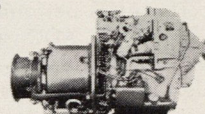
Headquarters Command

Headquarters Command, USAF (HED-COM) supports and services Headquarters USAF and other Air Force

(Continued on page 22)



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units in the Washington area. In addition, it administratively supports some 37,000 United States Air Force personnel in over 700 worldwide operating locations.

HEDCOM is responsible for supervision of Bolling and Andrews Air Force Bases, both near Washington; the U.S. Air Force Band; the 1100th Support Group; and the Malcolm Grow USAF Clinical Center. The latter serves approximately 100,000 military personnel and dependents.

Personnel: approximately 28,000 military and 9,000 civilians. Headquarters: Bolling Air Force Base, Washington, D. C.

Air National Guard

The Air National Guard (ANG), although not a major command, is a very important separate operating agency that provides the Air Force with some 1,500 mission aircraft and crews with a total of over 80,000 personnel, ready as units to meet emergency requirements of the active establishment.

ANG units in peacetime are commanded by the governors of the 50 states in which the units are located, as well as the Governor of Puerto Rico and the Commanding General in the District of Columbia.

Policy direction and support are received from the Air Force through the National Guard Bureau in the Pentagon. The operations and training supervision is effected by the major Air Force commands to which the units would be assigned in the event of mobilization.

The ANG performs a large percentage of all ADC intercept missions, with 22 squadrons on 24-hour runway alert status. There are six aircraft control and warning squadrons also on alert.

Twenty-five ANG airlift squadrons are assigned to the Military Airlift Command, and one air transport squadron is under the Alaskan Air Command. ANG aeromedical evacuation units moved more than 7,500 patients and 5,300 passengers in the first year of the Vietnam program that began in August 1965.

General purpose aircraft of the ANG, under TAC, total some 800 planes. These are composed of tactical fighter, reconnaissance, air refueling, and air commando units. Other units include air weather flights, and communications and ground electronics engineering installation agency (GEEIA) units performing daily services for the active establishment. About 80 percent of the ANG airlift activities are in support of the active forces.



NORAD is responsible for the air defense of the entire North American continent. It consists of the air defense forces of both Canada and the United States. At left, a USAF F-102 and F-106 flank a Canadian Air Force CF-101. All are participating in the constant patrols of the northern areas of the continent.

THE UNIFIED COMMANDS

In addition to SAC's responsibility as a specified command, U.S. Air Force organizations and men are active participants in seven unified commands which are composed of two or more services and report directly to the Department of Defense. These unified commands and their missions follow:

U.S. Alaskan Command

The U.S. Alaskan Command (ALCOM) has the responsibility for welding Army, Navy, and Air Force components in Alaska into a functioning team.

Command forces must be able to conduct an active air and ground defense of Alaska, and to maintain the necessary bases and logistic support for operations by forces of other commands. In addition, the Commander in Chief, Alaska, is also Commander, Alaskan NORAD Region. In this capacity, he is responsible for early warning of air attacks against the North American continent and for the defense of Alaska. A joint Air Force-Army NORAD Region Headquarters operates the air defense system in Alaska.

The Army component of ALCOM is charged with ground defense, and the Alaskan Sea Frontier, with headquarters on Kodiak Island, is the command's sea arm. Its mission involves protection of sea communications, reconnaissance of Alaskan waters, submarine and antisubmarine operations, mining, and harbor defense. The Alaskan Air Command is the air component of ALCOM.

U.S. Atlantic Command

The Commander in Chief, U.S. Atlantic Command (LANTCOM) is re-

sponsible for all joint U.S. military action in the Atlantic Ocean area. With headquarters in Norfolk, Virginia, the Atlantic Command staff is composed of senior military officers from all U.S. services.

Atlantic Command was formed in 1947 to facilitate greater administrative and operational control of U.S. military forces in the Atlantic.

The Commander in Chief, LANTCOM, is aided by component commands when designated by the Joint Chiefs of Staff. The Army Force Atlantic (ARLANT) and Air Force Atlantic (AFLANT) consist of Army and Air Force units which would be integrated into the Atlantic Command when deemed necessary by the Joint Chiefs of Staff. Both of these component commands have their own commanders, and while the forces are not permanently assigned, they could be melded into the Atlantic Command on a moment's notice. The October 1962 Cuba operation is a prime example of how the Atlantic Command functions when fully activated.

The Atlantic Commander in Chief, in his capacity as Commander in Chief, U.S. Atlantic Fleet, controls all U.S. Navy and Fleet Marine Forces (NAVLANT) in the Atlantic area on a permanent basis. Combining this with designated Army (ARLANT) and Air Force (AFLANT) units, the Atlantic Commander in Chief has the capability to summon and deploy to a contingency area any of the three—or a combination of them—to counteract any emergency.

Additionally, the Commander in Chief, LANTCOM, and U.S. Atlantic Fleet is also Supreme Allied Commander, Atlantic, under the North Atlantic Treaty Organization (NATO), and as such is commander of designated allied forces from the eight

NATO nations which contribute deep sea forces to the defense of the Atlantic community in time of war.

CONAD/NORAD

Continental Air Defense Command (CONAD) is a unified command consisting of U.S. air defense forces. It is commanded by the same U.S. Air Force officer who heads North American Air Defense Command (NORAD), which is an international command consisting of both United States and Canadian air defense forces. NORAD is the single agency responsible for aerospace defense of the entire North American continent. It has operational control of its component commands: the U.S. Air Force Air Defense Command, U.S. Army Air Defense Command, U.S. Naval Forces NORAD, and the Royal Canadian Air Force Air Defence Command. Its headquarters are in Colorado Springs, Colorado.

U.S. Pacific Command

The U.S. Pacific Command (PACOM) has the broad responsibility of defending the United States against attack through the Pacific. PACOM also supports and advances U.S. interests in Pacific and Far East areas. Geographically, PACOM covers approximately 85,000,000 square miles (220,135,000 km²), extending from the west coast of the Americas to the Indian Ocean, and from the Aleutians to the South Pole.

PACOM took on its present organizational structure in July 1957 when DoD consolidated all U.S. forces in the Pacific and Far East under the Commander in Chief, Pacific (CINCPAC), who reports directly to the Joint Chiefs of Staff. His headquarters are in Hawaii. Operational command of PACOM forces is delegated by CINCPAC to component and unified commanders. Principal component commands are U.S. Army, Pacific (USARPAC), U.S. Pacific Fleet (PACFLT), and U.S. Air Forces Pacific (PACAF).

Subordinate unified commands are headquartered in Japan, Korea, Taiwan, Thailand, and Vietnam. Chiefs of military advisory and assistance groups throughout the area also report to CINCPAC, as do designated representatives in the Philippines, Ryukyu, Marianas-Bonins, and Australia. Some 750,000 men and women, representing all military branches, serve with PACOM.

U.S. European Command

The U.S. European Command (USEUCOM), relocated from St. Germain-en-Laye, France, to Stuttgart, Germany,

is the senior U.S. military headquarters in Europe. The U.S. Commander in Chief Europe (USCINCEUR), who is also the Supreme Allied Commander Europe (SACEUR), exercises operational control through his Deputy Commander in Chief over the following service components: the U.S. Army Europe (USAREUR), U.S. Naval Forces Europe (USNAVEUR), and U.S. Air Forces Europe (USAFE). The USCINCEUR also commands assigned Military Assistance Advisory Groups (MAAGs) and Missions in Europe and North Africa.

The primary mission of the U.S. European Command is to support the USCINCEUR in his responsibilities as Supreme Allied Commander Europe and to honor the U.S. commitment to NATO. In peacetime, U.S. forces are under control of U.S. commanders, but in wartime control of these forces passes to NATO. The SACEUR/USCINCEUR command results in daily coordination between the staffs of USEUCOM and Allied Command Europe. This relationship promotes, in peacetime, an intimate mutual familiarity with pertinent plans, policies, programs, and facilities, which is invaluable to members of the Alliance in event of war.

Other missions of USEUCOM include ensuring that assigned forces are organized, trained, and equipped for the conduct of sustained combat operations; administering the Military Assistance Program; and supporting other unified and specified commands, as directed by the Joint Chiefs of Staff.

U.S. Southern Command

The U.S. Southern Command (USSOUTHCOM), located on the Isthmus of Panama at Quarry Heights, directs U.S. military efforts throughout Central and South America. With a 7,500,000-square-mile (19,423,500 km²) area of responsibility, it advances a broad range of programs in Latin America that are vital to the security of the Western World.

USSOUTHCOM's primary mission is to provide defense for the Panama Canal. Other major missions of the command include:

- Administering the Military Assistance Program for Latin American countries,
- Directing U.S. participation in hemisphere defense exercises,
- Conducting mapping and charting activities,
- Directing disaster-relief and search-and-rescue operations.

The Commander in Chief, USSOUTHCOM, with his joint staff of Army, Navy, Air Force, and Marine

personnel, exercises operational control over the army, navy, and air forces assigned for the defense of the Panama Canal.

Because these minimal forces are not required at all times to man positions in defense of the Canal they may be used in accomplishing the collateral tasks that make up the balance of the USSOUTHCOM mission.

To aid Latin American countries in military assistance programming, the Commander in Chief is represented in Latin American countries by a senior officer of one of the Armed Services. He is the principal military adviser to the U.S. Ambassador and directs the military assistance and advisory efforts of his Army, Navy, and Air Force section chiefs as they work with their counterparts of the host country.

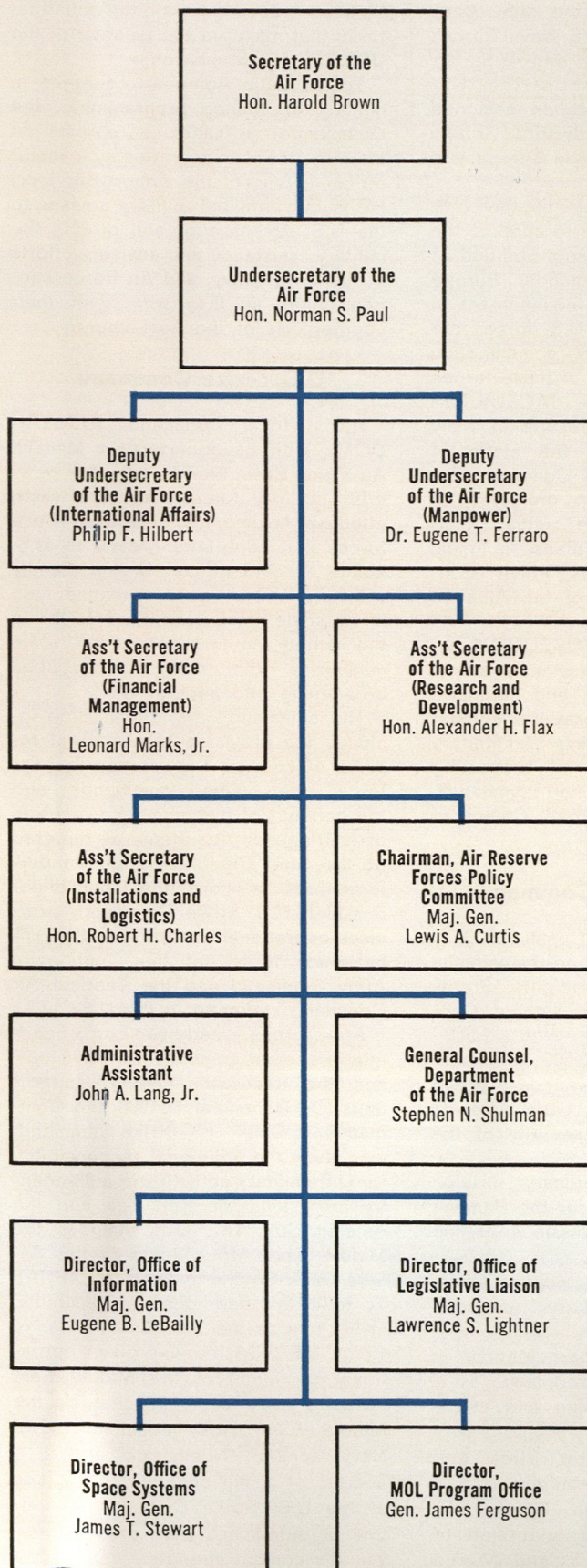
U.S. Strike Command

U.S. Strike Command (USSTRI-COM), with headquarters at MacDill Air Force Base, Florida, provides powerful striking forces that are swift, effective, flexible, and selective. These forces can contribute greatly to U.S. ability to deal efficiently and rapidly with any limited war in a manner and on a scale best calculated to bring the limited war to a conclusion, while minimizing the risk of hostilities broadening into general war.

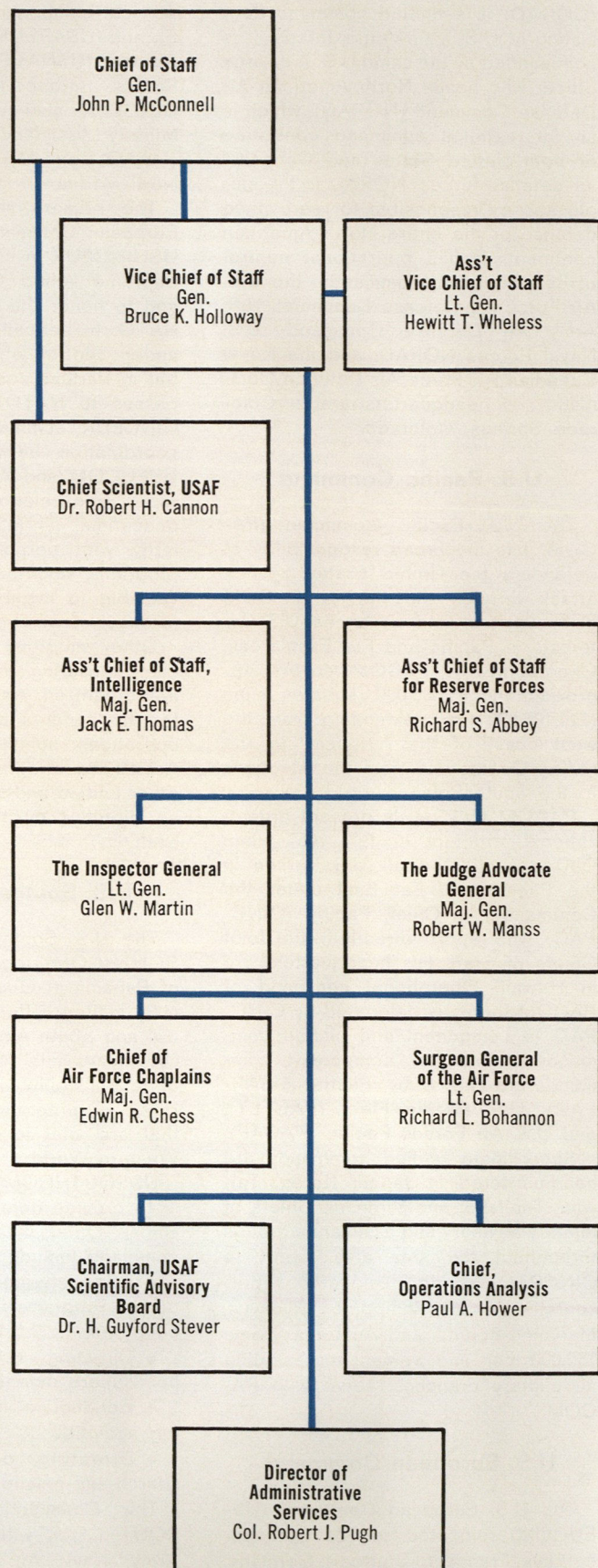
The command's twofold mission includes the provision of a general reserve of combat-ready forces to reinforce other unified commands, and the conduct of planning for execution of contingency operations as directed by the Joint Chiefs of Staff. To perform these missions, the Commander in Chief, U.S. Strike Command, exercises operational control over all combat-ready forces of the Continental Army Command and the Tactical Air Command stationed in the U.S.

Army forces include two corps headquarters, eight combat-ready divisions, and the necessary combat support units. On December 1, 1963, the Commander in Chief, U.S. Strike Command, was given the additional responsibility for U.S. military activities in a 63-country area, plus the Red Sea and the Persian Gulf. This area includes the Middle East, Africa south of the Sahara, and Southern Asia (MEAFSA). To fulfill this additional responsibility, in his role as the U.S. Commander in Chief, MEAFSA, he was given operational command of the Middle East Force, a Navy element located in the Middle East under command of a Navy admiral. Numbering almost a quarter of a million men, the forces of the U.S. Strike Command constitute a significant part of the Free World's combat strength. ☆☆☆

THE U.S. AIR FORCE SECRETARIAT



THE U.S. AIR FORCE CHIEF OF STAFF



THE U.S. AIR FORCE

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	Assistant for Colonel Assignments Col. H. F. Knowles				

An AEROSPACE INTERNATIONAL

Command & Staff Chart

(As of November 1, 1966)

THE MAJOR COMMANDS OF THE U.S. AIR FORCE

Commander in Chief, Strategic Air Command Gen. John D. Ryan Hq. Offutt AFB, Neb.	Air Defense Command Lt. Gen. Herbert B. Thatcher Hq. Ent AFB, Colo.	Commander in Chief, United States Air Forces in Europe Gen. Maurice A. Preston Hq. Lindsey AS, Germany	Commander in Chief, Pacific Air Forces Gen. Hunter Harris, Jr. Hq. Hickam AFB, Hawaii	Tactical Air Command Gen. Gabriel P. Disosway Hq. Langley AFB, Va.	Continental Air Command Lt. Gen. Henry Viccellio Hq. Robins AFB, Ga.
2nd Air Force Lt. Gen. Austin J. Russell Hq. Barksdale AFB, La.	9th Aerospace Defense Division Maj. Gen. Oris B. Johnson Hq. Ent AFB, Colo.	3rd Air Force Maj. Gen. John S. Hardy Hq. South Ruislip, England	5th Air Force Lt. Gen. Seth J. McKee Hq. Fuchu AS, Japan	9th Air Force Maj. Gen. Don O. Darrow Hq. Shaw AFB, S.C.	1st Reserve Region Brig. Gen. James H. Isbell Hq. Andrews AFB, Md.
8th Air Force Lt. Gen. David Wade Hq. Westover AFB, Mass.	1st Air Force Maj. Gen. Gordon H. Austin Hq. Stewart AFB, N.Y.	16th Air Force Maj. Gen. Stanley J. Donovan Hq. Torrejon AB, Spain	7th Air Force Lt. Gen. William W. Momyer Hq. Tan Son Nhut AB, Vietnam	12th Air Force Maj. Gen. Henry G. Thorne, Jr. Hq. Waco, Tex.	3rd Reserve Region Col. Jerome Tarter Hq. Dobbins AFB, Ga.
15th Air Force Lt. Gen. William K. Martin Hq. March AFB, Calif.	4th Air Force Maj. Gen. Carroll W. McColpin Hq. Hamilton AFB, Calif.	17th Air Force Maj. Gen. John D. Lavelle Hq. Ramstein AB, Germany	13th Air Force Lt. Gen. James W. Wilson Hq. Clark AB, Luzon, P.I.	19th Air Force Maj. Gen. Luther H. Richmond Hq. Seymour Johnson AFB, N.C.	4th Reserve Region Col. John T. Shields Hq. Randolph AFB, Tex.
1st Strategic Aerospace Division Maj. Gen. Harold E. Humfeld Hq. Vandenberg AFB, Calif.	10th Air Force Maj. Gen. Thomas K. McGehee Hq. Richards-Gebaur AFB, Mo.	86th Air Division (Defense) Col. J. M. Vande Hey Hq. Ramstein AB, Germany	315th Air Division (Combat Cargo) Col. Charles W. Howe Hq. Tachikawa AB, Japan		5th Reserve Region Col. I. H. Dregne Hq. Selfridge AFB, Mich.
3rd Air Division Maj. Gen. William J. Crumm Hq. Andersen AFB, Guam	14th Air Force Maj. Gen. James B. Tipton Hq. Gunter AFB, Ala.	The United States Logistics Group (TUSLOG) Brig. Gen. Sam J. Byerley Hq. Ankara, Turkey			6th Reserve Region Col. William J. Bohnaker Hq. Hamilton AFB, Calif.
		322nd Air Division (MAC) Brig. Gen. Burl W. McLaughlin Hq. High Wycombe AS, England			

Military Airlift Command Gen. Howell M. Estes, Jr. Hq. Scott AFB, Ill.	Air Force Logistics Command Gen. Kenneth B. Hobson Hq. Wright-Patterson AFB, Ohio	Air Force Systems Command Gen. James Ferguson Hq. Andrews AFB, Md.	Air Force Communications Service Maj. Gen. Richard P. Klocko Hq. Scott AFB, Ill.
21st Air Force Maj. Gen. Donald W. Graham Hq. McGuire AFB, N.J.	Alaskan Air Command Maj. Gen. Thomas E. Moore Hq. Elmendorf AFB, Alaska	USAF Southern Command Maj. Gen. Reginald J. Clizbe Hq. Albrook AFB, Balboa, C.Z.	Air Training Command Lt. Gen. Sam Maddux, Jr. Hq. Randolph AFB, Tex.
22nd Air Force Maj. Gen. Joseph A. Cunningham Hq. Travis AFB, Calif.	USAF Security Service Maj. Gen. Louis E. Coira Hq. Kelly AFB, Tex.	Air University Lt. Gen. John W. Carpenter, III Hq. Maxwell AFB, Ala.	Headquarters Command Maj. Gen. Rollen H. Anthis Hq. Bolling AFB, D.C.

U.S. AIR FORCE SEPARATE OPERATING AGENCIES

Aeronautical Chart and Information Center Col. John G. Eriksen Hq. St. Louis, Mo.	Air Force Accounting and Finance Center Brig. Gen. Thomas P. Corwin Hq. Denver, Colo.	Office of Aerospace Research Brig. Gen. Ernest A. Pinson Hq. Washington, D.C.	Superintendent, United States Air Force Academy Lt. Gen. Thomas S. Moorman Hq. Colorado Springs, Colo.
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Easily the most powerful and widely ranging striking force the world has ever known, the U.S. Air Force is also mankind's most potent instrument for safeguarding world peace. Its operational inventory totals 12,400 planes of more than 60 varieties, from the 2,400-pound (1,089 kg) O-1 Bird Dog to the 488,000-pound (221,360 kg) B-52 Stratofort, plus a thousand intercontinental missiles. Its pilots have flown higher and faster than those of any other country. It operates by far the world's largest airline, equally capable of delivering fighting men and their weapons quickly to any battle zone, or speeding food and medical aid to a stricken nation. Here, for the first time in any international publication, is a complete gallery of . . .

Aircraft and Missiles of the U.S. Air Force

BY ALLAN R. SCHOLIN, Associate Editor

The U.S. Air Force is undergoing a major transition in the type of aircraft it operates. Its main problem in effecting this transition is that it isn't quite sure where it wants to go.

Ten years ago the principal emphasis was on nuclear striking power as a deterrent to global war. Top priority in equipment and men went to the Strategic Air Command with its B-52 long-range Stratofortresses, supplemented by supersonic B-58 and subsonic B-47 medium jet bombers, and a fast-growing intercontinental ballistic missile force. To protect them against enemy attack, the Air Force assigned almost equal priority to the Air Defense Command (ADC), the USAF component of the North American Air Defense Command (NORAD). The third U.S.-based combat element, the Tactical Air Command (TAC), was accepted as a junior partner, mainly because of the nuclear weapons delivery capability of its fighter aircraft.

Today the priorities are largely reversed. SAC, still the keystone of U.S. military strength, and custodian of by far the largest share of the Free World's nuclear deterrent, is undergoing a decline in aircraft that more than matches its growth in missiles.

As the threat of a manned bomber attack on the Western Hemisphere has diminished, ADC is steadily becoming smaller. The war in Southeast Asia, and the general consensus that limited war in other parts of the world is far more likely than a global holocaust, has made TAC the ascendant member of the Air Force family.

Because TAC works in close partnership with ground forces, a corollary emphasis is being accorded the Military Airlift Command (MAC). It is rapidly acquiring a new fleet of transport planes capable of delivering Army units and all their equipment overnight to any point on earth, and to sustain air and ground forces indefinitely. The ability to respond quickly is a cardinal point in U.S. strategy, on the theory that a relatively small force arriving on the scene at the outbreak of an emergency can help snuff out a small war before it grows to the point where substantial ground and air units must be committed.

What bothers most U.S. Air Force leaders is that, in building the capability to fight—or, more hopefully, to prevent—small wars, the pendulum may swing too far in that direction, exposing what could become fatal

flaws in the nation's global deterrent strength. Suppose, for instance, that ballistic missiles were to be rendered impotent by revolutionary technological advances. To cover all possibilities, they say, USAF needs a "mix" of missiles and manned bombers.

To replace the last of the once-formidable B-52 force in the mid-1970s, air leaders are convinced USAF must have a new long-range bomber, called AMSA, for advanced manned strategic aircraft. Until now, however, U.S. Defense Secretary Robert S. McNamara has concentrated defense funds on building up tactical forces, allotting only token amounts for early development of AMSA components.

Other arguments revolve around the characteristics required in tactical aircraft. Within the Air Force, many insist that all new fighter planes should be supersonic and twin-engined. They concede that subsonic single-engine planes may be adequate for close-support operations in Vietnam, where enemy air opposition is nonexistent. But, they say, the Air Force cannot afford to gear its equipment to this type of war in the future. Its attack and fighter planes should be capable

(Continued on following page)

of penetrating to targets and surviving against the most sophisticated air defenses.

The prevailing view, however, holds that all-purpose fighters are far too expensive and that current needs can better be met by a combination of tactical aircraft, some carrying heavy payloads at subsonic speed, others supporting them by knocking out anti-aircraft emplacements and defending against enemy interceptors.

Designation System

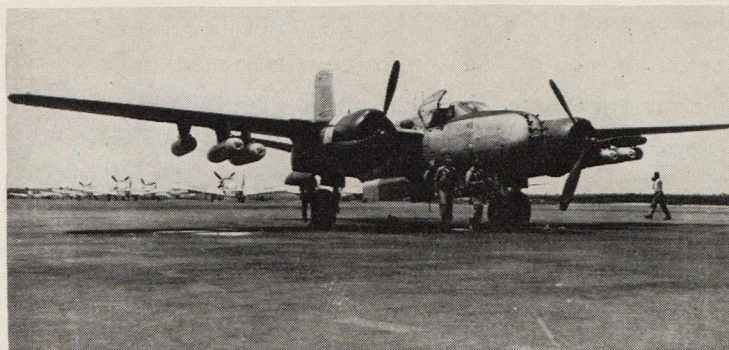
U.S. military aircraft designations identify their principal role, plus modifications for supplemental assignments. Bombers are identified by the letter B and numbers indicating the order in which each was approved for development. The B-52, for example, is the 52d bomber design recognized by the Air Force. Many designs are abandoned before reaching production, accounting for frequent gaps in numerical designations.

Four years ago, when the Defense Department set up a common designation system for all services, the numerical sequence was started over. The Air Force F-110, for example, became the F-4C.

Fighters are identified by the letter F, attack aircraft by A, cargo and transport planes by C, helicopters by H, trainers by T, utility planes by U, STOL and V/STOL by V, and experimental aircraft by X. These basic designations are often modified by prefix letters. K, for example, represents tanker. Thus the KC-135 is the tanker version of the C-135 cargo plane. H indicates rescue craft, as in the HU-16, a utility plane employed in rescue missions, and the HH-3E rescue helicopter. R stands for reconnaissance (RB-57), E for aircraft carrying specialized electronic gear (EB-66), W for weather reconnaissance (WB-47), X for experimental versions (XB-70), and Y for prototypes (YF-12A). A suffix letter indicates significant changes in production aircraft, the B-52H, for example, representing the eighth major version of the B-52 bomber.

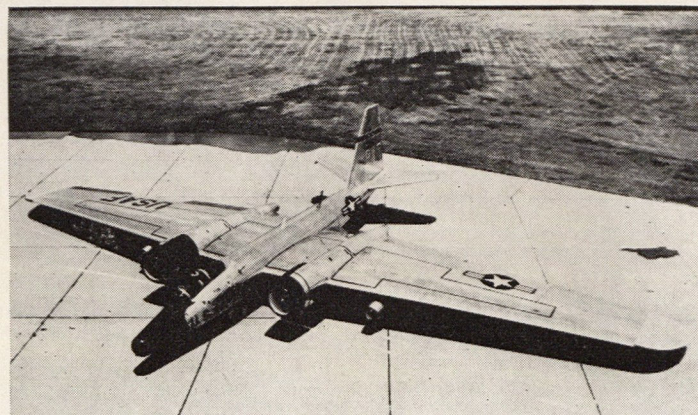
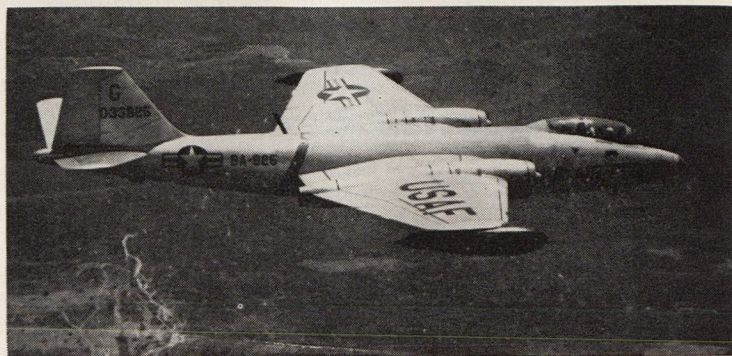
Bombers

Both the number and variety of bomber aircraft in the U.S. Air Force has declined in the past two years. Of six operational bomber-type aircraft remaining in the Air Force inventory, four are employed in the Vietnam War. They are the Douglas B-26K Counter Invader, Martin B-57B Canberra, Douglas RB-66 Destroyer, and, of course, the Boeing B-52 Stratofort, pounding Viet Cong concentrations almost daily from bases in the western Pacific.



B-26K
Counter
Invader

RB-57
Canberra



RB-57F
with
lengthened
wings and
auxiliary
jet engines

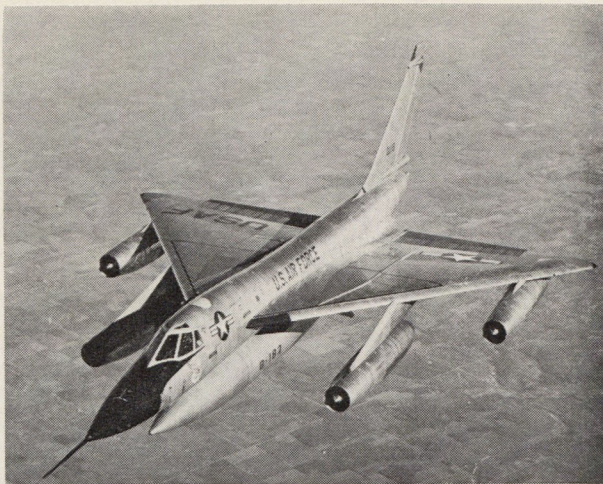
The B-26, now more than 20 years old, was originally known as the A-26. It is not related to the Martin B-26 light bomber which saw extensive service in Europe in World War II. The Douglas Invader, a mainstay of the Korean War, was all but retired from Air Force service when it was resurrected in the early phases of the Vietnam War. It proved too war-weary to accommodate the bomb loads and stresses of close-support operations and was withdrawn. But 40 Invaders were extensively modified by the On Mark Engineering Company of Van Nuys, California, to strengthen their wings and enhance firepower. Some of these are now back in combat. Powered by two Pratt & Whitney R2800-52W engines of 2,500 horsepower each, it flies at 305 miles per hour (490 km/hr), with a combat radius of 800 miles (1,280 km). It can carry 4,000 pounds (1,814 kg) of armament in its bomb bay, plus 6,000 pounds

(2,721 kg) on wing pylons. The nose houses eight 50-caliber guns, or can be replaced with a glass nose accommodating photo equipment for reconnaissance missions.

The B-57, based on the British Canberra, carries up to 8,000 pounds (3,628 kg) in bomb bay and wing pylons. It too is armed with eight 50-caliber machine guns, or, alternatively, can carry four high-velocity rockets. Two reconnaissance aircraft have been developed from the Canberra—the RB-57D and F. Both have been equipped with elongated wings, the D model having a span of 106 feet (32 m) and the F model 122 feet (37 m). The ceiling of each is reported to be above 100,000 feet (30,480 m). Powerplant of the B-57B is a pair of Wright J65 engines with 7,200 pounds (3,266 kg) of thrust each. The B-57D employs two Pratt & Whitney J57s, each with 10,000 pounds (4,536 kg) of thrust, while the B-57F is equipped with two Pratt



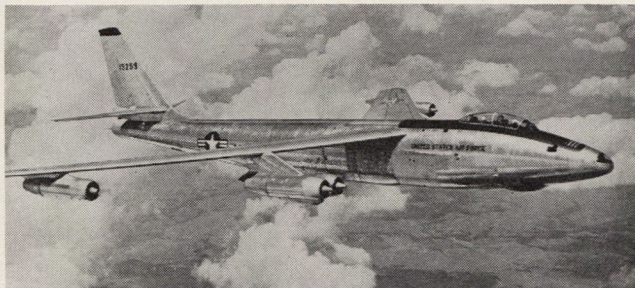
B-52 Stratofortress



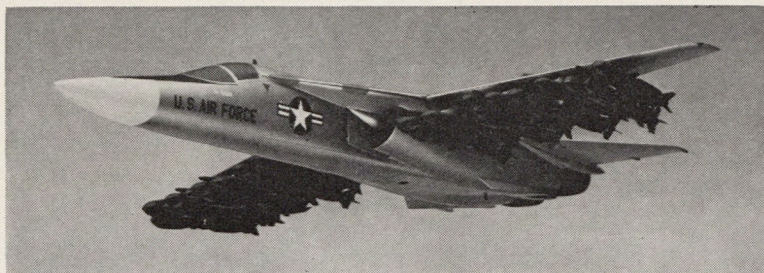
B-58A Hustler



RB-66 Destroyer



RB-47E Stratojet



FB-111

& Whitney TF33-11 turbofans of 18,000 pounds (8,165 kg) thrust, supplemented by two P&W J60-9 turbojets, each with 3,300 pounds (1,497 kg) of thrust.

Role of the RB-66 is to escort fighter-bombers on missions over North Vietnam, employing electronic gear to seek out and jam radar-guided anti-aircraft guns and missiles. (Thus it should more appropriately be called the EB-66.) Most RB-66s have been converted from the B-66 bomber, which was in turn a variant of the U.S. Navy A-3D. With two Allison J71-13 turbojets of 10,200 pounds (4,627 kg) thrust, its speed is 700 mph (1,126 km/hr) with a range beyond 1,500 miles (2,400 km). There is also a WB-66 version for weather reconnaissance.

SAC's mainstay, the B-52, has been operational in USAF for a dozen years, and G and H models are expected to go on to 1975. A total of 744 Stratojets had been produced by Boeing when production ended in 1962. B-52As

and Bs have been scrapped; C through F series are scheduled to be retired not later than 1970, to be succeeded by the General Dynamics FB-111. Models C through G are powered by eight P&W J57 turbojets, each with 13,750 pounds (6,237 kg) of thrust. The H model employs eight P&W TF33s, rated at 17,000 pounds (7,710 kg). Normally operated by a six-man crew, the B-52 has a gross takeoff weight ranging from 450,000 pounds (204,120 kg) in the C model to 488,000 pounds (221,360 kg) in the H. It carries a payload of up to 60,000 pounds (27,220 kg). G and H models also can carry two Hound Dog missiles. Unrefueled range is 6,000 miles (9,656 km) for the B-52C to more than 9,000 miles (14,484 km) for the B-52H, although all are capable of, and often employ, in-flight refueling.

Medium-range Boeing B-47 Stratojets, once rampant in the skies of Europe, North Africa, and America, now stand stripped and cocooned in the

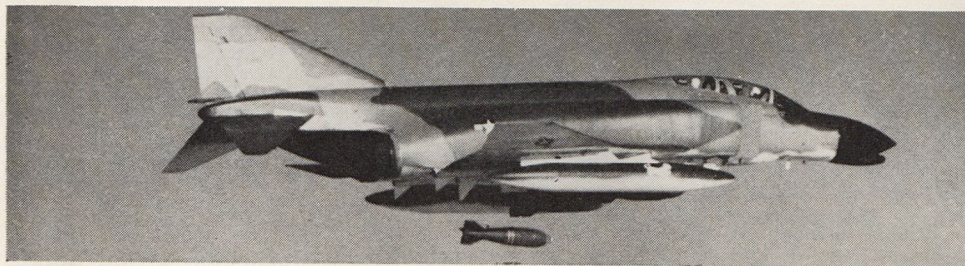
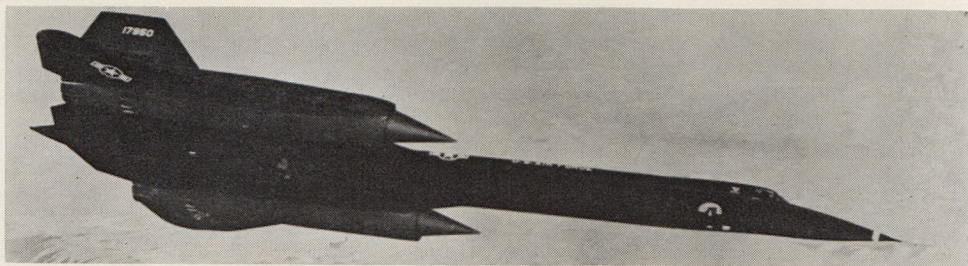
Arizona desert. A few reconnaissance versions remain in service for photo, electronic, and weather surveys, designated RB-47, EB-47, and WB-47.

Earmarked for retirement by 1970 is the Convair B-58 Hustler, world's fastest nuclear bomber, exceeding Mach 2 at 35,000 feet (10,668 m). About 80 are in service. Weighing 160,000 pounds (72,570 kg), one-third the size of the B-52, the Hustler carries nuclear weapons and part of its fuel supply in a disposable pod slung under the fuselage, and would fly home "clean" from a combat mission. The B-58 set an international speed record in October 1963, flying 8,000 miles (12,800 km) nonstop from Toyko to London in eight hours 35 minutes, averaging 938 miles per hour (1,510 km/hr). It is powered by four General Electric J79-5 turbojets, each with 15,600 pounds (7,076 kg) of thrust.

The scissor-winged FB-111, devel-

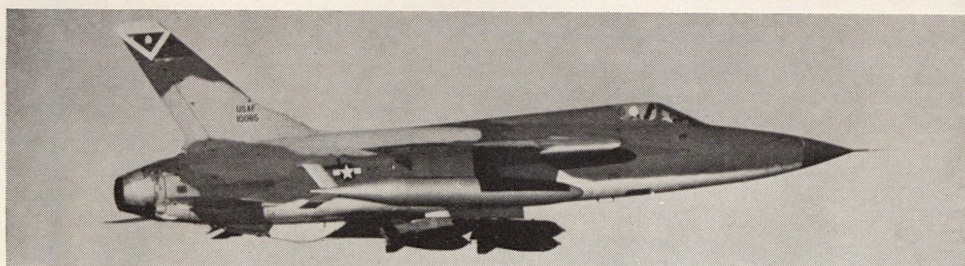
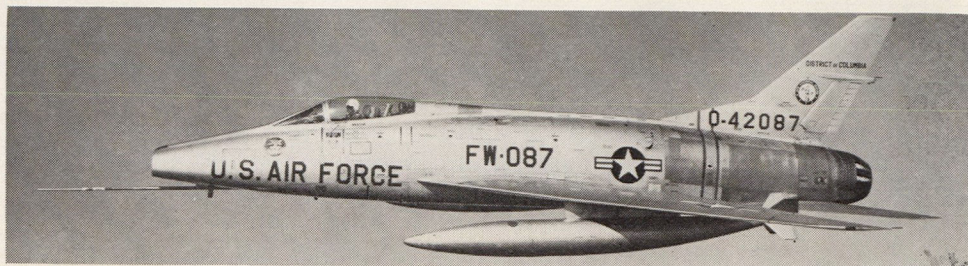
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SR-71



F-4C Phantom II

F-100C Supersabre



F-105 Thunderchief

oped by General Dynamics from its F-111 fighter, is scheduled to enter the Air Force inventory in 1968. A total of 265 are on order, covering an operational force of 210, plus replacement spares. The FB-111 will match the fuselage of the Air Force F-111A with the longer wings of the Navy F-111B, and with a strengthened undercarriage. It would carry nuclear weapons in its bomb bay, or up to 30,000 pounds (13,600 kg) of conventional bombs on wing pylons and in the bomb bay. It will be powered by two Pratt & Whitney TF30 afterburning fanjet engines with thrust exceeding 20,000 pounds (9,070 kg) each.

The FB-111 is no match for the B-52 in range or payload, nor will it be faster when carrying conventional bombs. But until—and Air Force leaders are far from ready to concede that “if” might be a more realistic word—an advanced manned strategic aircraft (AMSA) is produced, the U.S. will rely on its B-52s and FB-111s to back up its intercontinental missiles in continuing to deter global war.

Generally grouped with the bomber category, though it carries no bombs, is the Mach 3 Lockheed SR-71, one of two extremely high-performance craft growing out of Lockheed's secret A-11 design, the other being the YF-12A interceptor. Carrying a wide variety of advanced observation equipment, the SR-71 is capable of both preattack and postattack strategic reconnaissance missions. Flying at 2,000 miles per hour (3,200 km/hr) at 80,000 feet (24,384 m), it can survey 60,000 square miles (155,388 km²) of land or ocean per hour. Maximum takeoff weight for the 100-foot-long (30.5 m) SR-71 is estimated at 175,000 pounds (79,380 kg) or more. It is powered by two Pratt & Whitney J58 engines, with thrust of 40,000 pounds (18,140 kg) or more with afterburner, and range is said to be more than 2,000 miles (3,200 km).

Fighters

USAF's principal tactical weapon system is the McDonnell F-4 Phantom

II. Deliveries have topped the 1,000 mark and are still climbing. Most widely flown type is the F-4C, but the Air Force is now receiving the F-4D with improved avionics, and the F-4E, with a nose-mounted 20-mm Vulcan cannon, is on order. The latter will overcome a deficiency uncovered in the F-4C in Vietnam. In air-to-air combat the F-4C is armed only with Sidewinder and Sparrow missiles. But over North Vietnam, U.S. pilots are required to make positive identification of enemy fighters before opening fire, and, at close range, missiles have not proved completely effective. After identifying the enemy aircraft, F-4Cs have had to move away before firing their missiles. Recently pilots developed a tactic calling for a flight of two Phantoms to close in for identification while others lay back to fire their missiles on signal. With an internally mounted cannon, the F-4E can identify and fire simultaneously.

As a close-support fighter, the Phantom II is capable of delivering more than 12,000 pounds (5,400 kg) of mu-



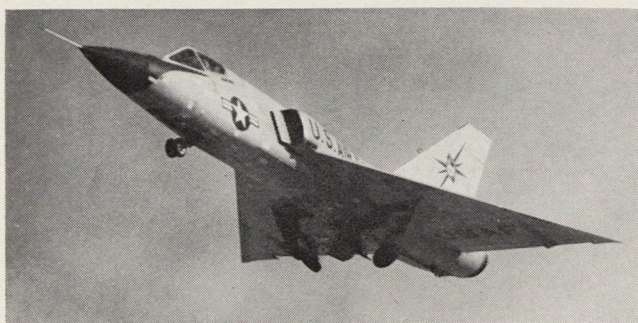
F-104C Starfighter



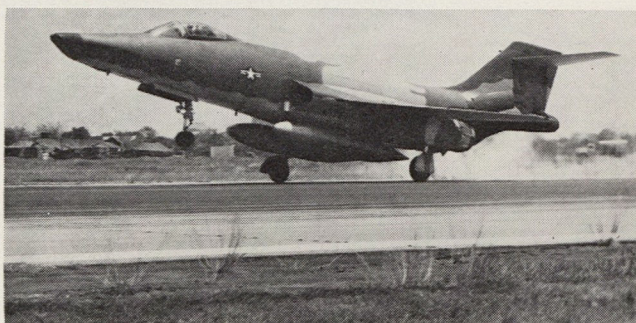
F-5A Freedom Fighter



F-102 Delta Dagger



F-106 Delta Dart



RF-101 Voodoo

nitions—bombs, incendiaries, rockets, or Bullpup missiles. Gross takeoff weight is over 40,000 pounds (18,100 kg) and unrefueled range exceeds 2,000 miles (3,220 km). Driven by a pair of General Electric J79-15 engines, generating 17,000 pounds (7,700 kg) of thrust, its top speed at altitude is Mach 2.5.

Second most prevalent USAF fighter is the North American F-100, which observed its 12th birthday last September. Its gross weight is only slightly below that of the Phantom. With a single Pratt & Whitney J57-21 engine of 16,000 pounds (7,260 kg) thrust, its top speed is above 800 miles per hour (1,280 km/hr). Its combat radius is about 500 miles (800 km), which can be augmented by refueling.

The fighter that has borne the brunt of hitting targets in North Vietnam is the Republic F-105 Thunderchief, an all-weather Mach 2 aircraft capable of carrying a six-ton (5.4 mt) payload. Heaviest single-engine fighter in the world, it is equipped with the Pratt & Whitney J75-19 turbojet producing 26,

500 pounds (12,000 kg) of thrust, and takes off with a gross weight exceeding 50,000 pounds (22,680 kg). Top speed is Mach 2.5—1.25 on the deck—and it can cover 2,000 miles (3,220 km) without refueling. Armed also with an internally mounted 20-mm Gatling gun, it has proved a match for North Vietnam's MIG-17s and MIG-21s after disposing of its external bombs.

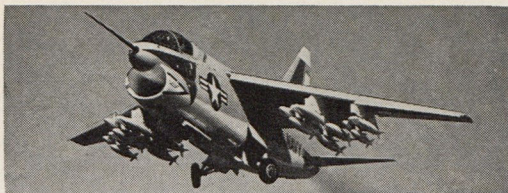
The U.S.-designed Lockheed F-104 Starfighter is employed in Canada, Japan, and several nations in western Europe, but only sparingly in the U.S. Air Force. Probably fewer than 100 are still in U.S. service, some as interceptors, others in a dual interceptor-ground-support role in Vietnam. But because the Starfighter is the only plane which can stay with the MIG-21 in a dogfight, the Air Force has expressed interest in a growth version of the Starfighter, designated the CL-981 by Lockheed. It could be employed to fly cover for the F-111A, whose exceptional qualities do not include the ability to outfight the MIG-21 or more modern Soviet interceptors.

Another U.S.-built fighter which has found more favor elsewhere than in the U.S. is the Northrop F-5 Freedom Fighter. It is flying in 14 countries, but so far the U.S. Air Force is scheduled to acquire fewer than 100, and those for joint use with the South Vietnamese.

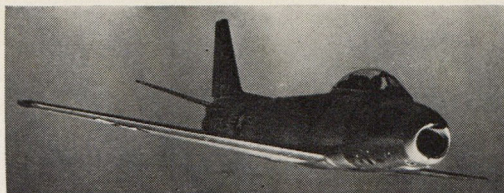
For defense against bombers, USAF flies the Convair F-102 Delta Dagger and F-106 Delta Dart. A program to transfer the F-102s to the Air National Guard has been interrupted in order to station some in the Far East as insurance against possible introduction into combat of IL-28 bombers furnished to North Vietnam by the Soviets. Both delta interceptors have recently been fitted with in-flight refueling equipment to permit speedy deployment overseas. The F-102, out of production since 1958, employs a Pratt & Whitney J57-23 turbojet rated at 17,000 pounds (7,710 kg) of thrust with afterburner, giving it a top speed of 850 miles per hour (1,368 km/hr). The F-106, with a more powerful engine, can reach Mach 2, but its principle

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A-7A
Corsair II



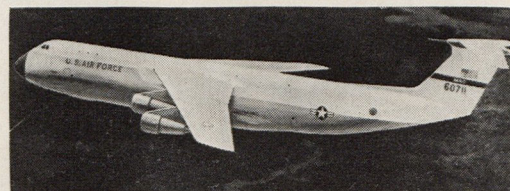
F-86F
Sabrejet



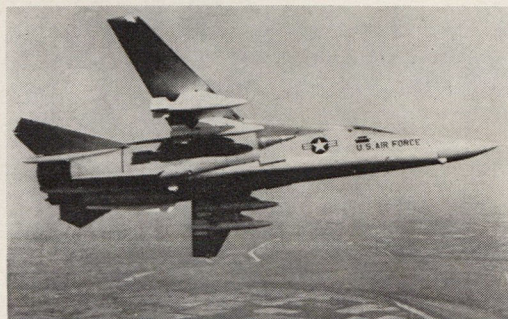
F-84F Thunderjet



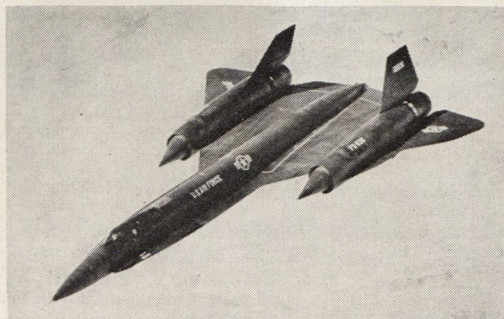
C-5A



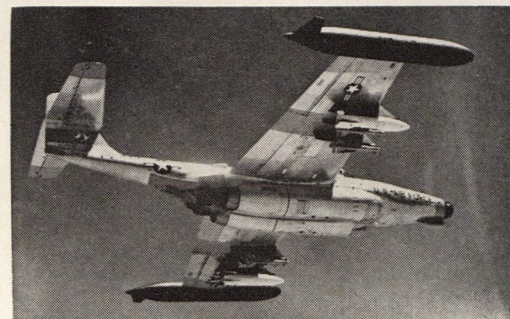
F-111A



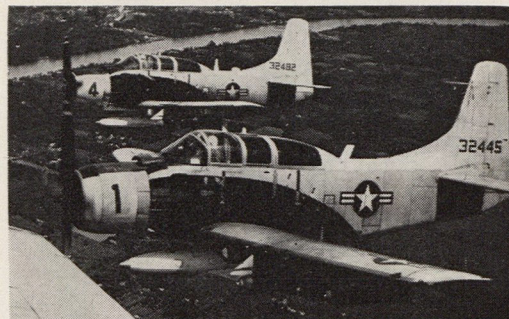
YF-12A



F-89J Scorpion



A-1E Skyraiders



pal advantage is its sophisticated electronic-guidance and fire-control system. Developed by Hughes and designated the MA-1, the system operates the plane after takeoff, flies it through climb and cruise to attack position, detects the target, fires at optimum range, and immediately breaks off to seek other targets. Both the F-102 and F-106 carry Falcon missiles internally.

A McDonnell product which preceded the F-4 in the USAF inventory is the F-101 Voodoo. The F-101A and C, initially fighters, are now more often seen in reconnaissance configurations, designated RF-101A and C, while the F-101B is employed by ADC as an interceptor. The Voodoo is capable of 1,200 mph (1,930 km/hr), powered by two Pratt & Whitney J57 turbojets with 15,000 pounds (6,800 kg) of thrust each. It is a big plane, with gross takeoff weight just under 50,000 pounds (22,680 kg).

The General Dynamics F-111A,

whose characteristics have been fully discussed in recent issues of this magazine, is one of two new fighters destined to join the Air Force inventory soon. The other is the Ling-Temco-Vought A-7D Corsair II, which will be powered by the British Rolls-Royce Spey engine. A subsonic long-range aircraft, the A-7 will be capable of carrying up to 14,000 pounds (6,350 kg) in payload, almost equaling its empty weight.

Because the A-7 is single-engined and subsonic, not all Air Force leaders have favored its purchase. But it is highly regarded by the U.S. Navy, for which it was originally designed, and the Defense Department persuaded the Air Force to buy it as well.

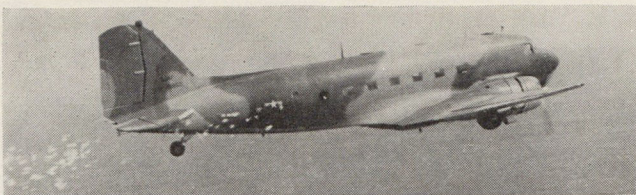
A plane the Air Force would very much like to add to its inventory is the Lockheed YF-12A interceptor, holder of official world speed and altitude records. Secretary McNamara has offered no encouragement, however, suggesting instead that the Air

Force consider an interceptor version of the F-111.

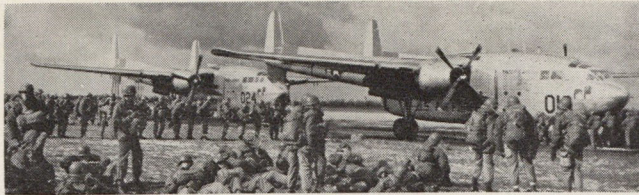
Other fighters deserving mention are the ancient piston-engine A-1E Skyraider, a hand-me-down from the Navy, resurrected as a counterinsurgency fighter in Vietnam, and the Republic F-84F Thunderjet, North American F-86F Sabrejet, and Northrop F-89J Scorpion, still in service with the Air National Guard.

Cargo and Transport Aircraft

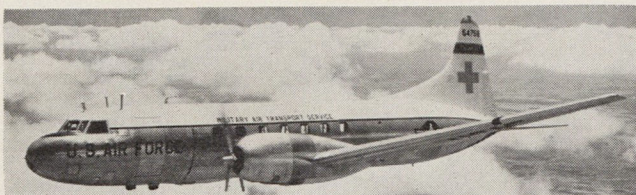
There are some 20 types of cargo and transport aircraft in the U.S. Air Force inventory. For economy and efficiency, USAF would like to reduce them to perhaps half a dozen. The enormous C-5A, first of which is to be ready in 1968, could replace many times its number in older, smaller craft. Seventeen C-5As could have handled the entire "Big Lift" operation of October 1963, which required more than 200 planes of lesser size. Yet, such



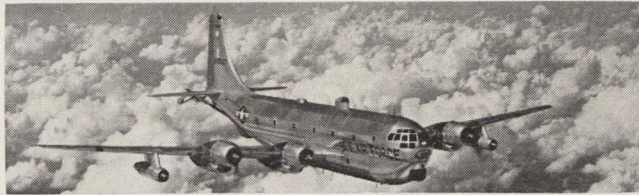
C-47 (dropping propaganda leaflets)



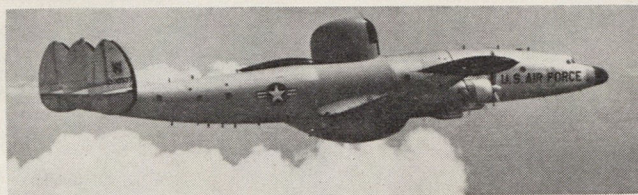
C-119 Boxcars



C-131E Samaritan



KC-97L Stratotanker



EC-121 Super Constellation



C-46 Commando



C-54E Skymaster

are the demands for airlift that they tend to expand to meet all available capacity.

Nor is it particularly efficient to employ a 250,000-pound (113,400 kg) payload monster to deliver a sorely needed electronic component to a remote radar site. It seems safe to predict, therefore, that five years from now, when the C-5As have joined the C-141s in USAF's transport fleet, the variety of cargo-aircraft types will not have diminished.

It would be impossible, for example, to imagine an Air Force without the Douglas C-47, the ubiquitous Gooney Bird, whose career began before World War II. Having outlived all its contemporaries, it is embarked on a new career as an attack aircraft in Vietnam. Armed with three 7.62-mm Miniguns firing out of the left side of the fuselage at a combined rate of almost 20,000 rounds a minute, it has been named "Puff the Magic Dragon," after the title of a one-time popular Ameri-

can song. When the Viet Cong sought to shoot down the AC-47 by stationing anti-aircraft weapons on its blind side, the Air Force pointed more Miniguns out of the right side of the fuselage so that it can now fire continually as it performs horizontal figure 8s over the battle zone.

Also aging but still serving USAF usefully are the twin-engine Curtiss C-46 Commando, Fairchild C-119 Boxcar, and Convair C-131 Samaritan; and the four-engine Douglas C-54 Skymaster, Boeing C-97 Stratofreighter, and Lockheed C-121 Constellation. All are piston driven. The World War II-vintage C-46, employed as a freighter in many parts of the world, was returned to Air Force duty with TAC's air commando wing. The twin-boom Boxcar is flown mainly by the Air Force Reserve in exercises with Army paratroopers and in a variety of passenger and cargo flights.

The C-131, military counterpart of the Convair 240, 340, and 440 airliners,

serves as an air ambulance, a medium-range executive transport, and as a trainer for navigators and radar observers. In its trainer role it is designated the T-29.

The C-54, used today primarily as an administrative command aircraft, is the military version of the civilian DC-4. Air National Guard pilots, whenever they can get away from their civilian occupations, are flying the C-97 and C-121 on passenger and cargo runs all over the world, relieving Military Airlift Command (MAC) planes and crews for higher-priority missions. The Stratofreighter also serves the Air Guard as a tanker, called the KC-97, with a pair of General Electric J47 turbojets mounted under the wings to help it keep up with its jet fighter customers. The Constellation, meanwhile, has been outfitted by USAF as a flying radar station. Designated the EC-121 Warning Star, or Big Eye, it loiters off North Vietnam as its "scope-

(Continued on following page)



C-118A Liftmaster



C-124 Globemaster



C-133 Cargomaster



CV-2A Caribou



CV-7 Buffalo



RC-130A Hercules

head" technicians vector fighter-bombers to their targets in bad weather and warn them of radar-guided ground fire.

Also getting up in years are two more Douglas transports—the C-118 Liftmaster, military counterpart of the DC-6, and the C-124 Globemaster. Both have been flying since the early 1950s. The Liftmaster is employed as an aeromedical transport and as a cargo and personnel carrier, largely within the U.S. Many Globemasters have been transferred to the Air Guard and Reserve, which fly it on cargo runs across both the Atlantic and Pacific, but because its fuselage can accommodate all but the biggest Army vehicles, some are being retained in active service.

Largest transport in the Air Force until the C-5A becomes available is the Douglas C-133 Cargomaster. Its cargo hold, 90 feet (30 m) long, can accommodate any of USAF's intercontinental ballistic missiles, haul 100,000 pounds (45,360 kg) of cargo, a pair of

40,000-pound (18,140 kg) prime movers, 16 loaded Jeeps, or 200 passengers. Driven by four Pratt & Whitney T34-9W turboprops of 7,500 shp each, its gross takeoff weight is 286,000 pounds (129,730 kg). Cruising at 300 miles per hour (480 km/hr), it will carry a 90,000-pound (40,820 kg) payload 2,250 miles (3,620 km) or 44,000 pounds (19,960 kg) 4,300 miles (6,920 km).

In Vietnam, the bulk of the intra-theater airlift is performed by a pair of twin-engine light transports—the de Havilland CV-2 Caribou and Fairchild Hiller C-123 Provider—materially assisted by the Lockheed C-130 Hercules. On January 1 the Air Force will officially take over Caribou operations from the Army under an agreement reached last spring to shift all fixed-wing transports to the USAF. Equipped with two Pratt & Whitney R2000 engines of 1,450 horsepower each, the Caribou will haul 32 troops or 5,000 pounds (2,270 kg) of cargo

over a 240-mile (390 km) range. USAF also acquired four de Havilland CV-7 Buffalo turboprop transports, with roughly double the Caribou's payload, which the Army had acquired for field test. The Army had hoped to get more CV-7s but the Air Force at this writing believes existing equipment adequately covers the Buffalo's capabilities.

Adept at operating from short, unprepared fields, the C-123 has proved a capable performer in Vietnam. Its high tail assembly and squat landing gear facilitates rapid on- and off-loading without special cargo-handling devices. To further improve short-field takeoff, a pair of General Electric J85 jet engines of 2,850-pound (1,300 kg) thrust are being mounted on the C-123's wings, supplementing its two Pratt & Whitney R2800 piston engines of 2,500 horsepower each. With a gross weight of 60,000 pounds (27,220 kg), the Provider can carry 60 troops or 24,000 pounds (10,890 kg) of cargo.

Now serving in the air forces of a



C-123 Providers



KC-135 (refueling F-105s)



VC-137C

dozen nations, the C-130 is the kingpin of Tactical Air Command troop carrier and paratroop operations, and is used by the Military Airlift Command in medium- and long-range transport flights. Powered by four Allison T56-7 turboprops of 4,050 shaft horsepower each, the C-130 will carry 25,000 pounds (11,340 kg) over a 4,300-mile (6,920 km) range, or 35,000 pounds (15,880 kg) 3,500 miles (5,630 km). Maximum gross takeoff weight is 155,000 pounds (70,310 kg).

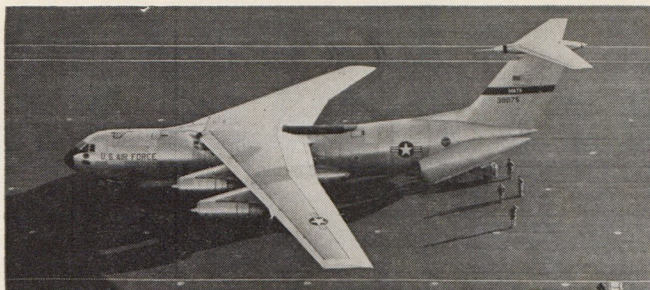
It has also proved highly useful for other missions. RC-130As have performed photomapping missions in South America, Africa, and elsewhere. HC-130Bs operating from Hawaii made midair recoveries of thousands of capsules released from orbiting satellites. The HC-130B and E serve in search and rescue missions, some operating as tankers and "mother" craft for HH-3E helicopters in Vietnam, others tracking storms for USAF's Air Weather Service. DC-130As launch and con-

trol drone aircraft used in air-to-air target practice and perhaps in reconnaissance flights over mainland China. C-130Ds, equipped with skis and jet-assisted takeoff bottles, support operations in the Antarctic.

Most USAF tankers in the past evolved from bombers or transports, such as the KB-50, now retired, and the KC-97. One that reversed the process is the Boeing KC-135 Stratotanker, which actually preceded the C-135 transport. Both are military adaptations of the Boeing 707 commercial airliner. More than 600 KC-135s have been delivered to USAF since production began in 1957. The KC-135A and C-135A are powered by four Pratt & Whitney J57-59W turbojets with 13,750 pounds (6,240 kg) of thrust, KC-135B and C-135B with four P&W TF33-9 turbofans, rated at 18,000 pounds (8,170 kg) each. France has purchased a dozen Stratotankers, equipped with P&W TF33-5 engines, to refuel its Mirage IV nuclear bombers.

With the arrival of the Lockheed C-141, C-135 transports have been shifted to other missions, including radar and weather reconnaissance (RC-135, WC-135). Several have been modified extensively to serve as airborne tracking stations for Apollo spacecraft missions. A modification of the KC-135, designated EC-135C, is employed by SAC as an aerial command post, at least one of which is airborne at all times, capable of directing SAC's bomber force if its underground command post were put out of action.

An uprated Boeing 707 operated by the Air Force for the President of the U.S. is the VC-137C, also known as Air Force One. It is basically the Boeing 707-320B, embellished with state-rooms, berths, conference table, and elaborate communications and electronic equipment. Three VC-137Bs, originally Boeing 707-120s but employing more powerful turbofan engines, (Continued on following page)



C-141 StarLifter



C-140 JetStar

XC-142
(on carrier
trials)



AT-37D
(firing
rockets)



VC-6A

yielding longer range, also serve as transports for White House and Cabinet officials. All are equipped with four Pratt & Whitney JT3D-3 turbofans, with 18,000 pounds (8,170 kg) of thrust each.

For short-range executive missions, the Air Force employs the Lockheed C-140 JetStar and the Beech VC-6A King Air. The JetStar is equipped with four P&W J60 engines of 3,000 pounds (1,360 kg) thrust, giving it a speed of 550 miles per hour (890 km/hr) and a range up to 2,500 miles (4,020 km). It carries ten passengers. C-140s are also employed by the Air Force Communications Service to check USAF navigation aids and communications worldwide.

The Beech King Air is powered by a pair of United Aircraft of Canada PT6A-6 turboprops of 500 shp each. It carries up to ten passengers at a maximum range of 1,400 miles (2,250 km).

Newest plane in USAF's transport

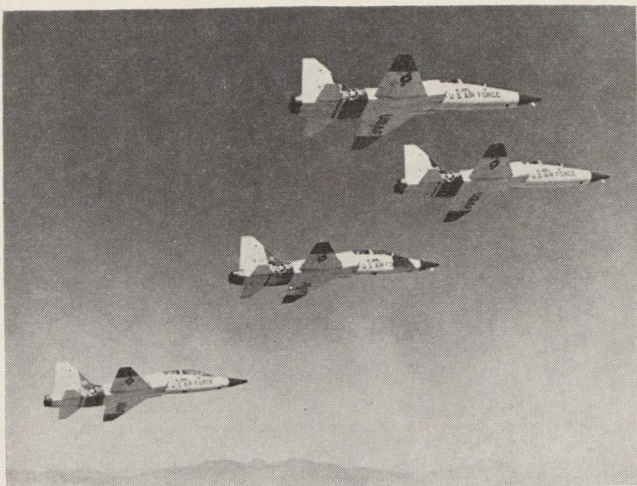
fleet, and the first pure-jet aircraft developed from the start as a cargo plane, is the Lockheed C-141 StarLifter. More than 200 StarLifters are on order to equip 14 MAC squadrons. It is 145 feet (40 m) long, with a wingspan of 160 feet (50 m), and its tail is 39 feet (10 m) high. Equipped with four Pratt & Whitney TF33-7 turbofans, each with 21,000 pounds (9,530 kg) of thrust, it cruises at 550 mph (890 km/hr), carrying an average payload of 55,000 pounds (24,950 kg) across the Pacific with only one stop, and returning nonstop from Japan to California with 100 passengers or more. Even before it entered service, however, it was apparent that the C-141 does not have a big enough fuselage to carry outsized Army equipment. C-5A production is being rushed to complement the C-141, permitting an optimum mix of heavy, bulky cargo and troops between the two types.

The cavernous fuselage of the C-5A will accommodate the heaviest Army

equipment, including the 50-ton (45.3 mt) Main Battle Tank. It will carry about three times the payload of the C-141. Its 28-wheel landing gear will enable it to operate from 4,000-foot (1,220 m) sod fields. Powered by four 40,000-pound-thrust (18,140 kg) General Electric 1/6 turbofans, it will cruise at 500 mph (800 km/hr) with a maximum payload of 250,000 pounds (11,340 kg) or 600 troops. Trading range for weight, it will haul 112,000 pounds (5,080 kg) 6,300 miles (10,140 km) nonstop or 220,000 pounds (9,980 kg) 3,600 miles (5,790 km).

Other military missions being considered for the C-5A include air defense warning and control of interceptor aircraft over vast distances, anti-submarine warfare patrol, and serving as a launch platform for Poseidon long-range ballistic missiles.

Finally, in the cargo category, is the XC-142 V/STOL transport developed by Ling-Temco-Vought with assistance from Ryan and Fairchild Hiller. Five



T-38 Talons



T-33 T-Bird



T-41A



T-28D Nomads

are now in operational test. This four-engine craft employs General Electric T64 turboprop engines of 2,850 shp each, linked with propellers by an interconnecting shaft, and normally cruises with two engines shut down. In STOL mode it can carry a payload of 12,000 pounds (5,440 kg) or 32 troops; for vertical takeoff, 8,000 pounds (3,630 kg). Cruising speed is 285 mph (460 km/hr) with a range, fully loaded, of 460 miles (740 km).

Trainers

Several years ago, the Air Force pioneered the use of jet aircraft from the first day of pilot training, employing the Cessna T-37 in basic pilot training, followed by the T-33, and later the T-38, in advanced training. Last year, however, it returned to a preliminary screening phase in which cadets start out with 30 hours in the propeller-driven Cessna T-41A before proceeding to the T-37.

The T-41 is an off-the-shelf Cessna 172F, employing a 145-hp Continental O-300C engine driving a fixed-pitch propeller. Speed is 138 mph (220 km/hr). The T-37 is powered by two Continental T25 turbojets of 1,025 pounds (470 kg) thrust each, giving it a speed of 350 mph (560 km/hr). Gross takeoff weight is 6,600 pounds (2,990 kg) and range about 650 miles (1,050 km).

The Northrop T-38 Talon has largely supplanted the Lockheed T-33 in advanced training. Closely related to the F-5 fighter, the T-38 is equipped with two General Electric J85-5 engines with 3,850 pounds (1,750 kg) of thrust, yielding a top speed of Mach 1.2. Takeoff weight is 11,600 pounds (5,260 kg).

The Talon is one of three USAF trainers that have evolved into fighter planes, others being the T-28 Nomad and the Cessna T-37. The T-28 is one of the world's most widely flown military aircraft, appearing in air forces of some 50 nations. In the light-

fighter version, designated T-28D, it is equipped with two 50-caliber machine guns and up to 1,800 pounds (820 kg) of ordnance, rockets, bombs, or incendiaries.

Soon to be tested in Vietnam is the AT-37D fighter, for which Cessna recently received a 39-plane initial contract. It will have twice the power of the T-37 trainer, employing two GE J85/J2 engines with thrust of 2,400 pounds (1,090 kg) each. Gross takeoff weight is almost doubled, to 12,000 pounds (5,440 kg). For a complete description of the AT-37D see the October issue, page 47.

Rounding out the Air Force roster of trainers are the Convair T-29, described earlier in its C-131 transport role, and the North American T-39 Sabreliner, also a military and civilian executive transport. The T-39A serves the Air Force as a utility trainer and fast liaison aircraft; the T-39B is fitted with all-weather search-and-range radar. (Continued on following page)

T-39 Sabreliner



UH-1F Iroquois

HH-19B Chickasaw



HH-21B Workhorse

UH-13 Sioux



CH-54A Skycrane



HH-43B Huskie

dar (NASARR) and doppler navigation system for F-105 pilot training. It is powered by two Pratt & Whitney J60-A3 jets providing 3,000 pounds (1,360 kg) of thrust each and flies at 575 mph (920 km/hr) with a range beyond 1,000 miles (1,610 km). As a transport, it carries eight passengers and a two-man crew.

Helicopters

Helicopters are employed in the Air Force primarily for air rescue, the remainder for liaison and ballistic missile site support. The latter duty is performed by the Bell UH-1F Iroquois, similar to the U.S. Army's well-known "Huey" assault craft. For rescue missions in Vietnam, the Air Force has just ordered the Sikorsky HH-53B, which, with a takeoff weight of 35,000 pounds (15,880 kg) is second in size only to Sikorsky's CH-54 Flying Crane in the U.S. It employs many CH-54 components but has an enclosed fuselage and watertight hull, permitting landings at sea.

The HH-53B will be assigned initially in Southeast Asia to rescue pilots downed over North Vietnam, supplementing the Sikorsky HH-3E, popularly called the "Jolly Green Giant." The HH-3E is equipped with two General Electric T58 shaft-turbine engines of 1,250 shp each. With a rotor span of 62 feet (20 m) and gross takeoff weight of 18,000 pounds (8,170 kg), it can carry up to 5,000 pounds (2,270 kg) or 25 passengers. Its 800-mile (1,290 km) range is augmented by provision for air-to-air refueling from modified HC-130 transports. Its airtight fuselage permits landing on water.

The HH-3E and HH-53B will replace the older Sikorsky HH-19 Chickasaw and Boeing Vertol HH-21 Workhorse in USAF air rescue roles. The HH-19 is flown by all U.S. Armed Forces and is in wide military and civilian use throughout the world. Its payload capacity is 2,500 pounds (1,130 kg) or ten passengers. The HH-21, known for its banana-shaped fuselage, carries twice the payload of the HH-19, though over a somewhat shorter range.

For close-in rescue missions the Air Force employs the Kaman HH-43B Huskie. It carries special equipment to extinguish fires in planes that may have crashed on takeoff or landing. An advanced version, the HH-43F, with additional power to operate at higher altitude, has been furnished to several countries under the U.S. Military Assistance Program.

The Air Force also employs a number of Bell UH-13 Sioux helicopters for utility purposes. More than 3,000 Sioux models have been built in the U.S. and in other countries under Bell license.

Utility and Experimental

This category includes both prosaic and exotic aircraft. Among the former are the Cessna U-3 and Aero Commander U-4, both off-the-shelf counterparts of the Cessna 310 and Aero Commander, respectively—employed as liaison-administration aircraft. Among the exotic types are the Lockheed U-2 high-altitude reconnais-

sance craft, now engaged mainly in weather-sampling missions to detect radioactivity in the atmosphere, and the North American X-15 research plane, which holds the unofficial world records for speed of 4,104 mph (6,600 km/hr) and altitude of 354,200 feet (107,960 m).

The Cessna O-1 Bird Dog is noted for its performance in Vietnam as a spotter plane to mark targets for close-support fighters. It is scheduled to be succeeded in 1967 by the North American OV-10A LARA—light armed reconnaissance aircraft—for which the Air Force has just placed a 109-plane order.

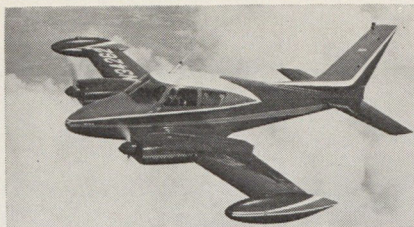
USAF's Air Commando forces employ the Helio U-10 Courier, a four-to six-place utility STOL transport capable of flying at speeds as low as 30 mph (48 km/hr). It can take off over treetops within 500 feet (150 m) from unimproved surfaces, and land in 400 feet (120 m) or less.

The Grumman HU-16 Albatross amphibian, which will observe its 20th birthday in 1967, serves primarily as a search and rescue aircraft, but is also employed as a light transport with special forces units.

Missiles

The Air Force is now well into the third and fourth generation of inter-continental ballistic missiles. Its first ICBM, the Convair Atlas, has been withdrawn, and now serves as a booster for military and civilian spacecraft. Similarly, the Martin Titan I, first silo-launched ICBM, has been retired. A total of 54 Titan IIs, employing storable propellants, remain in service. Silo-launched in less than a minute, the Titan II has a thrust, range, and payload greater than any other U.S. ICBM. It employs a two-stage booster, both produced by Aerojet-General, the first providing a thrust of 430,000 pounds (195,040 kg) and the second 100,000 pounds (45,360 kg). Its launch weight is 330,000 pounds (149,690 kg), its range over 9,000 miles (14,480 km).

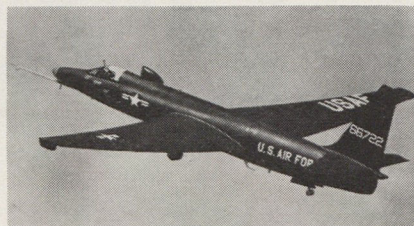
Principal U.S. deterrent missile weapon is the Minuteman, built by an industry team headed by Boeing. Some 1,000 Minuteman missiles are operational in underground sites in five states in the north central plains. Minuteman I missiles are steadily being replaced with later-model Minuteman IIs, and design of a Minuteman III is well advanced. The Minuteman is a three-stage vehicle; first stage employs a thrust of 170,000 pounds (77,110 kg); the second, 65,000 pounds (29,480 kg); and the third, 35,000 pounds (15,880 kg). Launch weight is 70,000 pounds (31,750 kg) and range



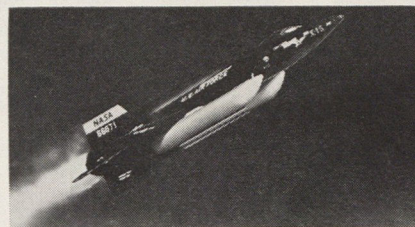
U-3B



U-4A



WU-2



X-15 No. 2



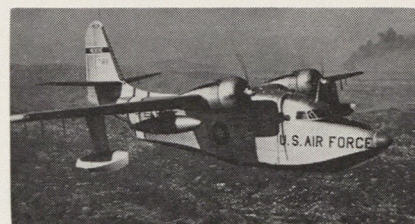
O-1E Bird Dog



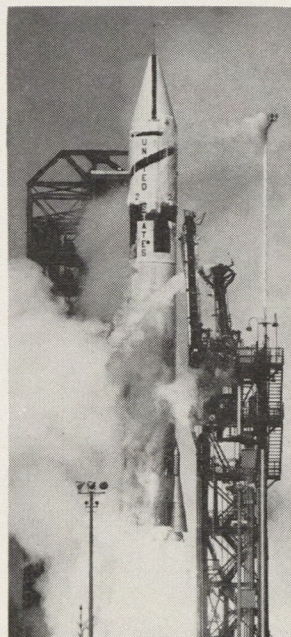
OV-10A LARA



U-10A Courier

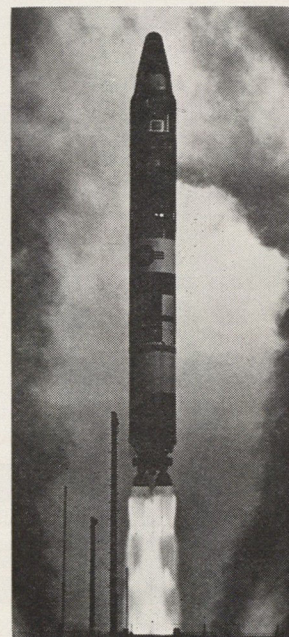


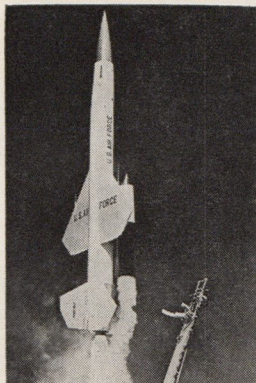
HU-16 Albatross



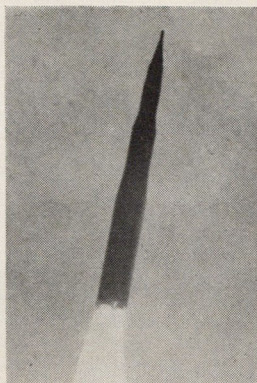
Atlas-Centaur

Titan II





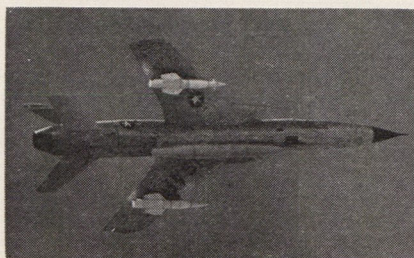
Bomarc B



Minuteman II



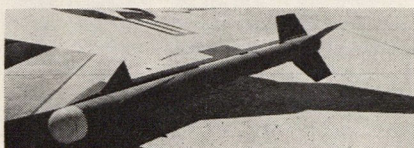
Falcons—AIM-26A, -4C, -4A, -4G, -4F



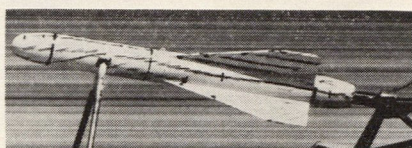
Bullpups on F-105



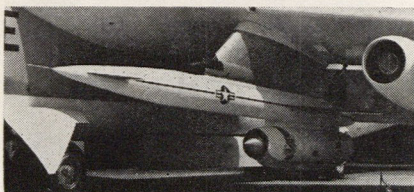
Genie on F-101B



Sidewinder



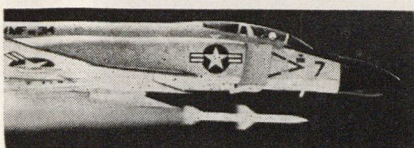
Walleye



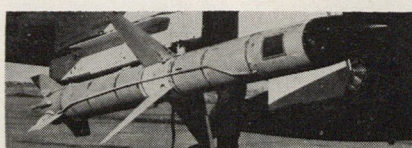
Hound Dog on B-52



Mace



Sparrow IIIIB fired from an F-4



Shrike

is from 6,300 miles (10,140 km) in Minuteman I to 7,000 miles (11,270 km) in Minuteman II.

A third USAF surface-to-surface missile is the Mace, a tactical, air-breathing weapon system built by Martin/Baltimore. It can employ a conventional or nuclear warhead, with a range up to 1,200 miles (1,930 km). It is launched by a 100,000-pound (45,360 kg) rocket booster, after which it flies like an aircraft, powered by an Allison J33-41 engine with 5,200 pounds (2,360 kg) thrust. The Mace is deployed in Europe and Okinawa.

Responsibility for U.S. anti-aircraft and antimissile defense rests primarily with the Army, but the Air Force does employ the Boeing Bomarc missile, a total of 188 being emplaced at six sites in the U.S. and two in Canada. After initial boost by a 50,000-pound (22,680 kg) thrust Thiokol rocket, it flies at Mach 3 speed powered by a pair of Marquardt ramjet cruise engines, each producing a thrust of 12,000 pounds (5,440 kg). It covers a range of 440 miles (710 km) up to an altitude of 100,000 feet (30,480 m).

Four types of air-to-air missiles are employed on USAF fighters. They are the Hughes Falcon, with nine configurations in use or development, employed on the F-4C, F-101B, F-102, and F-106; the Philco Sidewinder, carried on the F-4C, F-100, F-101A and C, F-104, and F-105; the Raytheon Sparrow, on the F-4C; and the nuclear Genie, built by Douglas, operational on the F-89J, F-101B, and F-106.

Major development efforts are under way on air-to-ground missiles. Only three are operational today—the Bullpup, in two versions, employed on F-4C, F-100, and F-105 fighters; the Hound Dog, a long-range standoff missile carried on the B-52H; and the Shrike antiradiation missile.

The Bullpup B, weighing 571 pounds (260 kg), and Bullpup C, with launch weight of 1,785 pounds (810 kg), have proved successful against tactical targets, but their guidance system requires the pilot to maintain a course in line with the target, thus exposing him to ground fire. It will soon be supplanted by the Walleye, a television-guided missile which the pilot can direct to its target while on a reciprocal course.

Two other projects designed to replace Bullpup are the Hornet and Maverick. Few details are available.

The Shrike, intended to home on radar emanations, has not been particularly effective in Vietnam, apparently because it loses its target when radar emissions are shut off. An advanced version is now in development, intended to correct this and other shortcomings.

☆☆☆

Speaking of Space

Because of the pressures of the Vietnamese War, there has been a slowdown in funding and decision-making in the U.S. civilian and military space efforts. But, in and out of uniform, planning and progress toward new goals continue . . .

USAF and NASA in Space: A Time of Pause

BY WILLIAM LEAVITT

Senior Editor, Science/Education

From the beginning the U.S. Air Force has played a major role in the United States space effort. The military contribution, content, and significance of American space programs in no way reduce the importance of America's civil space agency, the National Aeronautics and Space Administration. NASA's achievements since the days of Sputnik have been massive, and if there were any sure way of measuring the prestige race between Russia and the United States, any fair-minded observer would have to conclude that NASA has helped mightily to bring the United States up even, on most counts, with the Soviets.

Yet it is a fact that more than half of the American satellites in orbit are performing military tasks. These military satellites are doing important security jobs, ranging from spaceborne communications to patrolling space for man-made radiation which would indicate Soviet violations of the 1963 nuclear test-ban treaty. U.S. Air Force satellites regularly report strategic intelligence and during the coming decade may well be succeeded by "multi-purpose" vehicles which will combine in single payloads such functions as observation, communications, and early warning.

In a few years, it is likely, too, that military **tactical** communications—as opposed to worldwide communications—will, to some degree, be managed by satellite. There are distinct advantages, many defense planners believe, to spaceborne tactical communications by which field commanders could talk, by voice or code, with higher headquarters on circuits free from the in-

terference difficulties so often encountered with conventional systems.

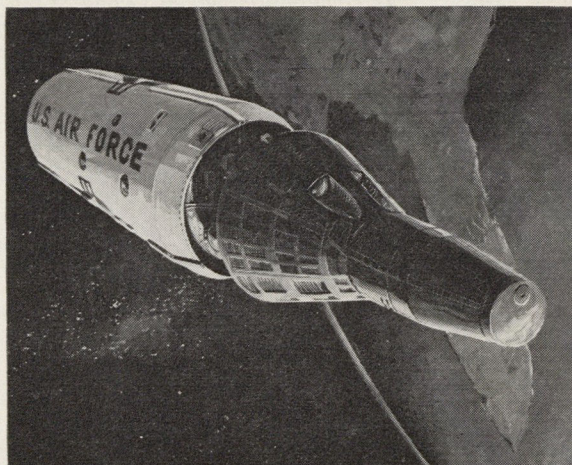
All these military satellites are unmanned. But the potential of manned military systems will be explored too, in the oncoming U.S. Air Force Manned Orbiting Laboratory (MOL), now expected to be operational in 1969. The MOL, a program announced by President Johnson in August 1965, will be an orbiting canister big enough to sustain two men in a "shirt-sleeve" environment for a month. The military crew will be boosted into orbit aboard a Gemini capsule topping the canister, in turn mounted on a Titan IIIC rocket. After their 30-day experimental missions, the military astronauts will return to earth aboard the capsule that carried them into space.

Since the Presidential announcement of MOL in 1965, this Air Force pro-

gram has been wrapped in tight secrecy. But it is known that, despite the financial pressures of the Vietnamese War, the project continues to be funded at a level of at least \$150 million a year, and that a sizable number of Air Force specialists are working on the project with Douglas, the principal contractor. There is little doubt that if the Asian war were not now somewhat straining the personnel resources of the Air Force and defense community, there would be even more military and civilian experts working on MOL.

Beyond MOL, planning for the military potential of the space medium continues. There is, for example, presently under way—under the general direction of the Air Force Systems Command, which has been from the

(Continued on following page)



The U.S. Air Force's Manned Orbiting Laboratory will permit close analysis of manned military capabilities in space. Two-man crews, operating in a "shirt-sleeve" environment, will spend 30-day tours in orbit. Until MOL deployment, all U.S. military satellites will be unmanned.

beginning the prime repository of space capability within the USAF—a long-range study of possible military space missions under varying geopolitical circumstances during the years 1972 to 1985.

Analytical teams from the major commands of the Air Force are engaged in a series of projections of the several kinds of strategic world situations that may develop during that time frame, and how various U.S. space forces might best serve American and Free World interests in such environments. An early phase of the study has already produced a kind of working textbook, called the "Space Planner's Guide." The "Guide" provides the technical background and realistic constraints to be used by the various participating USAF planning panels around the country. The final product of the study, a second, complementary, space-concepts text, is scheduled for completion in 1967.

This current Air Force study is, in the jargon of the Pentagon, primarily "in-house." That is, the effort is staffed by Air Force people who are pooling their expertise and creative talents to come up with realistic forecasts of force structures for the future in which space systems would play important roles.

Air Force planners say that the effort is "low key" in the sense that it is (1) no crash project and that (2) most of the participants in the various commands are working on a voluntary basis. There will be contributions from industry and such Air Force advisory groups as the well-known RAND Corporation of Santa Monica, California, and NASA. A political plus for the Air Force study is the fact that the uniformed service's civilian superiors in the Defense Department's Directorate of Defense Research and Engineering have been briefed on the program and presumably have provided moral support.

One quite valuable technique of the study, in the view of Air Force planners, is the intent to measure various earth-space force-structure mixes against possible future strategic environments from the point of view of cost/effectiveness and the execution

of national policy. Cost/effectiveness is now, of course, a way of life in the Pentagon. But the Air Force approach is somewhat of a departure from the traditional technique used by Defense Department planners.

The Defense method has generally been to create "packages" of military forces and measure their effectiveness and costs in terms of a single military function such as "general war" or "limited war" or the like. The difference in the current Air Force space study is that various mixes of earth and space forces will be measured in various proportions against possible future strategic situations rather than simply being aggregated to serve a particular military function. The Air Force panels will write strategic "scenarios" portraying likely future world situations ranging from the bipolar strategic environment to a space-age Fortress America. Scenarios will include even a "one world" possibility.

As technical and conceptual data is fed in from subpanels around the country, prime panels—studying missions, systems, force structures, applications, principles, and doctrine—will do the final job of proposing future Air Force space, concepts, systems, and force structure mixes that might reasonably be expected to have validity in the years ahead.

What does all this add up to? In a sense, it suggests that the Air Force, like its civilian counterpart, NASA, is living in a lengthy moment of pause, a prime feature of which is examination of the next chapter in operational space history. Although American military and civilian space achievements of the past several years have been beyond doubt monumental, few observers will argue that in any real sense they resulted from earlier, pre-Sputnik, hard-headed projections of technology and strategy. The early American space program was primarily reactive to the propaganda and potential military threat of Russia's space feats in the late 1950s.

As someone remarked at one of the innumerable "What next in space?" meetings that crowd official agendas these days in the United States, the U.S. did not embark on its space pro-



Directing the USAF Systems Command, which is the prime repository for USAF space capabilities, is Systems Command Commander, General James Ferguson.

gram because Guatemala had sent up a satellite.

Today, however, the emphasis is on purposeful planning. On the military side, the U.S. Air Force, as the American aerospace arm and as the designated prime military space research-and-development agency of the Defense Department, has always had to provide some justification for its space projects. On the civilian side, NASA, which was created in the early days after Sputnik and in the midst of a public near-panic, initially had less justifying to do, considering the costs of its projects, than would ordinarily have been the case as a matter of U.S. public policy.

NASA's mission originally was to get America moving in space and not worry about costs or traditional justifications. The Air Force's mission was in those days to supply men and hardware to NASA, to support NASA's efforts. Of course, even then, the Air Force was examining various potential military/space missions and systems. But most of its planning was necessarily intuitive. There was virtually no body of existing knowledge available.

Now there is. And it is a vast amount of knowledge, when one considers that it was less than five years ago that the first American Astronaut, Colonel Glenn, orbited the earth. The Americans, the Russians, and the rest of the world know that man can survive and operate in space, at least for short periods of up to a couple of weeks. We know, too, that unmanned space vehicles have more than paid for themselves—in the long-run—as strategic observation platforms, weather-watchers, communications relays, and scientific data collectors. But now that

USAF'S PRIMARY SPACE RESPONSIBILITIES

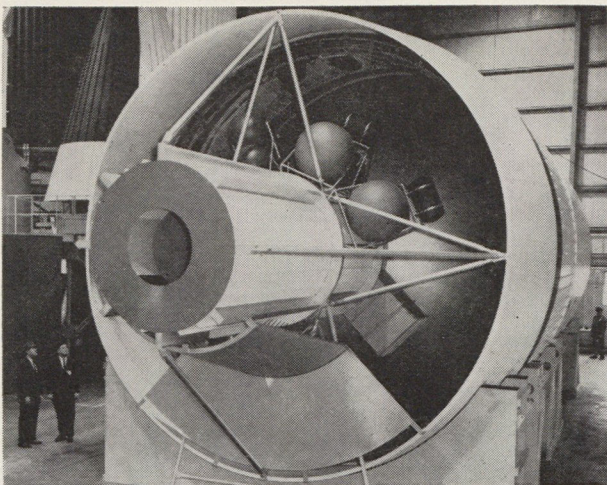
- It is the prime military space research-and-development agency within the Defense Department.
- It collects and maintains the central space-tracking records at NORAD Headquarters, Colorado Springs, Colorado.
- It operates the Western and Eastern Test Ranges at Vandenberg Air Force Base, California, and Cape Kennedy, Florida.
- It is developing the USAF Manned Orbiting Laboratory.
- It supports National Aeronautics and Space Administration missions.

the infancy of the space age is coming to a close, we know, too, that in the field of manned space operations there are major problems to be solved before we can be sure that men can operate purposefully for really economically long periods. The difficulties U.S. astronauts have experienced in their efforts to perform useful tasks in the void outside their space capsules suggest that what was initially thought to be quite an easy endeavor will require much more analysis.

Astronauts, one top NASA official has said privately, may well need completely independent and self-propelled capsules inside which they can move about to perform tasks outside the main spaceship. Interestingly enough, if the simple tethered spacesuit and hand-gun do prove to require too much human-energy output by the astronaut, another nagging problem of manned spaceflight may be on its way to solution—that of space rescue.

Up to now, NASA has relied on the redundant safety features built into the main space vehicle to protect astronauts from mishap once they are in orbit. And to date, no U.S. astronaut—and it may be said that there is no acknowledged evidence that the situation in the Soviet Union is any different—has lost his life in an operational space mission. But there can be little doubt that if manned space traffic continues to increase, if there are large space stations carrying many men, there will, in the nature of things, be mishaps, and a consequent requirement for some sort of reliable space “lifeboats.”

If research and development of self-propelled single-man (or multiman) capsules are undertaken to help solve



NASA has proposed this “orbital workshop” project in which a Saturn IVB upper stage would loft an Apollo spacecraft and astronauts into orbit after which the stage’s empty hydrogen tank would house crews for month-long orbital stays. Many observers have pointed to “orbital workshop” as competitive with MOL.

the present “walk-in-space” troubles encountered by U.S. astronauts, it will be a start toward solution of the general problem of space rescue.

The subject of space rescue has been considered important enough to be examined openly at a recent New York City meeting of the Aviation/Space Writers Association, at which several space-industry experts presented conceptual approaches to space rescue.

NASA’s manned spaceflight operational difficulties, including the still not completely known effects of radiation and weightlessness, are compounded in any military analysis of manned space operations.

In the void of space, men would be quite vulnerable, in present space systems, to man-made radiation attack, because of the broader spread of radiation in the space environment. And military orbital vehicles, unless they had sizable maneuvering capabilities beyond those available today, would probably be easy targets for earth-fired antisatellite weapons. Space tracking, an assigned responsibility of the North American Air Defense Command, is a highly developed art. Presumably the Soviets are as good at it as the Americans. To be able to track accurately solves many of the problems of knocking out a satellite.

Added to these orbital-operational problems of NASA is the continuing dilemma the civil space agency faces in the selection and execution of future goals beyond its present Apollo moon-landing program, which some observers now believe could occur ahead of schedule, in 1968, instead of the generally assumed 1969. U.S. public and Congressional interest is heavily focused on the Vietnamese War, racial unrest at home, and the rising cost of living. As for manned missions to Mars, the man in the street is scarcely overcome with enthusiasm, although there is much support in the

scientific community for a step-by-step exploration of the Red Planet.

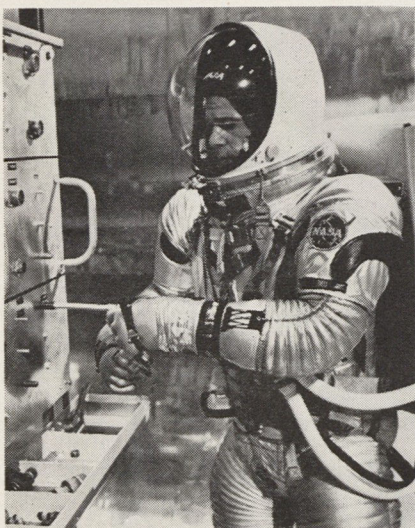
Consequently, the once-high popular interest in manned spaceflight has lessened. NASA is still vigorously trying to sell to the Administration a well-funded start on its proposal, called Apollo Applications, to use Apollo modules and Saturn booster components in a long-range earth-orbital and lunar manned research program.

As part of this general approach, NASA has lately proposed a project called Orbital Workshop, in which the empty tank of a Saturn S-IVB booster would be orbited for occupancy by a NASA research crew. Some observers have suggested that such a project would be competitive with and duplicative of the already approved Air Force MOL.

In any case, at this writing, and as new budgets are being prepared in Washington, there is no certainty about which NASA proposals will be approved and funded by the Administration. Thus, like the Air Force, NASA has plenty of time—during this decisional hiatus—to explore its potential future mission and projects.

All this uncertainty is doubtless annoying to military and civilian space planners. But in at least one sense, it could be a useful hiatus. For, in this adolescent period of the space age, realistic analysis of purposes and goals can be achieved with much greater ease than was possible under the circumstances of the early post-Sputnik days.

Then the U.S. requirement was to demonstrate to itself and to the world, at whatever cost, the country’s ability to match the Russian achievement. Now, as pointed out above, there is a useful body of knowledge and experience, and there are goals that can be intelligently compared. Decisions can be more rationally made than they were in the days of rumor and alarm nearly a decade ago. ☆☆☆



Research on human ability to work in space continues. This is a Lockheed experiment in which subject performed simple tasks in near-vacuum of altitude chamber.

U.S. commercial airlines are luring pilots away from the military services. . . . CL-84 and XC-142A V/STOL aircraft make successful over-water rescues. . . . Air Force extends investigation of unidentified flying object (UFO) reports. . . . Listening posts will help voyagers to the moon stay in contact with earth. . . . Australia's air minister praises the F-111. . . . Air Force purchases OV-10As in major policy shift. . . . Thailand gets a new air base. . . . New helicopter travels on ground like an automobile. This month's aerospace developments are highlighted by . . .

UFOs and U-TAPAO

By JUDITH DAWSON and CAROLE KLEMM, Editorial Assistants

PILOT SHORTAGE . . . U.S. military pilots are being lured away from the Armed Forces by commercial airlines. The airlines, extremely short of pilots to meet fast-rising demands for passenger and cargo traffic, can promise fast salary raises, giving ex-military pilots salaries higher than that of general or flag officers in six to ten years.

As a result, the U.S. Armed Forces are facing a critical pilot shortage. The U.S. Air Force experience in the past year is typical of the problem the services face. It trained 2,700 new pilots, but lost more than 4,000, 2,600 of whom retired after 20 years' service or more, 1,200 who left after five to 15 years' service, and 200 released for medical or other reasons.

The U.S. Navy has gone so far as to suggest that it be allowed to pay up to \$25,000 extra to pilots who agree to stay five years beyond the original service commitment. If such a bonus were approved, it would probably apply to all the services. The money would be well spent, for it costs \$150,000 or more to train a jet pilot, who, in most cases, is obligated to stay in the service only five years. Getting an experienced pilot for a second five-year tour at \$25,000 would be a bargain by current economic standards.

The U.S. Army needs pilots to fly the many new helicopters being turned out by Bell Helicopter, The Boeing Company, Hughes Aircraft, Lockheed Aircraft, and Sikorsky Aircraft. The Army now graduates about 450 pilots a month, but needs far more. It hasn't lost as many to the airlines, since air carriers are primarily interested in jet-qualified pilots.

Because the Air Force and Navy

would have to reopen many bases to accommodate additional students, instructors, aircraft, and support facilities, the Department of Defense has been reluctant to raise the pilot training rate, although DoD has contracted for a 30-percent increase in the production of combat planes. Defense Secretary Robert McNamara ran into strong criticism from Congress when he insisted on closing many bases for economic reasons during the past two years. He apparently does not want to be put into the position of reversing his own order.

In addition to the current high demand the airlines have for jet pilots, the advent of the supersonic transport is expected to contribute to the need for experienced pilots. United Air Lines alone says it will hire 1,900 pilots in 1967. Major airlines admit that airline pilot schools produce only a fraction of their needs; they depend heavily on military alumni.

The Armed Forces, themselves, are partly responsible for the pilot shortage. The pilot-to-aircraft ratio in combat units has been raised to increase the utilization rate of available military aircraft. Furthermore, the trend is now toward two-place fighter aircraft. The popular F-4 Phantom II (see page 30) requires a two-man crew. When the two-place F-111 enters service in 1968, still more pilots will be needed.

To fill the demand, Air Force officers who haven't been in the cockpit of an operational aircraft for years are going into refresher training, many to fly combat missions in Vietnam. With so many pilots off in Vietnam or involved in training, the remainder of operational aircrews are constantly called away on exercises and other

commitments. In the past year, for example, a typical Tactical Air Command pilot spent more than 200 days away from home. Considering the effect of frequent absences on his family, it is not hard to understand why a pilot may yield to the vigorous recruiting efforts of the airlines.

* * *

SPIES FROM SPACE . . . Do strange beings from outer space travel regularly to earth in fantastic spacecraft, to hover over and spy on earth communities?

The U.S. Air Force says "no" and for 20 years has insisted no evidence has proved the existence of "flying saucers" carrying visitors from other planets. But Americans who have seen unidentified flying objects (UFOs) over their homes and cities are convinced that the Air Force is not telling the general public the truth, mainly to avoid panic.

As a result, the Air Force has selected the University of Colorado, Boulder, Colorado, to conduct independent investigations into UFO reports, analyze phenomena associated with UFO sightings, and double-check the Air Force on its investigating methods.

Under a research agreement negotiated by the Air Force Office of Scientific Research, Colorado University expects to call on the services of more than 100 scientists around the country. The project is headed by Dr. Edward U. Condon, physics professor and former Director of the National Bureau of Standards. He will be assisted by Dr. Stuart W. Cook, Chairman of the Colorado University psychology department, and Dr. Franklin E. Roach, astrophysicist with the U.S.



Successful rescue missions have been performed by the two tilt-wing, vertical/short-takeoff-and-landing (V/STOL) aircraft pictured here. A sling lowered from the CL-84, left, manufactured by Canadair Limited, Montreal, Canada, hoists C. R. Simmons, Canadair employee, from a dinghy 80 feet (24 m) below the plane in open water. Meanwhile, Ling-Temco-Vought Aerospace Corporation, Dallas, Texas, announced that its XC-142A aircraft, above, made its first over-water V/STOL rescue in U.S.

Environmental Science Services Administration (ESSA).

More than 10,000 sightings have been reported to the Air Force since Project Blue Book was started in 1947 to log and investigate UFOs. Of these, 94 percent were explained by natural phenomena or man-made causes, but the other six percent, about 650 cases, are unsolved, most because of inadequate information on which to base the investigation, although some just couldn't be explained away.

Many sightings, claimed to be UFOs, have actually been of weather balloons, orbiting satellites, unusually bright stars, or aircraft. Scientists have speculated that unexplained sightings can be attributed to interaction of certain gases emanating from the ground under unusual atmospheric conditions or to electrical discharges from power lines.

Many "flying saucer" reports come from people with fanciful imaginations and others from those who want to see their names in the papers. One man who claimed he was kidnapped and taken on a saucer ride to Venus several years ago even appeared on national television and radio shows to describe his "adventures."

But Major General E. B. LeBailly, U.S. Air Force Director of Information, whose staff handles the reports, noted that many come from "intelligent and technically well-qualified individuals whose integrity cannot be doubted."

Dr. Condon and his associates expect to concentrate on about 100 sightings and will submit a report to the Air Force in 1968.

* * *

V/STOL RESCUE . . . Tilt-wing, ver-

tical/short-takeoff-and-landing-type (V/STOL) aircraft may soon be employed in the rescue and recovery role, traditionally a helicopter mission. Two of these V/STOL aircraft, one a Canadair CL-84 and the other a Ling-Temco-Vought triservice XC-142A, recently carried out simulated rescues.

Late in September the Canadian aircraft lifted C. R. Simmons, a Canadair employee, 80 feet (24 m) from a floating rubber dinghy in open water.

Another successful rescue had been performed earlier over land.

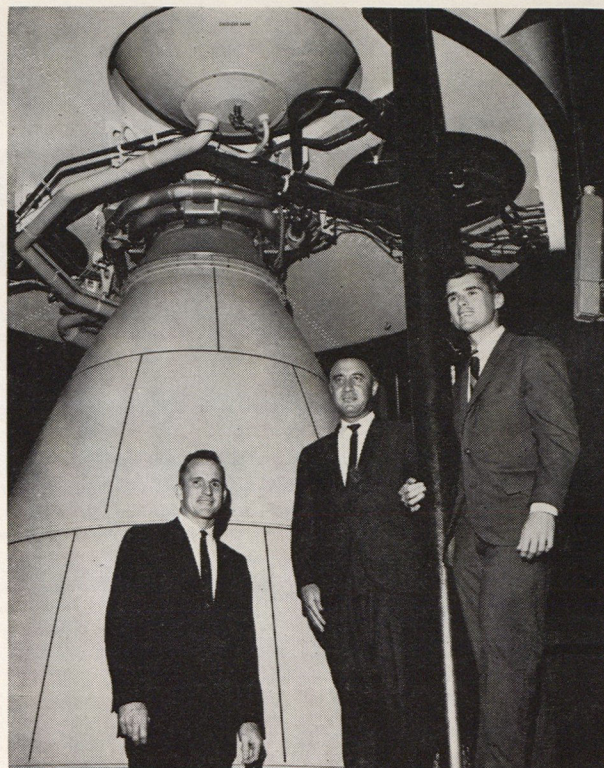
The CL-84 flew over the target area in cruise configuration, made a turn, and approached the subject in tilt-wing mode. A sling was then lowered and the subject was hoisted into the cabin within approximately two minutes. The vacant dinghy remained stable in the water and held closely to its original position, demonstrating

(Continued on following page)



The Chilean Air Force recently received the first three of eight Twin Otters ordered from de Havilland Aircraft of Canada. First military purchaser of the aircraft, the Chilean Air Force is using them for aerial survey work and logistic supply of isolated communities. The plane's high rate of climb, coupled with its ability to take off with a ground run of only 655 feet (200 m), suits it ideally for the rugged Chilean terrain.

The three-man crew scheduled to be aboard the first manned Apollo spacecraft flight in the first quarter of 1967 are, from left, Lieutenant Colonel Edward H. White, II, USAF, senior pilot; Lieutenant Colonel Virgil Grissom, USAF, command pilot; and Commander Roger Chaffee, USN, pilot. Alongside them is a mockup of the spacecraft engine for Apollo, built by Aerojet-General, El Monte, California.



the relatively moderate degree to which the propeller downwash disturbed the area beneath the aircraft.

In test operations near Dallas, Texas, in mid-October, the four-engine turboprop XC-142A lifted John Narramore, an expert frogman and LTV Aerospace Corporation employee, from a bobbing life raft and into the plane. The sling used was the standard U.S. Navy "horse-collar" sling attached to 125 feet (38 m) of cable.

The airplane, capable of speeds of up to 430 miles an hour (690 km/hr) in level flight, was piloted by LTV test pilots John Omvig and Robert Rostine for the Air Force Aeronautical Systems Division, Wright-Patterson Air Force Base, Ohio.

The XC-142, with its propellers pointing skyward, took off vertically and inched its way into position over the tiny raft, as winch operators directed the movement of the big aircraft to place the cable and its "horse collar" in water within reaching distance of Narramore. The test subject then quickly donned the sling and was hoisted by the winch through a hatch in the bottom of the airplane.

Narramore, who has been picked up by helicopter on many occasions, said he experienced no problem with downwash of the propellers blowing the raft, with spray obscuring his vision, or with downwash as he was being hoisted into the airplane.

The live pickup was performed after a series of rescue tests by Air

Force crews using dummies to establish that oscillations were no problem. Earlier, the Air Force had performed dummy pickups over land at altitudes down to approximately 50 feet (15 m) without difficulty.

"We still have some work to perform on procedures, but I am convinced the XC-142 can be used safely and effectively for rescue work both on land and at sea," Dr. Walter J. Hesse, Vice President and V/STOL

Program Director for Ling-Temco-Vought, said.

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HELICOPTER ON WHEELS . . . A

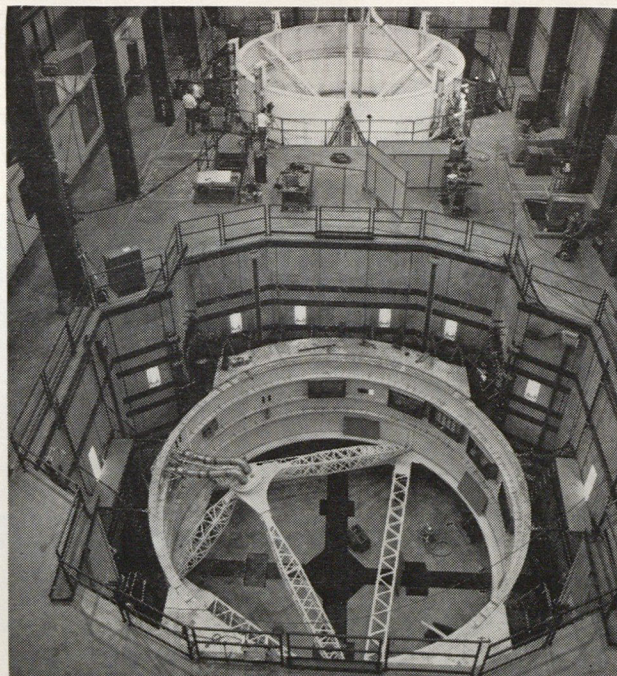
new type of autogiro that automatically folds its overhead rotor blades so that it can travel along the ground like an automobile has been developed by Aeronautical Research & Development Corporation of Cambridge, Massachusetts.

Called the Autocopter, it is available in both military and civilian configurations. The new vehicle makes it possible for a pilot to land his plane and then continue his journey on land without changing to a jeep or truck.

The four-place Autocopter can take off or land in any small clearing, costs \$15,000 in military configuration, cruises at 125 miles per hour (200 km/hr), and has a ground speed of 65 miles per hour (105 km/hr). The pilot can make the craft hover by powering the rotor and executing certain prescribed maneuvers. Prespinning the rotor also gives it vertical takeoff capability. On the ground, it can quickly move under cover with rear-wheel drive, without the use of the rotors. Flight operation is extremely quiet, because the rotors are free spinning and the two engines are muffled.

Company officials claim the fiberglass rotors will remain stable even if punctured by small shells. The blades will not fly apart or rupture. They also suggest amphibian use for the Autocopter by equipping it with four pontoons. Powered by the pusher propeller, the water speed could reach 30 knots.

The craft has a gross weight of 2,500 pounds (1,130 kg) and an over-



Testing of entire substructures of the second stage of Saturn V, the three-stage vehicle, capable of sending 45 tons (40.8 mt) to the moon, has begun at Wyle Laboratories, Huntsville, Alabama. In the foreground is the forward skirt, which connects via an interstage to the rocket's third stage. Behind is the second-stage thrust complex mounted on a 400,000-force-pound (181,440 kg) shaker system at the High Force Vibration Test Facility.



Belgian Air Force Lieutenant Colonel Bill Ongena makes a low-altitude, high-speed roll in his F-104G Starfighter at an air show at Beauvechain Air Base, Belgium. The F-104G, designed by Lockheed Aircraft Corporation, Burbank, California, forms nucleus of Belgium's air defense force and boasts the best flight safety record of Belgium's operational combat aircraft. Starfighters also bear the insignia of 13 other Free World nations.

all length of 17.5 feet (5.3 m). The 1,100-pound (500 kg) payload includes fuel for 400 miles (640 km) and four fully equipped troops, or a pilot with cargo and armament. Twenty-caliber machine guns or Miniguns can be mounted to be operated either by the pilot or a gunner.

* * *

KEEPING TUNED TO EARTH . . .

To help voyagers to the moon keep contact with earth, the Radio Division of the Bendix Corporation is developing eight high-altitude listening posts.

The communications system, including a seven-foot (2.1 m), 750-pound (340 kg) parabolic antenna that fits into the nose of an aircraft, is installed on Apollo range-instrumented aircraft, designated A/RIA by the U.S. Air Force electronics system division, technical director of the A/RIA program. The A/RIA craft are the airborne additions to the ground and sea stations set up to maintain contact with the Apollo spacecraft prior to its being sent on its flight to the moon. Prime contractor for the A/RIA is Douglas Aircraft Company.

The communications equipment weighs 13,000 pounds (5,900 kg) and, in addition to the antenna, includes 26 receivers, transmitters, and multiplexers as well as multicouplers, magnetic data and voice recorders, oscilloscopes, signal generators, and teletypewriters.

The seven-foot antenna, believed to be the world's largest steerable airborne antenna, will be used to locate the relative position of the spacecraft as well as to receive all data and voice signals.

To test the listening post, Bendix sent a Super Constellation on high-

altitude flights between Washington, D. C., and Harrisburg, Pennsylvania—simulating the flight of the Apollo—while the antenna caught the telemetry and voice signals from the plane.

* * *

NEW HOME FOR B-52s . . . The paint is barely dry, but already there are reports that U.S. Air Force KC-135 tankers are operating from the 11,000-foot (3,350 m) runway of Thailand's new air base at Sattahip in the Gulf

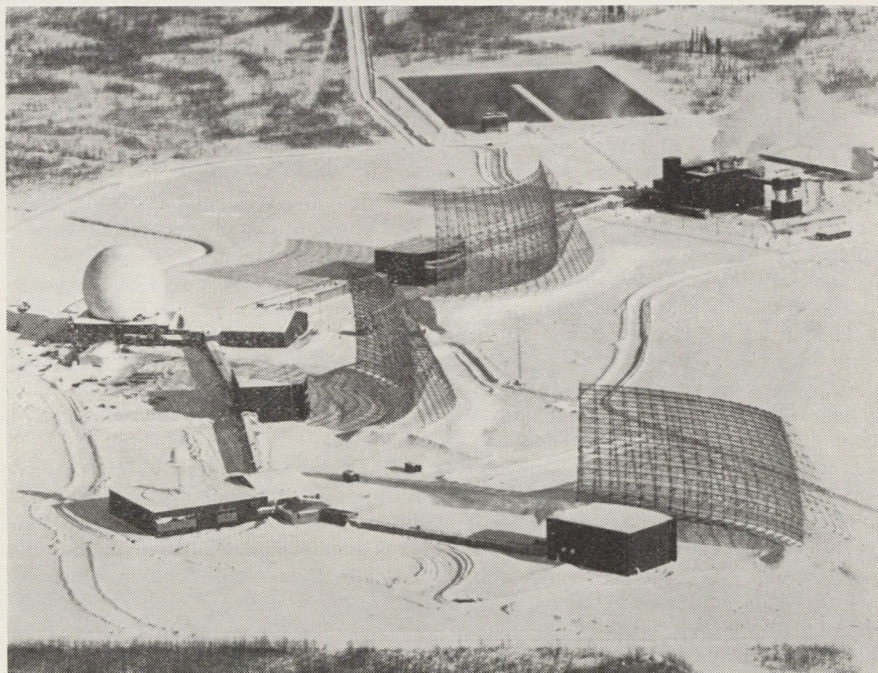
of Siam below Bangkok. And B-52 bombers may not be far behind.

The base, which includes a major seaport and naval base as well, is even larger than Cam Ranh Bay in Vietnam. It was built mainly by U.S. technicians with U.S. funds. In the early days of its construction, the American contractors building it advertised in U.S. West Coast newspapers for workers to help in constructing a "B-52 bomber base" in Thailand. The advertisement was hastily revised soon afterward, deleting reference to the Boeing B-52s.

President Johnson has denied that B-52s are flying from U-Tapao, as the new base is named, but he has not said it won't be so used in the future.

Most likely, the Stratoforts will continue to operate primarily from their base in Guam, in the Western Pacific. But it makes sense that, instead of returning 2,500 miles (4,025 km) to their western Pacific base after each strike, B-52s may now, or soon, continue on to U-Tapao, only 500 miles (800 km) from Vietnam, lay over for crew rest, take on a new bomb load, and hit the Viet Cong again on the way back to Guam.

Stationing Boeing KC-135 tankers at U-Tapao relieves the congestion at Bangkok's busy airport, and may lessen the advance warning the tankers give North Vietnamese anti-aircraft gunners of an impending fighter strike when
(Continued on following page)



This giant tracking radar, part of the U.S. Air Force's Ballistic Missile Early Warning System (BMEWS), has been placed in operation in Alaska. Produced by the Radio Corporation of America at Moorestown, New Jersey, this 15-story-high radar will provide long-range, ultrahigh-speed warning in the event of ballistic missile attack on North America or Great Britain from over the top of the world. Similar tracking radars are located at Thule, Greenland; Fylingdales Moor, England; and Moorestown, New Jersey.

they take off from Bangkok to accompany Thailand-based fighters. Because of overloaded facilities at Bangkok, some tankers have come from as far away as Okinawa and the Philippines to rendezvous with fighters attacking targets in the north.

Also based at U-Tapao are U.S. Navy patrol bombers—Lockheed P-2 Neptunes and P-3 Orions—assigned to surveillance runs over the vast reaches of the Indian Ocean.

Thai officials are beginning to admit publicly that U.S. warplanes are indeed flying from Thai bases. As one high Government official explained in ceremonies dedicating the new base at Sattahip, the Thais are cooperating with the U.S. "because we realize that our intentions are the same"—to prevent a Red takeover in Southeast Asia.

* * *

AIRCRAFT FOR SMALL WARS . . .

A major shift in U.S. foreign policy from massive retaliation to limited war is being reflected in U.S. Air Force aircraft purchases.

According to Assistant Air Force Secretary Robert H. Charles, USAF is moving away from buying planes to carry out massive retaliation and is buying aircraft designed specifically for counterinsurgency warfare. This policy shift is evidenced by the Air Force's decision to buy 109 North American OV-10As and an improved version of the McDonnell F-4 Phantom for air-to-air combat.

Charles said the OV-10A, sometimes called the Flying Jeep, is tailored for wars like Vietnam and will be used to spot targets for jets and for limited close support for troops. The Marine Corps also plans to buy 80 OV-10As.

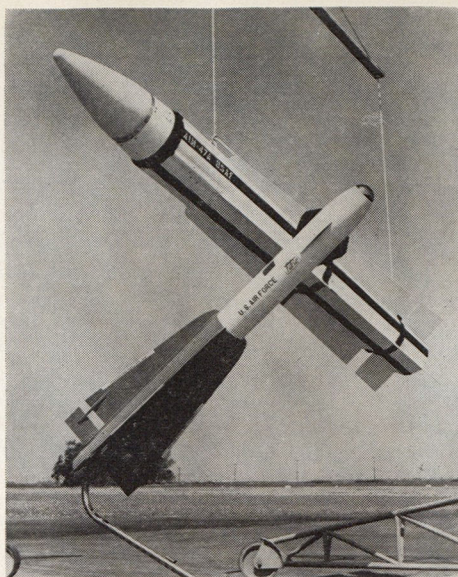
The improved F-4, designated the F-4E, will be employed primarily against Russian MIG-21s. Along with a bigger engine, the F-4E will have a 20-mm gun in its nose for close-in combat when missiles may be ineffective.

USAF and Navy Phantoms, carrying Sidewinders or Sparrow IIIs have racked up a good score against North Vietnamese MIG-21s, but their missiles aren't particularly effective at close range unless the target plane is flying almost straight ahead. The F-4E's nose cannon will give the pilot the option to fire when he spots the MIG silhouette.

Other improvements in the F-4E are higher-thrust J79-17 engines, advanced search radar, and new CORDS (Coherent On-Receive Doppler System) for low-level attack. The Defense Department announced USAF will buy 99 F-4Es.

* * *

FLATTERY FOR F-111 . . . General Dynamic's F-111 received high praise recently from Australian Air Minister



These advanced air-to-air missiles are designed for use with the U.S. Air Force's newest aircraft. In the foreground is the AIM-4D, an infrared Falcon series missile, to be used by both tactical fighters and all-weather interceptors—the F-102, F-101, and F-4 series aircraft. The AIM-47A, in the rear, is undergoing flight testing with the new YF-12A interceptor. The missiles, developed by the Hughes Aircraft Company, Culver City, California, have range and performance capabilities never before achieved in missile design.

Peter Howson, who flew the variable-wing airplane at Fort Worth, Texas, in October.

"Everything good that I have been told about the F-111 is confirmed," he said about the controversial craft.

Australia's Howson, who gained his pilot's wings as a World War II naval aviator, made a one-hour-and-15-minute flight during a visit to the company's Fort Worth plant. Australia has ordered 24 of the aircraft from the U.S. Government for use by the Royal Australian Air Force. Howson said he expects Australia's F-111 deliveries to start in mid-1968.

Referring to published reports of criticism of the F-111, Howson said, "I thought it rather good to see for myself just how wrong they are. . . . The plane exceeds all my expectations. . . . The flight controls are very light to the touch. You do not notice any change at all when you sweep the wings but with the wings swept back—and when the afterburner comes in—the acceleration is fantastic."

Flying with Howson was W. H. Harse, a General Dynamics F-111 test pilot. The mission included routine use of the variable-sweep wings, fully extended during takeoff and fully swept back during near-supersonic maneuvers.

* * *

GLOBAL COMMUNICATIONS . . .

By the end of 1968, more than 30 earth stations will be in the worldwide network, according to the Communications Satellite Corporation chairman, James McCormack. Five units are presently in operation supporting Early Bird transmissions between Europe and North America. He pointed to many additional installations in various stages of planning and construction in Europe, Asia, the Middle East, Africa, North and South America, and islands in the Atlantic and Pacific.

The latest communications satellite was successfully launched, but attempts to correct its path to the desired parking altitude of 23,000 miles (37,013 km) at its highest point and 195 miles (314 km) at its lowest failed. Comsat was expected to launch a replacement satellite. Built to serve the western Pacific, the vehicle had been expected to contribute to the effectiveness of U.S. military communications in Vietnam.

"The potential benefits of commercial satellite communications apply equally to both the developing countries and the more economically advanced countries," McCormack explained. Reliable, high-quality, low-cost communications of many types—both domestic and international—will prove a boon to growing competitive economies, increased understanding between nations, and world peace.

Shortly before McCormack made his remarks, nine international aerospace companies and three U.S. firms were selected to participate in the development and production of satellites for the Global Communication System, expected to be in operation in 1968.

They are Bell Telephone Manufacturing (BTM), Belgium; Contraves AG, Switzerland; Engins MATRA SA, France; Entwicklungsring Nord (ERNO), West Germany; Hawker Siddeley Dynamics, Ltd. (HSD), United Kingdom; ITT Federal Laboratories, United States; Laboratoire Central des Telecommunications (LCT), France; Mitsubishi Electric Corporation (MEC), Japan; Societe Anonyme de Telecommunications (SAT), France; Standard Elektrik Lorenz (SEL), West Germany; Sylvania Electronic Systems, United States; and TRW Systems of the U.S., which has over-all responsibility for the research, development, and construction of the six satellites. ☆☆☆

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