

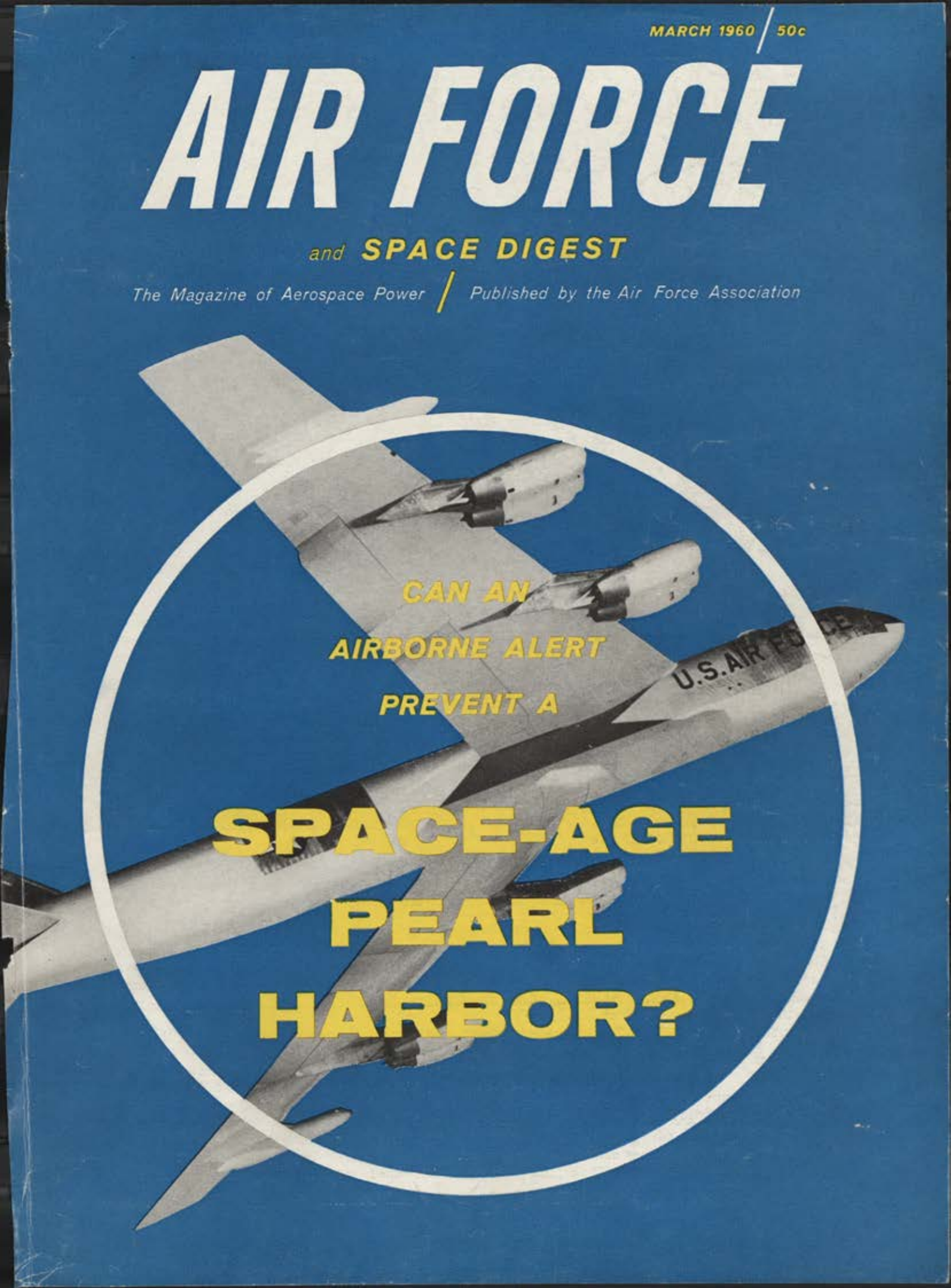
MARCH 1960 / 50c

AIR FORCE

and **SPACE DIGEST**

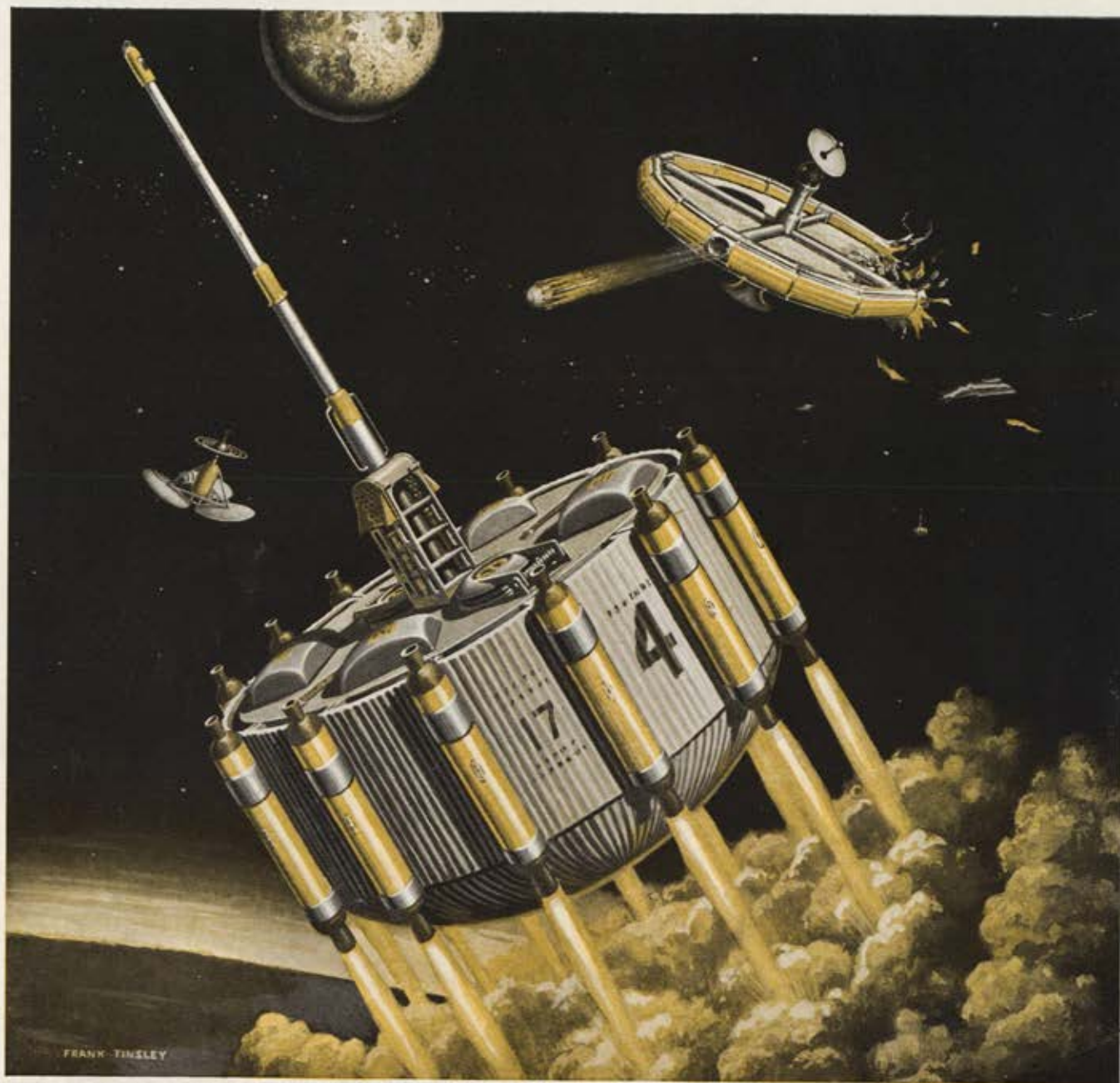
The Magazine of Aerospace Power

Published by the Air Force Association



**CAN AN
AIRBORNE ALERT
PREVENT A**

**SPACE-AGE
PEARL
HARBOR?**



STEPS IN THE RACE TO OUTER SPACE

Escape In Space

The space-assembled super satellites of the future will periodically encounter disaster—collision, mechanical failure, military attack, or the long chance of being hit by a meteorite. When this happens, "life boats" like the one shown here will bring their crews safely back to earth.

Here is the operational sequence of an escape in space:

1. Crew members don pressure suits and strap themselves into deceleration beds within the pressure-intact unit.
2. At the "Abandon Ship" signal, low-power, RATO-type launching rockets blast the sealed capsule from the threatened station (upper right illustration).
3. Acting on orders from an astrogational computer, the retro-rockets check the capsule's speed and break it out of orbit. (Foreground. Note details of offset heat shielding, hatches, slow-down parachute covers.)
4. As the capsule enters the outer atmosphere, the heat shield protects the astronauts. The life boat's momentum slows even further, and the shield is jettisoned as it cools.
5. Four parachutes are released, acting as air brakes. After a computed interval, other chutes are released.
6. The capsule lands in a predetermined

sea rescue area, and a ring of flotation bags inflate. A radio broadcasts the craft's location, and a bright sunshade serves as a visual and radar target for rescuers.

ARMA, now providing the inertial guidance system for the ATLAS ICBM and engaged in advanced research and development, is in the vanguard of the race to outer space. For this effort, **ARMA** needs scientists and engineers experienced in astronautics. **ARMA**, Garden City, New York. A Division of American Bosch Arma Corporation.

AMERICAN BOSCH ARMA CORPORATION

THE NEW AGE OF COMMUNICATION



FROM SATELLITES...

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By teletype, businessmen will send purchase orders, bills of lading, quotations, and other vital information to any business office anywhere on our globe.

Communicating by typed message will be independent of long lines and cables, unaffected by magnetic storms and quantity limitations of earthbound radio channels. It will be accurate, inexpensive and immediate.

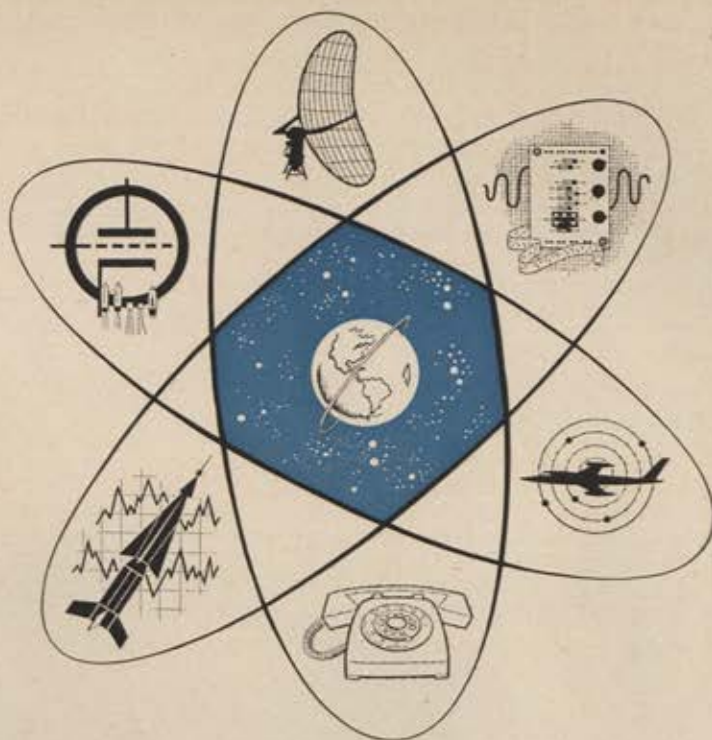
True world-wide teletype will come of age through space communications. Satellites placed in hovering orbit 22,000 miles above the earth will serve as relay stations for many thousands of channels.

The new age of communication will develop rapidly in the 1960's with the pioneering efforts of companies like Radiation Incorporated.

RADIATION IS a growing company in the communications field. Our business is research, development, and manufacture of electronic systems, including radar, telemetry, data processing, antenna systems, test devices and related electronic equipment. If you'd like more information about us, write for the latest Capabilities Report. Address Radiation Incorporated, Dept. A3, Melbourne, Florida.



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Now Sylvania—long experienced in the field of defense systems research, development and production—offers this far more comprehensive yet unified source of systems management and capability. Systems-oriented in concept and personnel, Sylvania Electronic Systems now integrates under one direction all the skills and facilities of one of the world's leaders in communications and electronics—General Telephone & Electronics, and its subsidiaries, including:

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LEICH ELECTRIC COMPANY • ELECTRONIC SECRETARY® INDUSTRIES, INC.

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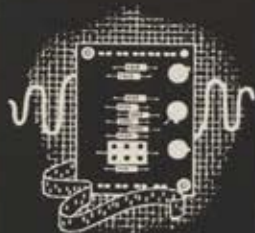
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Communications Systems

SYLVANIA ELECTRONIC SYSTEMS offers skills and experience covering the complete electromagnetic spectrum in the media of air, space, water, ground. This integrated systems group includes the capabilities of the 32 domestic and international telephone operating companies in the General System. This group offers the most advanced equipment and development capabilities

in dial telephone systems, automatic electromechanical and electronic switching systems, central office and terminal equipment, toll and exchange voice, telegraph, and data carrier transmission systems for wire, cable and radio applications, microwave relay and mobile radio systems and advanced low detectability and secure communications systems.



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Sylvania leadership in digital data processing is typified by its most recent achievement: design and development of MOBIDIC. This solid state, mobile computer will give field armies real-time solutions to many intelligence and reconnaissance problems, almost instantaneous answers to operational problems involving logistics, inventory control, etc. Sylvania has also pioneered in

developing electronically driven electroluminescent display equipments and systems. SYLVANIA ELECTRONIC SYSTEMS has subsystem management and development responsibility for the data processing portion of the Air Force BMEWS program, including new and advanced concepts of 3-dimensional data take-off circuitry and equipment.



Detection and Tracking Systems

SYLVANIA ELECTRONIC SYSTEMS has an advanced capability in high resolution, electronically scanned radar. Example: Sylvania has man-

agement and development responsibility for the Army's AN/MPQ-32, a mobile artillery detection, tracking and fire control system.



Intelligence and Reconnaissance Systems

In recent years, Sylvania has developed numerous types of broadband receivers, signal analyzers and sensing devices across the entire spectrum. Advanced anti-intrusion

devices are now under development. In addition, Sylvania is developing and managing several other highly classified programs in this area.



Electronic Warfare Systems

Sylvania leadership in electronic warfare is typified by its advances in countermeasures and counter-countermeasures against all known types of electromagnetic radiation. Sylvania

manages the passive defense system for the B-58, and maintains a quick-reaction capability and facility for Army ground-based electronic warfare activities.

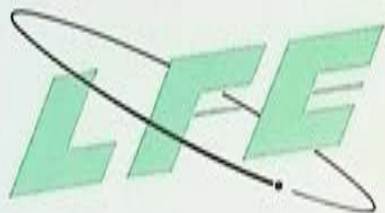
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for **GENERAL TELEPHONE & ELECTRONICS**





is experienced

*...in Airborne
Navigation Systems*

The bat isn't the only animal with a self-contained navigation system but it does have one of the most efficient.

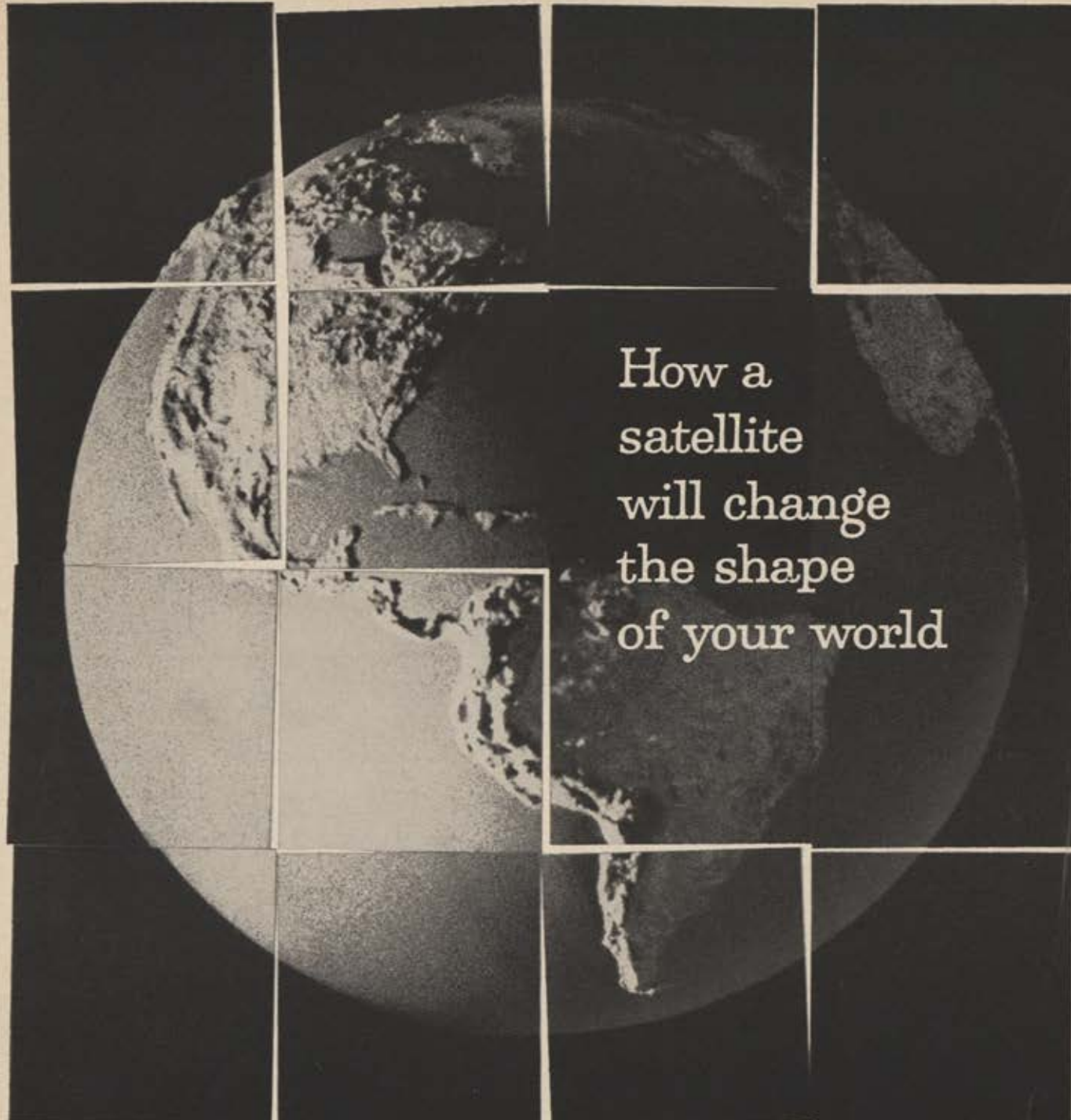
LFE is one of the original developers of self-contained navigation equipment for aircraft. Today, we are the major prime contractor of the United States Air Force for fully automatic navigation equipment operating totally independent of terrestrial navigation aids.

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How a satellite will change the shape of your world



The "Doubting Thomas" who questions the practical value of today's space shots is answered by a growing list of useful satellites...

Just as a military need for radar helped you have TV sooner, so you can expect peacetime benefits to come from rocket and missile research.

Space probes have already revised our concept of Mother Earth's figure. Now geographers suggest maps made

by camera from a cartographic satellite. It would give us the first completely accurate map of the world—a project of major value in defense.

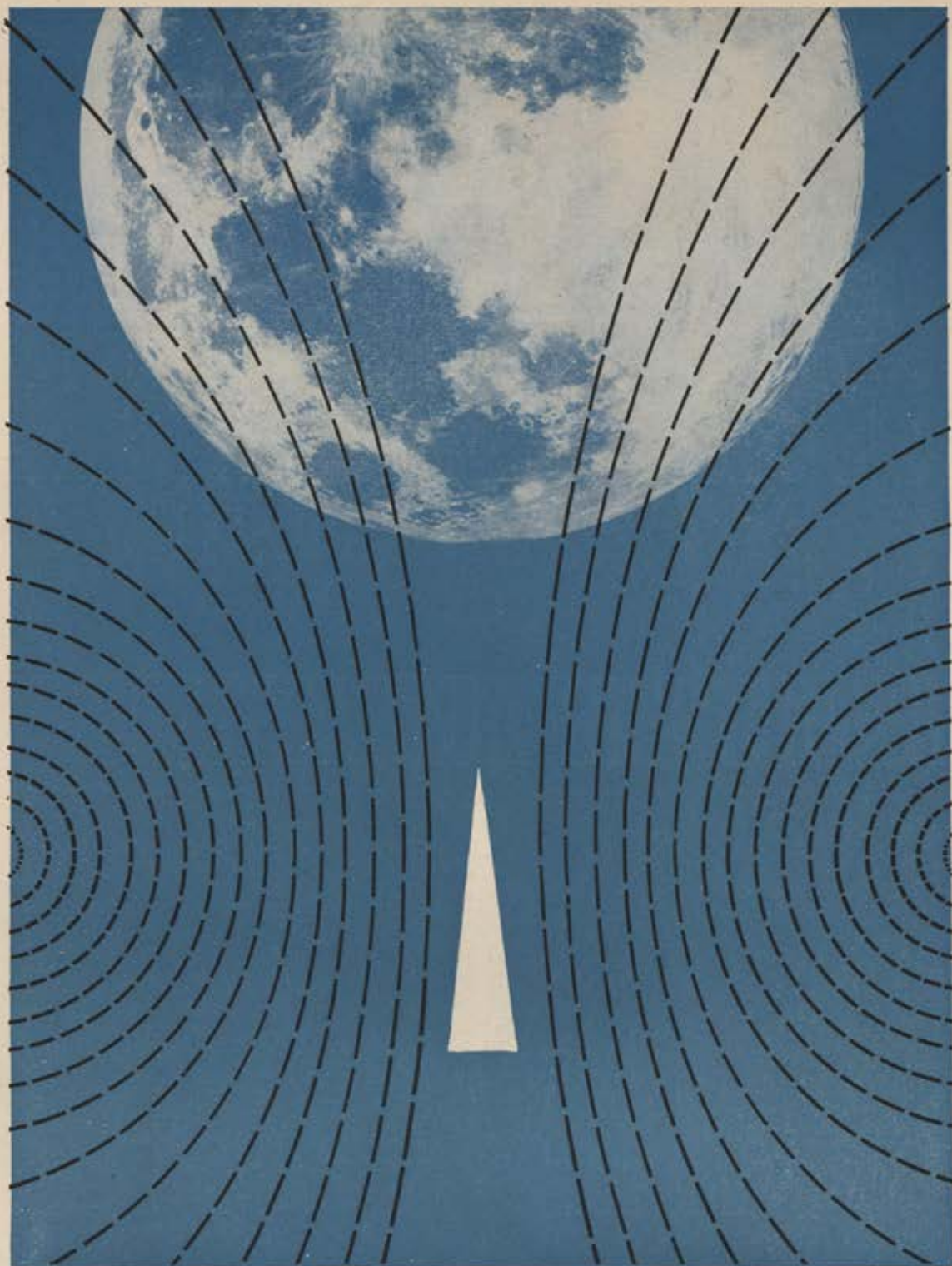
While the map-making satellite is still to come, a rocket that can orbit it—the Douglas *Thor*—is already called "workhorse of the Space Age." It has been successful in more than 90% of its firings. It boosted the first nose cone recovered at ICBM range, and is already deployed at NATO sites abroad. Now the Douglas *Delta*, NASA's advanced research version of *Thor*, is ready to probe even deeper into space.

A series of satellites which will add to our knowledge of the world we live in are going into orbit. A major role in this research goes to the Douglas *Delta*, a research version of *Thor*.

DOUGLAS



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Avco's magnetic spaceflight—

When man first travels beyond the moon, the thrust may well be supplied by a new system of propulsion, based on principles of magnetohydrodynamics (MHD). This system uses a magnetic field to speed and expel ionized gas for power output. Magnetic thrust propulsion is a current project of the Avco-Everett Research Laboratory . . . working to extend the knowledge of man.

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Slippery Slide Rule

Gentlemen: In the January article "The Cutting of the Valkyrie," by Ed Mack Miller, I'm wondering about the sentence on page 33, "We will save \$85 million in FY '61—about 1/50 of one percent of our defense spending," which the writer used in stating the relationship of the B-70 savings to the total defense budget item. I take it he was referring to the \$41 billion figure as the total spending item. In that case wouldn't the percentage be 1/5 of one percent instead of 1/50? If it is an error, perhaps it came about in the same way that "fantastic" instead of "fantastic" got into the B-70 cutlines in our paper.

Robert D. Barnes, Editor
Great Falls Leader
Great Falls, Mont.

• We have a typographical gremlin who says, "A zero is nothin', ain't it?" To be exact, 1/5 of one percent comes to \$82 million. We were pleased to see a copy of Mr. Barnes's editorial "Are We About to 'Goof' in the B-70 Cutback?" from the January 30 edition of the Great Falls Leader. He cannot reconcile Secretary of Defense Gates' statement—that manned bombers are still the primary means of accurately delivering heavy nuclear weapons in volume—with the Defense Department's decision to cut back development of the aircraft which is designed to give this country indisputable superiority in the field of manned flight.

Being only too familiar with such slip-ups ourselves, we couldn't help but be amused at Mr. Barnes's reference above to his reprint of the Valkyrie picture, on which his paper carried the caption "The Fantastic Valkyrie."
—THE EDITORS

For Distribution to Historians

Gentlemen: This office was pleased to find your highly interesting and informative article "Keeping the Record Straight," by Mary Finch Tanham, in the January issue of AIR FORCE. Another facet of this subject, and one which would give well deserved recognition to the "workhorses" of the Air Force Historical Program, would

be a short article on the activities of the enlisted historian at wing level and below who furnishes much of the raw material for the studies prepared at higher headquarters and provides his commander with historical information which is utilitarian at the grass roots.

The primary purpose of this letter is to ask permission to reproduce this article for distribution to the enlisted unit historians within Second Air Force. We feel that this would be of interest to these men.

Charles H. Hildreth
Assistant Command Historian
Directorate of Information
Barksdale AFB, La.

• You are certainly welcome to reprint the article, with credit of course, to the magazine and to the author. And thanks for the suggestion for a future article—we'll bear this in mind.—THE EDITORS

Look Out Below

Gentlemen: Is it true that the SPACE DIGEST artists don't know which way is up or forward as distinctly different from aft?

Your December 1959 reprint of the New Yorker "almost-true" article, "After Progress, What?", by M. J. Arlen, has produced many chuckles, but the addition of your artist's conception of the "Wozzek" only added more confusion. Everyone is entitled to his own opinion as to missile design; however, the currently accepted design criteria for multistage rockets calls for the first stage on the aft end or base of the rocket. Your artist has mistakenly put Tacoma's address on the last stage, which is "up front."

My home is close enough to Tacoma to make me wonder about empty rocket cases landing in the backyard. When you turn things upside down and show warheads instead, I'm ready to join the coal miners.

R. S. Sasnett
Seattle, Wash.

• The artist's assumption was that the advertising and other messages would be appreciated mainly by launch-pad personnel prior to a blast-

off for Tacoma, where interest in the message on the missile would be minimal no matter what stages plunked cityward. We're glad you enjoyed the piece.—THE EDITORS

B-36 Crew

Gentlemen: I was pleased to see the picture of the B-36 crew in the article "USAF in Transition," on page 91 of your December 1959 issue. There is really nothing extraordinary about the picture, but its background might be interesting to note.

The man standing at the extreme right side of the picture is a Captain Patrick, who was the aircraft commander at the time. The picture was taken in August of 1953, at Yokota AFB in Japan. Believe it or not, we had just landed there after thirty-three hours and forty-nine minutes of continual flight. We were part of "Operation Big Stick" which Life magazine gave quite a play. We left from Fairchild AFB, Wash., and flew non-stop, following as nearly as possible a great circle course from the coast of Seattle to Japan.

We were supposed to have gone on to a farther base but developed trouble in number six engine and were forced to land at Yokota. This was the first B-36 crew ever to land in Japan. There was another crew which landed at Itasuki AFB, Japan, and they were met by the news media as part of the usual big buildup. They, of course, took the "glory" for being the first crew over there. Needless to say, after navigators' logs were compared it was brought out that we landed some thirty-seven minutes before the "Glory Crew" did.

You are probably wondering (are you?) why we look so clean after such a long flight. This was the question that was asked us as we all got out of the plane. Believe me, up until one hour out of Japan we were all a dirty lot. However, when it was decided that we would have to land at Yokota, the order was given to start shaving and put on new flying suits which we all had. Shaving was no problem since that model B-36 still had a washbasin and mirror aboard.

(Continued on following page)

I was the navigator on that trip, and in the picture I am the fifth one from the left—bottom row. Don't let the happy expression fool you. I was beat, and ready for the rack. . . .

Capt. Edward L. Russell
Ft. Walton Beach, Fla.

Vivid Recollection

Gentlemen: In looking over some back issues of AIR FORCE/SPACE DIGEST, the July 1959 article by William G. Bell, regarding John Purroy Mitchel, interested me intensely because of my familiarity with the situation. It was well written and described the incident accurately as far as investigation through written records allowed.

There is only one correction which I might make and that is Major Mitchel was flying a Thomas-Morse scout with a LeRhône rotary motor at the time of his death. This particular airplane was exceedingly sensitive.

My impression was, and I may be wrong, that Major Mitchel was undertaking his first flight in this particular airplane on account of his extreme interest and enthusiasm, because I had flown with him several times in Hispano-Suiza powered airplanes and he was a good pilot. Our feeling about the accident at the time was that he had forgotten to fasten the seat belt and when he started to land, or at least lower the nose, he was thrown forward in his seat and the airplane overturned. He fell approximately one-quarter of a mile from the airplane.

This is still quite vivid in my recollection because I had breakfast with Major Mitchel that morning at Gerstner Field.

Lt. Col. Harmar D. Denny,
AFRes. (Ret.)
Washington, D. C.

Medals for Air Museum

Gentlemen: Portrayal of the history of the Air Force would not be complete without an exhibit of aviation badges. Unfortunately, we do not have a complete selection of badges which have been authorized for wear. We feel that the following badges are hidden away among the effects of former Air Force personnel and might be donated to the Air Force Museum.

Military Aviator—Authorized May 27, 1913. 14 kt gold.

Military Aviator—Authorized August 14, 1917. Embroidered, silver bullion on dark blue felt; "US" in gold.

Junior Military Aviator—Authorized August 14, 1917. Embroidered, silver bullion on dark blue felt; "US" in gold.

Enlisted Pilot—Authorized August 14, 1917. Embroidered, white silk on blue felt.

Military Aviator—Authorized October 27, 1917. Embroidered, silver bullion on dark blue felt; "US" in gold.

Observer—Authorized December 29, 1917. Embroidered, silver bullion on dark blue felt.

Military Aeronaut—Authorized December 29, 1917. Embroidered, white silk on dark blue felt; "US" in gold.

Junior and Reserve Military Aeronaut—Authorized December 29, 1917. Embroidered, white silk on dark blue felt; "US" in gold.

Military Aviator and Junior and Reserve Military Aviator—Authorized December 21, 1918. Oxidized silver; "US" in gold.

Military Aeronaut and Junior and Reserve Military Aeronaut—Authorized December 21, 1918. Oxidized silver; "US" in gold.

Observer—Authorized December 21, 1918. Oxidized silver; "US" in gold.

Military Aeronaut and Junior and Reserve Military Aeronaut—Authorized January 25, 1919. Oxidized silver.

Observer—Authorized January 25, 1919. Oxidized silver.

Observer (Qualified as a Pilot)—Authorized November 12, 1920. Oxidized silver.

Airship Pilot—Authorized October 14, 1921. Oxidized silver.

Airplane Observer—Authorized October 14, 1921. Oxidized silver.

Technical Observer—Authorized November 10, 1941. Oxidized silver.

Balloon Pilot—Authorized November 10, 1941. Oxidized silver.

Senior Balloon Pilot—Authorized November 10, 1941. Oxidized silver.

Balloon Observer—Authorized November 10, 1941. Oxidized silver.

Service Pilot—Authorized September 4, 1942. Oxidized silver.

Glider Pilot—Authorized September 4, 1942. Oxidized silver.

Liaison Pilot—Authorized September 4, 1942. Oxidized silver.

Bombardier—Authorized September 4, 1942. Oxidized silver.

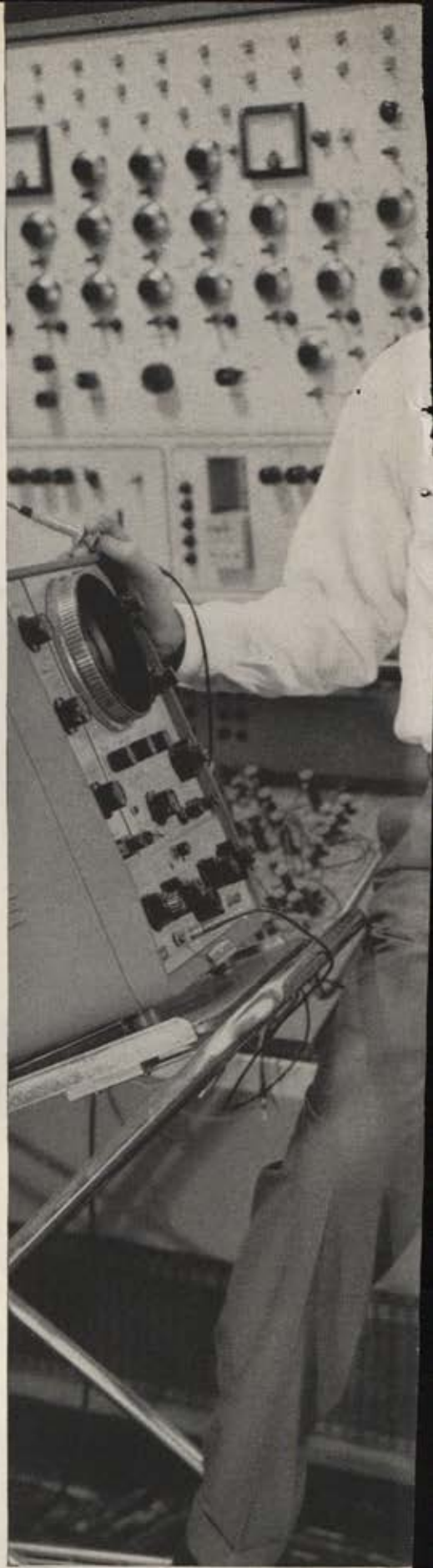
Navigator—Authorized September 4, 1942. Oxidized silver.

Aerial Gunner—Authorized April 29, 1943. Oxidized silver.

Flight Engineer B-29—Oxidized silver.

We request donors to send their badges to the Director, Air Force Museum, Wright-Patterson AFB, Ohio.

Capt. Kenneth T. York
Executive Officer
Air Force Museum
Wright-Patterson AFB, Ohio



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Military Electronics Division

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What's New With RED AIRPOWER

Here's a summary of the latest available information on Soviet air intelligence. Because of the nature of this material, we are not able to disclose our sources, nor document the information beyond assurance that the sources are trustworthy.

Russia's Air Force is virtually unaffected by Premier Khrushchev's announced reduction in the Soviet armed services. Information now available indicates Russian air commands will be maintained at present levels. However, extensive cutbacks appear in the wind for the ground forces, and the Red Navy will also be cut back.

The only ground force not affected, so far as is known, will be the Red artillery—Russia's missile force. More and more young men wearing the black insignia of the artillerymen are seen on Russian streets these days.

There is a total of 700,000 personnel in the Red Air Force according to the studious British Institute for Strategic Studies (see page 38 for the full report). The same organization says the Reds have 200 turboprop Bear bombers, 500 pure-jet Bison bombers, and 500 pure-jet Badger bombers of medium range.

The Soviet tactical bomber force is put at 5,000 aircraft, of which Blowlamp and Backfin are the two most modern.

Fighter-interceptor forces add up to 13,500 aircraft, including old MIG-15s and MIG-17s, some YAK-25 all-weather types, and the more modern supersonic MIG-19s and MIG-21s.

Add to these some 4,000 aircraft in the Red Navy. The Navy gets cast-off aircraft from the Air Force.

Paratroop units and support aircraft, believed to exist in increasing numbers, are not included in these totals.

• • •

Here is additional data on Russia's MIG-21 all-weather interceptor, the last interceptor design announced by the Russians. Now in operational use in the USSR, the aircraft is known as Faceplate among NATO powers. It also has been given to several of the satellite air forces, including the East Germans.

An improved version of the MIG-21 went into production in Russia in October of 1957. Using afterburner and at altitudes of about 35,000 feet, the aircraft can achieve a speed of Mach 2.3.

It has 20- and 37-mm Nudelmann guns common to so many Soviet interceptors. There also is a tray of eighteen unguided rockets that can be let down beneath the fuselage. More important are mountings under each wing, presumably afterthoughts, for M-101A infrared guided missiles.

The MIG-21 has a range of 1,200 miles. It does not

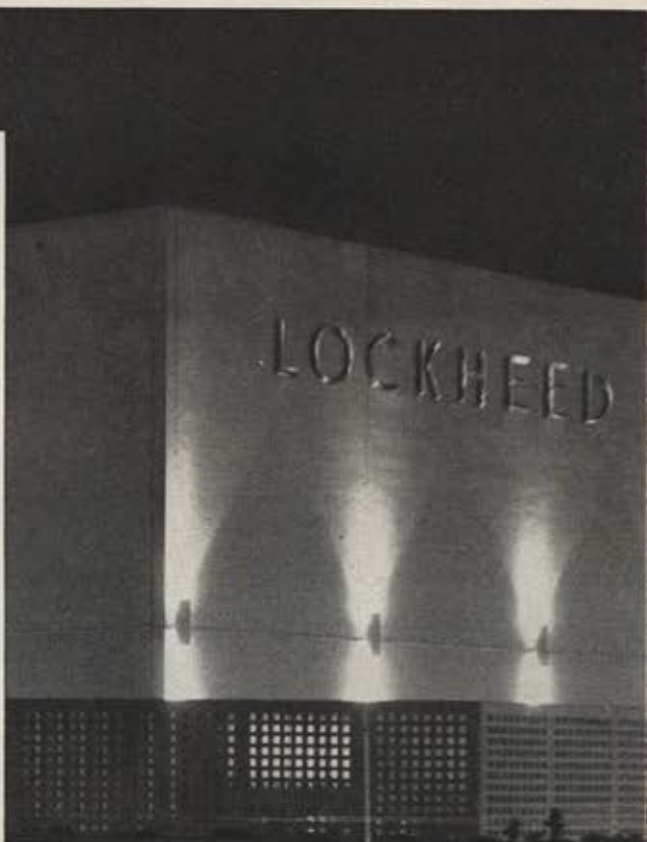
SATELLITE CENTER U.S.A.

This is the home of Lockheed's advanced Satellite Systems organization. It houses the 2,500 scientists, engineers, and technicians who build satellites for the Discoverer, MIDAS, and SAMOS programs of the U.S. Air Force. Here, under one 346,000-square-foot roof, is America's largest satellite center.

LOCKHEED

MISSILES & SPACE DIVISION

Sunnyvale, California



appear to be designed for low-level work against ground targets.

• • •

Soviet aircraft design engineers are wrestling with an idea that has also interested engineers in this country for some years. That is how to come up with materials that can, first, add structural strength to high-speed aircraft and space vehicles while they are wrestling their way through the difficult, thick layers of atmosphere near the earth, and then can be burned as fuel to provide thrust when this tough going is past.

Boost-glide vehicles such as USAF's Project Dyna-Soar would profit from development of these materials. We have already moved in this direction. Our most advanced solid fuels of today use tiny particles of aluminum and magnesium.

The Russians also are working on ways to burn aluminum or magnesium materials, structural or otherwise, with oxygen or fluorine to get thrust from them. The Russians are, in addition, looking at plastics to see if they can get them to perform a dual structural-and-fuel role.

• • •

Aeroflot, Russia's airline, reports it carried fifty percent more passengers in 1959 than 1958. This impressive performance is explained by a number of facts. First, a greatly increased number of seats were available with the introduction of jets. Second, local service was expanded through use of types previously engaged in flying trunk routes now served by jets.

A third factor was that industrial employment has been rising steadily in Russia. More Russians are earning higher incomes as a result and can afford to travel by air.

• • •

Opening of the first direct air service between New

York and Moscow now appears to be more a problem of technology than of politics. The Russians continue to have trouble with their giant turboprop TU-114, which is quite an airplane on paper but quite a problem in the maintenance hangars. Its counter-rotating propellers have caused all sorts of gear-box problems. The vibration the propellers set up has adversely affected structural and skin elements of the aircraft. Until these can be licked, the Russians have no aircraft capable of regular nonstop service between Moscow and New York—although they have done so on special occasions like the Khrushchev visit to the US. The US now has pure jets that can do the job nonstop both ways.

Contrary to some early reports, the forthcoming TU-124 announced by designer Andrei N. Tupolev is medium-range rather than long-range.

Until they have an airplane that can do Moscow-New York nonstop, the Russians are not likely to be eager to open the two-way, two-nation service. The US has given rights to Pan American to fly the route. But the Russians keep delaying even though they publicly talk about the need for US-USSR nonstop air service.

• • •

A flying bus helicopter, apparently designed after the familiar YAK-24, NATO code-named Horse, recently was unveiled in Moscow. The design was credited to I. A. Erlikh. A. S. Yakovlev designed the YAK-24 and received no fewer than five Orders of Lenin and six Stalin Prizes for doing so.

The new craft features an automatic pilot, something not previously found in Soviet production-type helicopters. It is about sixty-five feet long, has twin rotors, and two piston engines. It seats thirty people in a comfortable modern cabin.—END



AEROSPACE WORLD

Frederic M. Philips

ASSOCIATE EDITOR

The Aerospace World

A giant snail shell, a rare drug, a burning house, and a monkey's premarital adventure played prominent roles in this month's aerospace story.

So did a mighty missile that "finally" worked.

The background music, a study in cacophony, came from Washington. A top-level national defense debate was in progress.

Airman 1/C Bruce C. Barwise spent three days at the end of January in a most improbable situation. He was a man in an aluminum snail shell moored in Lake Erie.

Actually, however, there was no madness in this method of testing the habitability of the ejection capsule for SAC's new Mach 2 bomber, the Convair B-58 Hustler. Airman

A simultaneous event across the country pointed up the extensive nature of current USAF human factors testing. Even as Airman Barwise began his snail sail, Air Force physician Capt. Duane E. Graveline stepped into a giant bathtub at Brooks AFB, Tex., for a week's stay to find out what effect prolonged immersion would have on his body.



January 9 was double-play day for Col. Don Speirs. The colonel, Civil Air Patrol regional operations officer in the national capital area, received an emergency call early in the day from a hospital in Martinsburg, W. Va. The hospital needed a shipment of blood quickly. Colonel Speirs took off for Martinsburg from his home base, Falls Church, Va., Airport, in a matter of minutes.

The delivery made, he turned his Ryan Navion toward home—and part two of the day's adventures. Passing over Poolesville, Md., Colonel Speirs saw flames shooting up from an isolated farmhouse. No one on the ground seemed to be aware of the blaze.

So Colonel Speirs dropped his craft to treetop level and buzzed a farmer working in a nearby field, circling on each pass and pointing toward the flames. The colonel radioed a fire report to Federal Aviation Agency headquarters in Washington, and personnel there got word out to local firefighters.

Colonel Speirs circled the house, occupants of which were away for the day, for several minutes. Then he flew up and down country roads vectoring in arriving fire engines. Once they were on the scene, he put his plane down in an open field, helped lay hose to a pond, joined in the task of hauling furniture from the flaming home, and, following this, manned a hose with the volunteer firemen who had converged from nearby towns. The structure saved, he climbed back into his plane and continued home.

USAF and its CAP auxiliary fly mercy missions continually here and abroad. Most of them receive little publicity. Two Lowry AFB pilots provided another splendid example of "USAF to the rescue" on January 28. Five members of a Rapid City, S. D., family were stricken that day with botulism, a form of food poisoning that is normally fatal unless treated with a comparatively rare serum within four hours after symptoms appear. None was on hand in Rapid City. Nearest known source was a Denver laboratory. No commercial flights were available. Capt. J. B. Lane and 1st Lt. G. R. Helmick of Lowry got the serum to Rapid City by T-33 jet trainer less than two hours after the original call was received in Denver.



Artist's sketch, Boeing B-52H, slated for SAC in 1961. Craft is powered by eight Pratt & Whitney turbofan engines. Armed with Hound Dog, the "H" is equipped with pods containing rockets to be used as penetration aids to targets.

Barwise lived in the snail-shaped capsule from January 27 through 29, sitting "like a man in a barber's chair getting a shave," eating candy bars, and talking by radio to USAF researchers on a Coast Guard tender nearby.

He was troubled by leg cramps, boredom, and difficulty sleeping during the three days afloat, he said later, but added that he "could have stayed a lot longer." The capsule (*see cut on the opposite page*) is 4½ feet by 2½ feet. Airman Barwise is 6 feet, 2 inches tall. Air Force project officer Capt. Billy J. Mills announced the test yielded "extremely valuable information."

The stricken family was released from St. John's Hospital, Rapid City, next day.



Hardware news of the month came from Cape Canaveral, Fla., where on February 2 USAF fired a Titan ICBM successfully for the first time in nine months. And for the first time successful separation and ignition of the missile's second stage (*see cut*) was achieved. It was also the first shot utilizing a Titan command guidance system.

It was a spectacular and timely success for the ninety-five-foot Martin ICBM, biggest and potentially most powerful US missile. The Titan scored four straight first-stage successes early in 1959, then came on lean days. Titans exploded and burned in August 14 and December 12 tests. Prior to the February 2 shot, widespread questioning of the Titan program was being heard in and out of Congress.

But the February 2 vindication of Titan was at least partially marred three days later. On the fifth, another of the giant missiles took off smoothly and headed out to sea from the Cape. Within less than a minute, however, it veered sharply and exploded.



Intent or capabilities? How strong is Russia today? Should SAC planes fly a continuous air alert? Must we step up our defense efforts to protect our survival? The questions, critical ones all, flew thick and fast in a full-dress debate among our national defense decision-makers in Washington. Here were some of the highlights:

★ Secretary of Defense Thomas S. Gates got the ball rolling in mid-January. He told Congress and then a press conference that a new intelligence estimate based on Russian "intent" rather than "capabilities" rendered a more optimistic conclusion on US strength vis-à-vis the Soviets.

★ At the same time, by contrast, Central Intelligence Agency chief Allen W. Dulles briefed a congressional committee in closed session, and members emerged to tell newsmen the information they had received on Russian strength was "not encouraging." It was later reported that Mr. Dulles spoke of "substantial" Red missile gains.

★ A few days later, SAC's Commander in Chief, Gen. Thomas S. Power, said in a speech in New York that a force of just 300 Russian missiles, half IRBMs and half ICBMs, "could virtually wipe out our entire nuclear strike capability within a span of thirty minutes" and that they could develop this capability by mid-1961.

★ On January 23, Air Force Secretary Dudley Sharp told an Oklahoma City audience that "there is no clear indication that the Soviets are or will be significantly ahead of us" in ICBMs. He said that there might be a "missile gap," but there surely was no "deterrent gap" problem facing the nation.

★ Two days after that, Secretary Gates told the House Space Committee that we were not relying on "intentions" but on "more and better information" on Russian strength, which puts us in a better position than we had thought.

★ On January 27, President Eisenhower backed up his Defense Secretary at a press conference, declaring that we now had "better estimates" on Russian strength and the US has "all the power that would be necessary to destroy a good many countries."

★ On February 1, Secretary Gates said before a Senate Appropriations subcommittee that General Power's warning regarding Russian missile strength was "unrealistic."

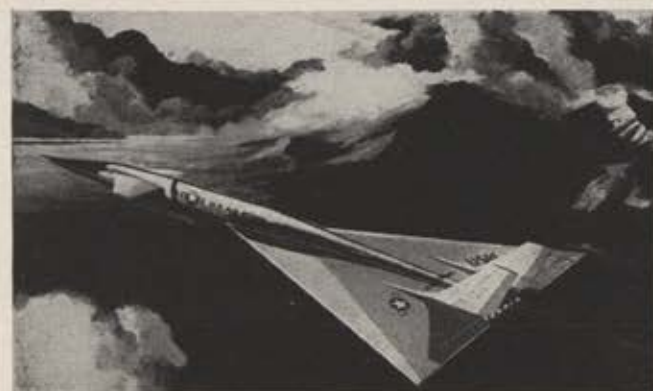
★ Gen. Nathan F. Twining, Chairman of the Joint Chiefs, reassured the same group, "The US is the strongest nation in the world and will remain that way."

★ On February 2, before the Senate Preparedness and
(Continued on page 17)



Wide World Photos, Inc.

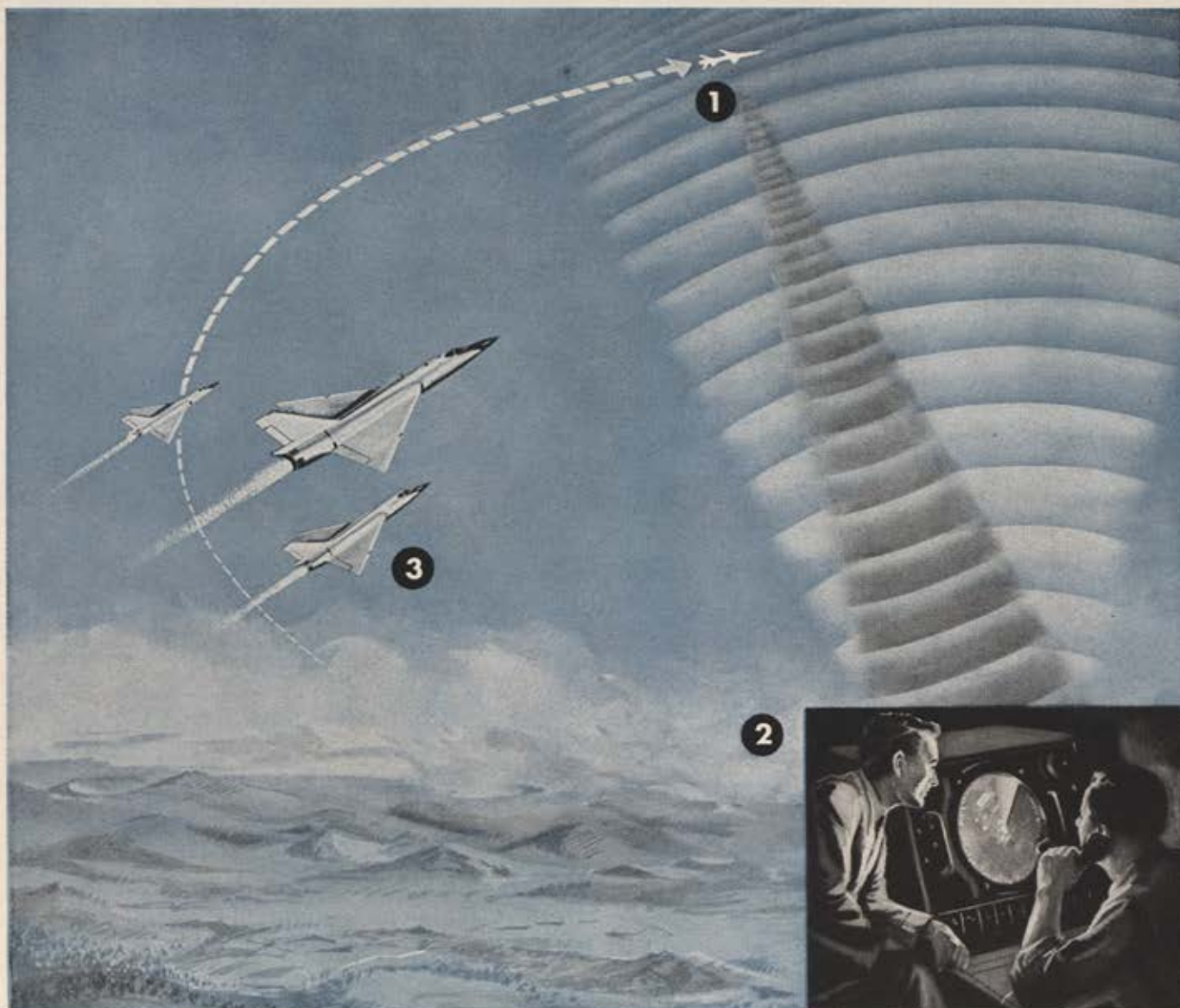
Three days in a survival capsule in icy Lake Erie marked A/IC Bruce C. Barwise's contribution to aerospace medics' and engineers' plans for the watertight capsule which is expected to be carried aboard the Convair B-58 Hustler.



Artist's conception of the B-70 supersonic strategic bomber now being developed in prototype by North American Aviation, Inc. Sketch released by Department of Defense.



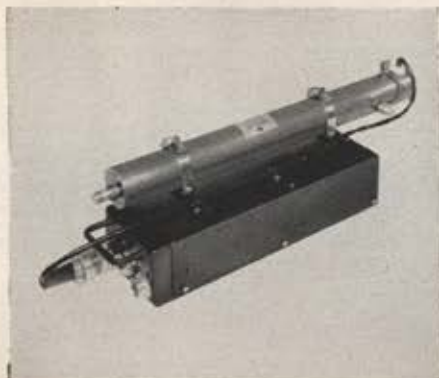
The second stage of the USAF Martin Titan ICBM, generating some 80,000 pounds of thrust, is the largest and heaviest US vehicle to be separated from first stage in flight. The engine is some forty-one feet long and weighs approximately twenty-four tons, according to released figures.



(1) Drone flies at speeds of Mach 2 and beyond, and at altitudes greater than 50,000 feet. Pulse from ground radar is detected by drone's SEE system, which "enhances" the pulse and retransmits it (2) to radar station. Much larger "pip" is seen on radarscope than drone would

ordinarily make. Size of picture can be adjusted to suit the particular military exercise. Radar operator dispatches fighters or missiles (3) which intercept and "kill" drone.

How drones "stand in" for giant bombers and missiles



KEY COMPONENTS in SEE system are Sperry Traveling Wave Tube Amplifier, and compact power package. Total weight: less than 20 pounds.

For testing the nation's defenses, a unique electronics system—named SEE for Sperry Echo Enhancer—makes miniature target drones look like intercontinental bombers or missiles.

SEE is a simple and inexpensive method of doing this vital job. Weighing less than 20 pounds, it consists of a traveling wave tube developed by Sperry's Electronic Tube Division, plus a miniaturized power "package" and antennas. By means of simple antennas, the equipment receives signals from ground radars, returns these signals with greater intensity to ground radarscopes. "Pips" of any desired size can be created.

Extensively flight-tested at Cape Canaveral, SEE has had broad acceptance by the military services and is being delivered also to defense contractors and friendly foreign governments. Designed for use with either surveillance, air-intercept or tracking radars, it is also applicable to ground control since it can be used in locating and tracking aircraft with great accuracy and over long ranges.

SPERRY

Space Committee, General Power stood by his initial warning and called for funds to place SAC planes on continuous airborne alert, large-scale procurement of the North American B-70 Valkyrie bomber, and a vastly increased missile program.

★ On February 3, the President dismissed warnings from General Power and those who agreed with him as representing the "parochial viewpoint" of "these generals."

★ On February 4, Lt. Gen. Bernard Schriever, Commander of the Air Research and Development Command, appearing with General Power, declared before the Senate group that the nation had lost valuable time in development of missiles. He said the "best thing" now was to boost future missile programming by a good bit, including that of the Minuteman second-generation ICBM, and to perfect early-warning systems and warning and reconnaissance satellites. Continuing his testimony at the next session, General Schriever said he feared that Russia's missile superiority was bound to increase "at least until the end of 1961."

(See page 33 for a detailed analysis of the airborne-alert question.)

This, then, was the pattern of debate in the nation's capital. The public, plainly perplexed, could do little but look on and hope that wisdom and national strength, wherever they lay, would win the day.



A girl monkey went for a violent ride over the Atlantic on January 21. She came back "frisky and full of the Old Nick," and plans for her marriage were announced forthwith.

She was Miss Sam, named for her alma mater, USAF's School of Aviation Medicine at Brooks AFB, Tex. A six-pound rhesus, she went on a rocket trip nine and a half miles up from Wallops Island, Va., in a NASA test of escape equipment. Picked up by a Marine helicopter at sea, she was said to have been in better spirits after her ride than before it. Officials said that the trip was rougher than those taken previously by male monkeys in the test series.

The next day, a University of Texas scientist announced plans to mate Miss Sam with one of those three males, Sam. He took a fifty-five-mile trip over the Atlantic on December 5. Scientists will wait with interest to see whether their flights have any apparent effect on their offspring. The wedding was set for "sometime in 1961." Miss Sam was said to be "very



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Airmen on Capital Hill: Missilemen Generals Schriever and Yates testifying before House Space Committee. General Schriever also appeared before Senate.

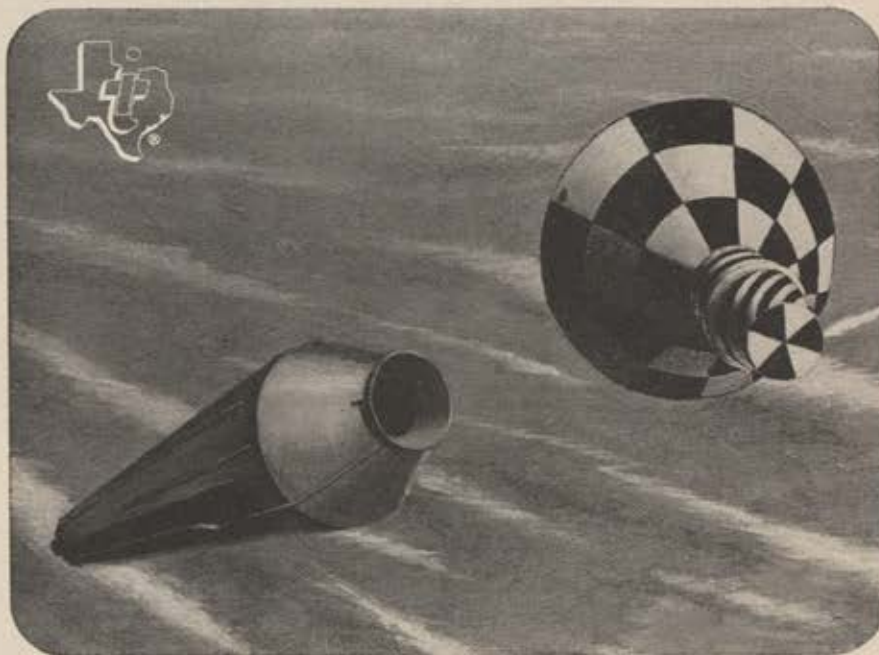
pretty for a monkey" but a "trifle young" for marriage at present.



Elsewhere in the aerospace world: On January 18, the Naval Research Laboratory in Washington announced that it had scored a dramatic breakthrough in radar. Newly developed

radar was said to have a startlingly increased range capability of 2,600 miles. Its applicability in air defense and defense against submarine-launched missiles could be immensely important.

The President's defense budget for 1961, \$41 billion as predicted, pro-
(Continued on page 19)



N.A.S.A.'s Project MERCURY, first U.S. manned Space Capsule, built by McDonnell Aircraft.

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Honors to Lt. Gen. James H. Doolittle. The veteran airman receives 1959 Silver Quill Award for distinguished service to aeronautical progress at National Business Publications dinner. Chief of Naval Operations Adm. Arleigh A. Burke presented award. Right, Robert E. Harper, president of NBP, looks on.



World Wide Photos, Inc.

Oklahoma's Jerrie Cobb won 1959 "Woman of the Year" trophy, from Women's National Aeronautical Association. Sen. Mike Monroney did honors.

vided for 1,510 new planes—633 Air Force, 658 Navy, 219 Army. The Air Force will buy forty-five Boeing B-52H intercontinental bombers this year to equip a fourteenth heavy bomber wing for SAC, plus thirty-two Convair B-58s for one wing, and 220 Republic F-105s.

Twenty-seven ICBM squadrons—thirteen Atlas and fourteen Titan—were also scheduled. On January 13, USAF announced that its three-year test program for the Thor IRBM was successfully concluded and a modified Thor would now be used as a "civilian rather than a military booster."

On January 20, Russia made a "superrocket" launch into a Pacific test range. The shot from a Caspian Sea base went some 7,800 miles, landed more or less "on target" 1,100 miles southwest of Hawaii. Ten days later, Russia fired a second rocket and declared its Pacific tests ended.

On January 20 Capt. Eddie Rickenbacker, America's "ace of aces" in World War I, added another "kill" to his record. Official US figures had credited Captain Rickenbacker, founder and chairman of the board of Eastern Airlines, with twenty-one aircraft and four balloons shot down in action on the Western Front. Air Secretary Sharp, acting on the recommendation of a Pentagon board set up to correct military records, issued instructions to adjust Rickenbacker's score by one more aircraft.

On January 22, another was added to the long string of successful Atlas launches from Cape Canaveral. A 6,300-mile shot fell within 1.24 miles of target.

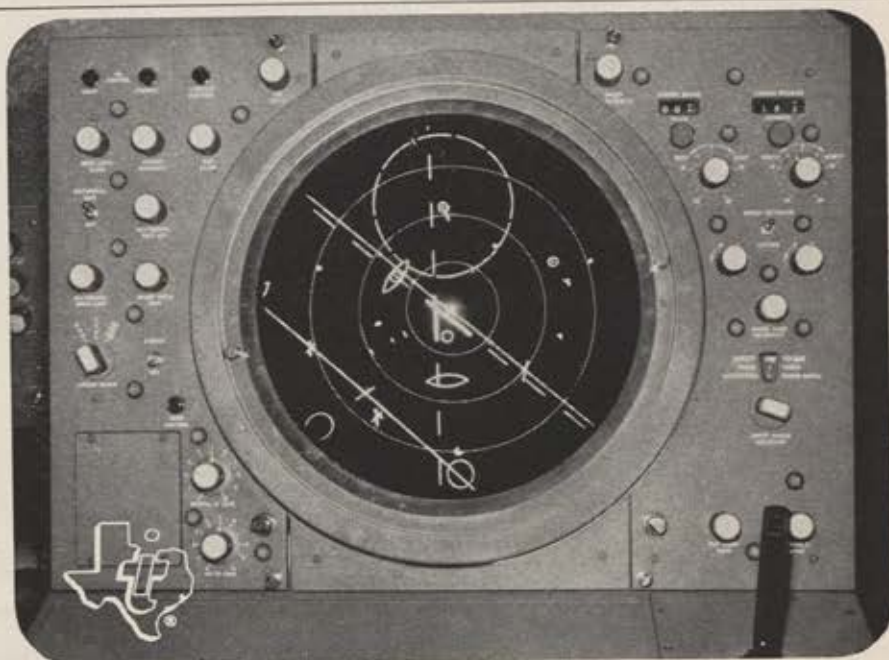
The Navy on January 25 launched the first of a series of gigantic balloons from the aircraft carrier *Valley Forge* in cosmic-ray tests. The bal-

loons, largest of which was as tall as a fifty-story building, were equipped to take photos of cosmic rays twenty-two miles over the Atlantic.

The X-15 North American test vehicle, with test pilot Scott Crossfield at the controls, completed its fourth powered flight on January 23, some 60,000 feet over Edwards AFB, Calif. It was the first X-15 flight since the ship crash-landed on November 5.

Air Chief of Staff Gen. Thomas D. White announced on January 25 that USAF's accident rate fell in 1959 to an all-time record low. There were 675 major aircraft accidents in 1959 compared to 894 the year previous. Total fatalities fell from 705 to 376. Rate of accidents was 8.3 per 100,000 flying hours compared to previous low of 10.4 that was set in 1958.

(Continued on page 21)



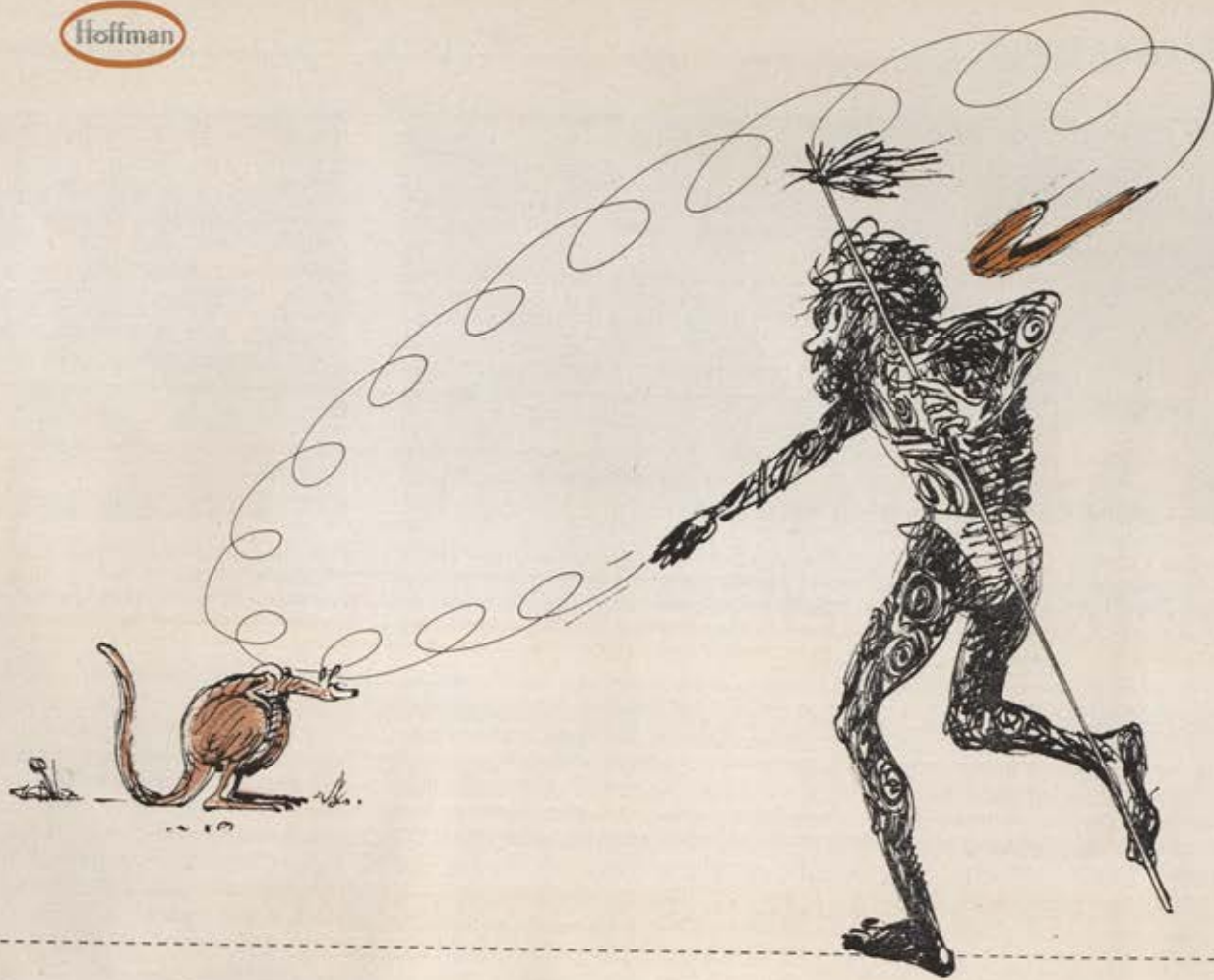
Ground clutter is eliminated by TI moving target indicator shown with video map at 20-mile range.

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guidance problems?



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Huge USAF Lockheed C-130, equipped with skis, made history January 23 by landing at Byrd Station on the inland plateau of Antarctica, first heavy transport to do that slippery job. The craft carried tons of supplies, including steel beams. C-130s out of Sewart AFB, Tenn., are expected to become regular part of Antarctic picture. Navy, running Operation Deep Freeze, hopes to acquire four.

On January 28, the Navy demonstrated a new communications system in which signals are bounced off the moon. It transmitted between Washington and Hawaii.

USAF's Bomarc-B air defense missile failed for the sixth time in a row in development tests at Cape Canaveral on January 29.

Discoverer IX failed on February 4. This was the third miss out of nine Air Force Discoverer shots, aimed at developing reconnaissance and warning satellites.

Staff Changes

Dr. Joseph V. Charyk, formerly Assistant Secretary, Research and Development, USAF, has become Under Secretary of the Air Force, the position held by Dudley C. Sharp, the new Secretary.

Maj. Gen. Harvey T. Allness, who was with Alaska Communication System, NORAD and CONAD, Ent AFB, Colo., is now Chief of Staff USAFE . . . Maj. Gen. Kenneth P. Bergquist, former ARDC Deputy Commander for Air Defense Systems Integration Division, Laurence G. Hanscom Field, Mass., is now ARDC Commander, AF Command and Control Development Division, at the same base, retaining his former post as additional duty . . . Maj. Gen. William H. Blanchard was transferred from Commander, 7th Air Division, SAC, High Wycombe, England, to Director of Operations, SAC, Offutt AFB, Neb. . . . Maj. Gen. Wendell W. Bowman, formerly Commander, Central Air Defense Force, ADC, and Commander, Central North American Air Defense Region, CONAD, Richards-Gebaur AFB, Mo., becomes Commander, 33d Air Division, Semi-

Automatic Ground Environment, ADC, and Commander, 33d North American Air Defense, CONAD, at the same base.

Brig. Gen. Robert S. Brua, reassigned from Chief, Medical Services Inspection Division, Director of Readiness and Materiel Inspection, Office TIG, Norton AFB, Calif., to Surgeon,



World's smallest turbojet engine, by Williams Research Corp., Michigan, is designed to be mounted on tips of helicopter rotor blades and for other small aircraft use, military and commercial.

MATS, Scott AFB, Ill. . . . Maj. Gen. Cecil H. Childre, former Director of Operation and Training, TAC, is now Deputy for Operation, TAC, Langley AFB, Va. . . . Maj. Gen. James V. Edmundson, who was Director of Operations, SAC, Offutt, AFB, Neb., is now Assistant to DCS/Personnel, (Continued on page 23)



Hughes' FALCON Air-to-Air Missiles in front of Convair F-102A

TI INFRARED OPTICS IN MISSILE SYSTEMS

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Hq. USAF, Washington, D. C. . . . Brig. Gen. William M. Gross, formerly Chief of Staff, TAC, Langley AFB, Va., has become Chief MAAG, Denmark . . . Brig. Gen. Royal Hatch, former Deputy for ANG Affairs, CONAC, Mitchel AFB, N. Y., is now DCS/Personnel, USAFE . . . Brig. Gen. Benjamin G. Holzman, Air Force Office of Scientific Research, ARDC, Washington, D. C., has been named Commander, AF Research Division, ARDC, same base.

Brig. Gen. Cecil P. Lessig, formerly Commander, 29th Air Division (Def) ADC, and Commander, 29th North American Air Defense Division (CONAD), Malmstrom AFB, Mont., becomes Commander, 29th Air Division, (Semi-Automatic Ground Environment), ADC, and Commander, 29th North American Air Defense Region (CONAD), at the same base . . . Brig. Gen. Curtis R. Low, who was Vice Commander, WADF, Hamilton AFB, Calif., is now with Alaska Communication System, NORAD and CONAD, Ent AFB, Colo. . . . Maj. Gen. William W. Momyer, reassigned from Director of Plans, TAC, to Deputy for Plans, TAC, Langley AFB, Va. . . . Brig. Gen. James E. Roberts, former DCS/Personnel, USAFE, is now Deputy for Personnel, TAC, Langley AFB, Va. . . . Maj. Gen. Charles B. Westover, who was Director of Plans, SAC, Offutt AFB, Neb., becomes Commander, 7th Air Division, SAC, High Wycombe, England.

Promotions: Twenty-three brigadier generals have been nominated by President Eisenhower for promotion to two-star rank. They are: Arthur C. Agan, Jr., Glen R. Birchard, Chester W. Cecil, John K. Cullen, Charles M. Eisenhart, Thomas J. Gent, Jr., Donald P. Gaul, Perry B. Griffith, Donald L. Hardy, John K. Hester, Joseph R. Holzapple, William B. Keese, William C. Kingsbury, Frederick H. Miller, Charles H. Pottenger, Joseph J. Preston, Jermain F. Rodenhauser, Charles B. Root, Kenneth O. Sanborn, Prescott M. Spicer, Henry R. Sullivan, Jr., Major S. White, and James W. Wilson.

An additional forty-four colonels have been named for promotion to the rank of brigadier general. They include: Milton B. Adams, Carl W. Andrews, Julian H. Bowman, Richard F. Bromiley, Robert W. Burns, Andrew B. Cannon, Louis E. Coira, Roger M. Crow, Allman T. Culbertson, Richard D. Curtin, Leo F. Dusard, Jr., Richard W. Fellows, Robert D. Forman, Jamie Gough, Earl C. Hedlund, Elbert Helton, Franklin S. Henley, John B. Henry,



Dr. Joseph V. Charyk, left, former Assistant Secretary of the Air Force, Research and Development, is sworn in as Under Secretary by AF Secretary Sharp.

Jr., Robert H. Herman, Harris B. Hull, James W. Humphreys, Jr. and Vincent G. Huston.

Also Raymond T. Jenkins, Aubrey L. Jennings, William B. Kieffer, Richard T. Kight, Edward G. Lansdale, William E. Leonhard, Carroll W. McColpin, Thomas K. McGehee, Gilbert L. Meyers, Howard W. Moore, Douglas C. Polhamus, Walter B. Putnam, Robert C. Richardson, 3d, Ralph C.

Rockwood, James C. Sherrill, Robert N. Smith, Robert H. Strauss, Benjamin A. Strickland, Jr., J. Francis Taylor, Jr., Paul W. Tibbets, Jr., William R. Yancey, and Charles M. Young.

Retired: Brig. Gen. Edward B. Gallant, Brig. Gen. Lester W. Light, Brig. Gen. George F. McGuire, Brig. Gen. William H. Powell, Jr., and Brig. Gen. Raymond L. Winn.—END



USAF BOMARC Missile produced by Boeing Airplane Co — equipped with TI-built PDM/FM/FM telemetry system.

TI TELEMETRY IN MISSILE SYSTEMS

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AIRPOWER in the news



Claude Witze

SENIOR EDITOR

Secrecy Begets Confusion

WASHINGTON, D. C.

The most common complaint of observers here, both casual and intent, is that they are confused. Any number of excuses are being given for this confusion. One of them is that Administration spokesmen, like Defense Secretary Thomas S. Gates, Jr., have been misinterpreted. Another one is that military spokesmen, like Gen. Thomas S. Power, are too numerous and that they have all kinds of ideas. Then there are the out-and-out critics, like Senators Symington and Johnson, who are said to add to the confusion with some deliberate intent because they aspire to a presidential nomination by the Democratic party.

Certainly the press has not distinguished itself if, indeed, it ever was willing to accept the assignment of clearing up the confusion. At this writing at least four prominent news weeklies, the kind that are read by millions of Americans, have printed four different sets of figures estimating our missile strength vis-à-vis the Russians. The figures are for now and some time in the future. In addition to being different they all are at least partly wrong and, according to reliable sources, all guilty of upgrading the true US strength. It is germane to recall, in this connection, that General Power is one of the men who is outspoken in his demand that the American people be given the straight facts. The SAC Commander in Chief is not running for public office, but his case has drawn the attention of the House Government Information Subcommittee ever since he wrote a book that was banned from publication. This winter the General is more intent on winning support for the airborne alert program he considers essential to our survival. But in his appearance before the Senate Preparedness and Space Committees headed by Mr. Johnson he made an eloquent plea for giving more information, accurate information, to the public. It is the public, General Power says, whose support he needs, and he feels the only way to get it is to tell them the facts. This, clearly, is one of the ideas he has as a general that is an anathema to the Administration.

There is no doubt about it; the Administration's defense program is under fire, and secrecy is one of the weapons it is using to fight back. There are two others worth mentioning. One is the technique of discrediting the critics with the argument that they don't know all the facts or that they have political or vested military ambitions. The final technique is pure Madison Avenue, and can result in headlines of such dubious merit as the following example from the *Washington Post* of February 11: "Eisenhower Sees Missiles for 1st Time."

This language was not used in the mimeographed "Remarks of the President on the Airstrip" issued in the best Madison Avenue style by the White House Press Secretary. The remarks were to the effect that Mr. Eisenhower found Cape Canaveral "a most highly instrumented place" and that the experience of his visit was worthwhile. He

hoped it also had been worthwhile for the reporters who accompanied him, some of whom are veteran visitors to Patrick AFB. They, like Senator Symington and a lot of people in defense industry, had spent many days at the Cape before they dropped in with the Chief Executive for his three-hour tour.

Some of these people also are aware that Cape Canaveral is the home of a test range and is not an operational base preparing to fire shots in anger. They know that the birds themselves are only about twenty percent of the operational weapon system, the rest being in a mighty complex of men and machinery commanded by General Power but still in mighty scarce supply. What they know of these things they may have learned at SAC Headquarters, Offutt AFB, Neb., for many of them have visited



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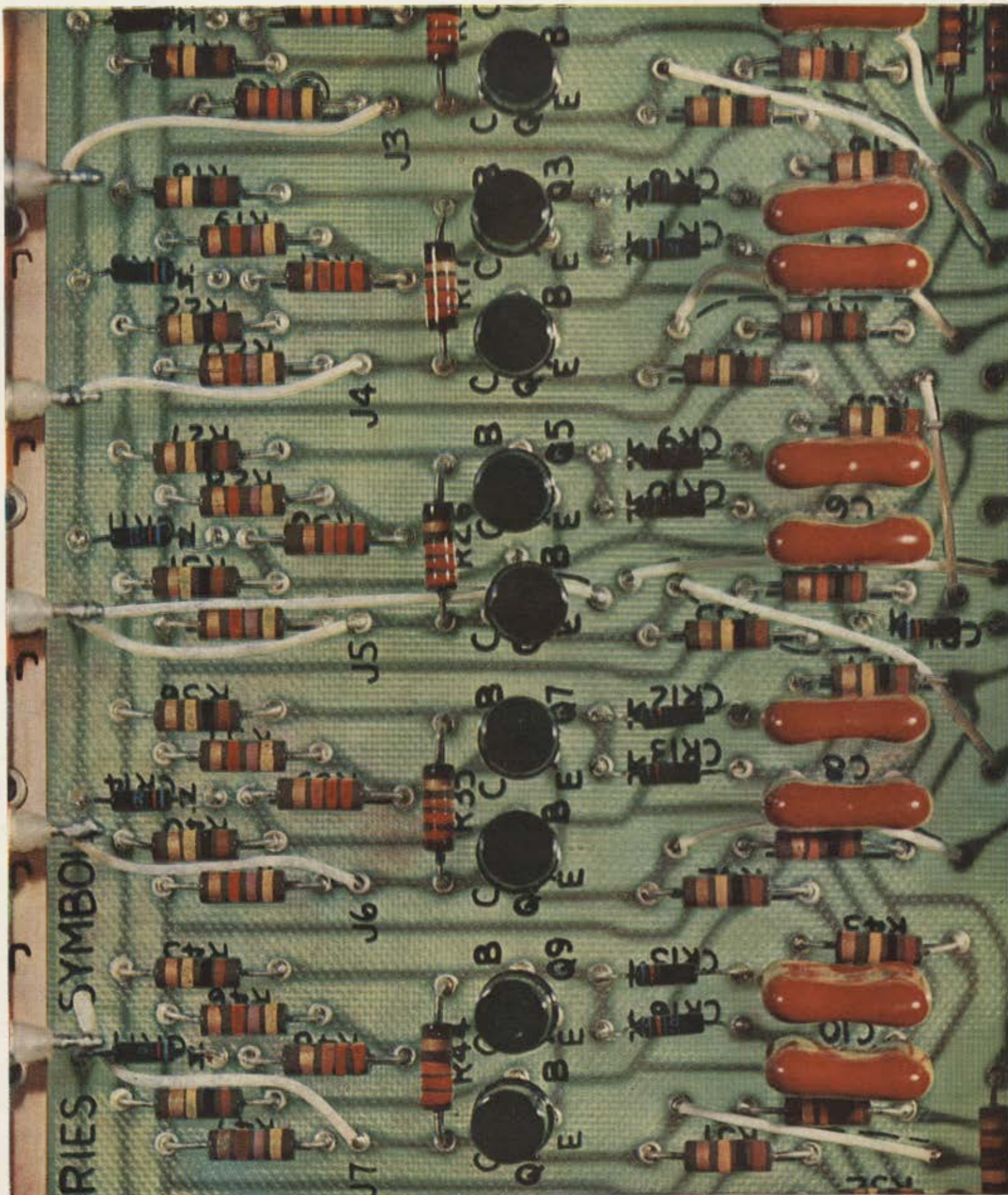
Sen. John Stennis (D.-Miss.), acting chairman of the Senate Space Committee, has a word with Gen. Nathan F. Twining, Chairman of the Joint Chiefs of Staff, during Senate hearings into the status of United States defense preparedness.

that key installation. Mr. Eisenhower, who entered the White House in 1953, never has been to Offutt. And he never has been to Vandenberg AFB, where the first operational missiles are located. These observations are pertinent in the sense that it is the weapon system the nation is discussing in the present debate. It is a system that will be used only when the word is passed to Vandenberg from Offutt, which will get the word from 1600 Pennsylvania Avenue.

The plea of General Power and others for less secrecy is not expected to bring any results. The White House has strong feelings on this subject, and the Republican National Committee has laid down the line of attack against critics who struggle against the restriction. It has been suggested that our strength is a deterrent only so long as potential foes know what the strength is. Presumably this means we have some way of telling the potential foe while keeping it a secret from our own people.

(Continued on page 27)

At 00^h00^m01^s GMT February 1, 1960, Martin logged its 425,412,000th mile of space flight



Without electronics it is impossible to design, build, test, launch, guide, track or communicate with a missile. That is why 40% of Martin's 7,500 engineers are electronic/electrical engineers.

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If pictures of missiles and aircraft which are airborne with CECO products actually *were* exhibited in a gallery, the section devoted to pump applications would be an impressive one. In addition, space would have to be set aside for future portraits, since right now . . . at Chandler Evans . . . a number of important pump design and development programs are underway.



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It has developed from recently published hearings of the House Subcommittee on Defense Appropriations that the Air Force has taken exception to data on the missile situation prepared by the National Intelligence Board. Presumably, it is the latter's arithmetic that is being used by such witnesses as Defense Secretary Gates and Gen. Nathan F. Twining, Chairman of the Joint Chiefs of Staff, although Senate committee members have said Allen Dulles, head of the Central Intelligence Agency, has not agreed with their conclusions. So far as the Air Force is concerned, it has disagreed with CIA and the National Intelligence Estimate in previous situations and proven more right than wrong.

Congressman Melvin R. Laird (R.-Wis.) has indicated that USAF gives the Russians credit for greater capability than other experts heard by Congress. This being true, it would justify the attitude of USAF spokesmen in their case for such weapons as the deceased F-108 long-range interceptor, the gutted B-70 bomber, and the airborne alert. Yet the President in his most recent press conference, as this is written, issues a clarion protest against congressmen, generals, "or one individual or one technician far down the line" who dares challenge his Defense Department "experts."

There is no denying there are political considerations in the argument, but regardless of its outcome the genuine threat is that the US may follow a path of preparing for the minimum danger because it is cheapest, and the American people are denied the right to decide what they are willing to spend. So long as our national defense effort is geared to what the Administration wants to spend, rather than to what we need, there will be an effort to find the formula for a minimum deterrent. And there is no way that any man, be he in the Kremlin or the Pentagon or the Bureau of the Budget, can tell us how to calculate that minimum deterrent.

The B-70 at Bargain Rates

The following exchange is from the transcript of hearings on the fiscal 1961 budget before the House Subcommittee on Department of Defense Appropriations. The principals are Rep. George H. Mahon (D.-Tex.), chairman of the committee, Maj. Gen. R. J. Friedman, USAF, Director of Budget, and Gen. Thomas D. White, USAF Chief of Staff.

Mr. Mahon asked how much the Air Force had requested for the B-70 Mach 3 bomber. Then:

General Friedman: Our request in the recommended budget was for approximately \$456 million.

Mr. Mahon: That is what the Air Force originally wanted?

General Friedman: That was our original estimate.

Mr. Mahon: What are you asking now?

General Friedman: The budget request contemplates \$75 million.

Mr. Mahon: You argued strenuously, I assume, Mr. Secretary and General White, for the \$450 million program for the B-70?

General White: Yes, sir.

Mr. Mahon: This decision was made by the Secretary of Defense or by the President?

General White: I got my orders from the Secretary of Defense, sir.

Mr. Mahon: Did this battle ebb and flow, or was there just a stone wall all the time?

General White: A certain amount of ebb and flow in it, sir.

It is clear that the ebb and flow has not ceased and that the slash from \$456 million to \$75 million may not be permanent. The Chief of Staff, a few moments after the above exchange, said he had spent "many sleepless nights" over the problem of whether he would try to save the F-108 Mach 3 interceptor or the B-70. He picked the latter. Why? Because it "would be the greatest threat to the Soviet Union."

This makes it clear that the Secretary of Defense, who gave General White his orders but is not reported to have lost any sleep over the question, made a decision that USAF feels will ease the burden on Russia. This is one of the critical features of the B-70 decision that has not been aired in the debate. The threat to Russia in the B-70 program is both military and financial. It is a military threat in the sense intended by General White. It is a financial threat in the sense that we can afford to build it a lot easier than Russia can build a defense against it. The shift to Mach 3 in our manned offensive system would force the Kremlin to launch a back-breaking program of new weapon systems, involving interceptors, ground-to-air missiles, and the complementing control system. As the B-70 designers know so well, it is necessary to develop a new family of aircraft metals and fabrication processes to meet the strains of a 2,000-miles-an-hour cruising speed. When General White speaks of the B-70 as marking a new "breakthrough" in aeronautics, he is referring to the heat barrier, beyond which, in his words, "your horizon is perhaps unlimited." So far, the Russians have had no compulsion to cross that horizon. There is no reason to doubt that they can do it, but the cost is something that would almost certainly stagger Mr. K. in his program to provide more consumer goods for his public.

This is not to deny that the B-70, if it is allowed to survive, would be an expensive airplane. General White estimated before the House committee that the unit cost will be \$24 million against \$8 million for the B-52. He did not discuss how much this price tag will be increased if the program is stretched out and the B-70 follows a stumbling cycle like so many of its predecessors. The original flight date for the B-70 already has slipped eleven months. If the decision were made to regain that eleven months there would have to be a crash program with all of its added costs. So far as production is concerned, leading to operational deliveries, the planned schedule can be met if the go-ahead, a reversal of the decision to gut the airplane, is made by June of this year. So far as subsystems are concerned, the contracts have been ordered terminated but are being sustained by the contractors on a minimum basis. The difficulty in restarting will increase the longer the delay. The idea, suggested by the Administration, that the gutted B-70 might use alternate subsystems already developed has no attraction for USAF. It has been compared to the racing car with a topflight driver who is sent on the track handicapped because the owner refused to buy him a proper pair of glasses.

Economies like this appear increasingly nonessential in the lush world that is America today. The B-70 is an airplane that the Russians can't afford. It has been estimated that it would cost *them* \$40 billion in five years if *we* continue the program. If General White's cost estimate can hold we would saddle Moscow with this defense burden for something in the neighborhood of \$10 billion. The B-70, like the B-36 of another day, may be a real bargain.

(Continued on page 29)

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MATS, Sin and Salvation

The promised report of the Department of Defense on "The Role of the Military Air Transport Service in Peace and War" has been completed and put through its paces at the White House. It has been released with a program approved by the President. USAF has set up a committee of civilian experts to figure out how the changes can and should be made. The Air Transport Association, easing its malignment of MATS for the time, has smiled, hailed the report as "a long step forward," and headed for Capitol Hill. Here, supported in some degree by the report, it is urging federal aid in the development of modern cargo aircraft because "the country cannot rely upon the natural development of this phase of our industry."

Recommendations approved by the White House do include a suggestion that the Defense Department and industry should share the costs of developing a modern turbine-powered airplane that can be used by military and civil airlines. It also says that MATS should stick more closely to its "hard-core" mission, if and when the airlines get the capability they need to support MATS. At the same time, the report recognizes that MATS must use the airlift it generates in preparing for its mission. So far as commercial contracting is concerned, the report favors policies that will do more than encourage modernization of airline equipment. It demands an insurance that there will be no interruptions to commercial service for the defense mission and that the carriers be required to meet certain emergency requirements. If a crisis arises, the report says in effect, an airline with a contract will be expected to increase its commitment.

One of the important things about the report is that it has succeeded in incorporating certain reservations that, in effect, throw the ball back to the airlines. If they capitalize on the opportunities they will be busy, too busy to devote energy to attacks on military procedures and methods of dividing traffic. There are reservations in the report. Despite all the screaming, it points out, "commercial cargo capability is extremely limited for emergency purposes and qualitatively inadequate . . . commercial carriers can accommodate only a relatively small percentage of the military traffic. . . . There are no aircraft in the commercial carrier industry which were originally designed as cargo



Emergency spare parts in hand, Air Force pilot leaves Cessna U-3A supplier, one of many designated to serve USAF across America.

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carriers." At another point: "Until there is an expansion in commercial air cargo capability up to the required level, it is appropriate that MATS be capable of making up any deficiency that may exist."

On the subject of scheduled traffic, the report points out that this is an area that results in maximum criticism of the MATS operation. It even suggests that much of the congressional opposition to modernization of the MATS fleet has resulted from this resentment. The opposition, about a year ago, managed to keep MATS from acquiring jet cargo planes considered essential for support of the

Strategic Air Command. The report also says that in case of an emergency, such as the Formosa deployment of mid-1958, MATS must upset other military airlift forces in order to meet its scheduled program.

There is little attention paid in the report to MATS passenger services, which drew a lot of attention from ATA critics over the past two years as "plush" operations run in direct competition with the commercial carriers. This noise has dropped perceptibly since it was announced that in 1959 MATS flew 2,400,000,000 passenger miles with a perfect safety record.—END



Above, AFA's first Panorama, San Francisco, 1955. Aerospace Panorama in 1960 will be larger and better than ever.

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(See page 102 for Housing Information)

Since AFA held its first Panorama in San Francisco in 1955 with fifty-eight exhibitors, the Panorama has more than tripled in size and number of exhibitors and is now the nation's largest display of aerospace and defense equipment. In 1959, at Miami Beach, the US Air Force was represented by five members of the Secretariat, including former Secretary James H. Douglas, seventy general officers, including Gen. Thomas D. White, Chief of Staff, and 553 other USAF officers. A total of 1,601 defense industry representatives registered at Miami Beach, including ninety-six presidents and board chairmen, 176 vice presidents, and 491 managers.

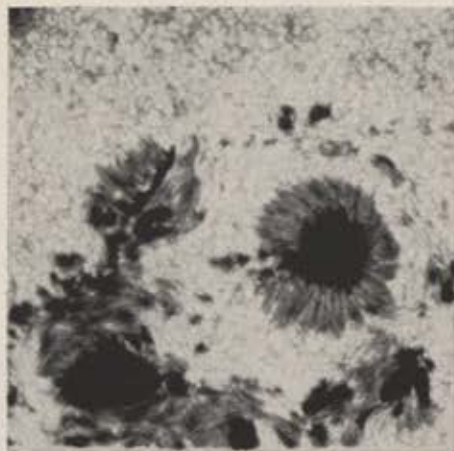
The 1960 Aerospace Panorama in San Francisco will be even larger and better attended. As this issue of *AIR FORCE/SPACE DIGEST* Magazine goes to press, we have already assigned more exhibit space than was occupied in Miami Beach.

With the program for San Francisco shaping up to be one of the best Convention programs ever offered, attendance records are sure to set a new high as they did in 1955. Why not make your plans now to combine an outstanding AFA Convention with the vacation of your life—in fabulous San Francisco, one of the most cosmopolitan cities in the United States. There are many famous and unique points of interest to visit in and around San Francisco.

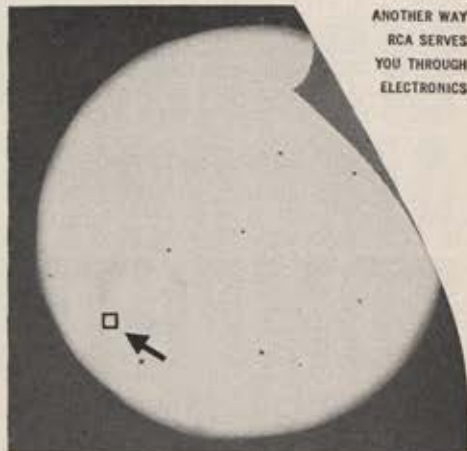
During World War II and the Korean conflict, many Air Force personnel passed through San Francisco on their way to and from the Pacific. The Air Force Reunion Party on Saturday night will bring back memories of those days and the 1955 AFA Convention and will make it possible to renew old acquaintances and friendships. Make your plans now to be on hand for this and the many other interesting events which are planned to make the 1960 Convention another great milestone in AFA's rapid growth.



Going up for "good seeing." Unmanned balloon-observatory starts its ascent to take sunspot photos. "Project Stratoscope" is a continuing program of the Office of Naval Research and the National Science Foundation.



One of the sharpest photos ever taken of sun's surface. It, and hundreds of others taken by stratoscope, may answer mystery of violent magnetic disturbances on earth.



ANOTHER WAY
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ELECTRONICS

Exact position of photograph in relation to the total sun surface is shown here. Plotting and photography of precise areas was made possible by airborne RCA television.

RCA REPORTS TO THE NATION:

REMARKABLE NEW PHOTOS UNLOCK MYSTERIES OF SUN'S SURFACE

Special RCA Television, operating from stratosphere, helps get sharpest photos of sun's surface ever taken

Scientists recently took the first, sharp, searching look into the center of our solar system. It was achieved not by a missile, but by a balloon posted in quiet reaches of the stratosphere.

The idea was conceived by astronomers at the Princeton University Observatory. They decided that a floating observatory—equipped with a telescope-camera—would offer a stable "work platform" from which sunspots could be photographed free of the distortion caused by the earth's atmosphere.

But "Project Stratoscope" encountered an unforeseen and major obstacle on its initial flight. A foolproof method was needed for aiming and focusing the telescope of the unmanned observatory. Princeton asked RCA to help.

A special RCA television system was devised which enabled observers on the

ground to view exactly what the telescope was seeing aloft. This accomplished, it was a simple matter to achieve precise photography—directed from the ground by means of a separate RCA radio control system.

The resulting pictures reveal sunspot activities in unprecedented detail. They provide the world with important information regarding the magnetic disturbances which affect navigation and long-range communications.

The success of "Project Stratoscope" is another example of RCA leadership in advanced electronics. This leadership, achieved through quality and dependability in performance, has already made RCA Victor the most trusted name in television. Today, RCA Victor television sets are in far more homes than any other make.



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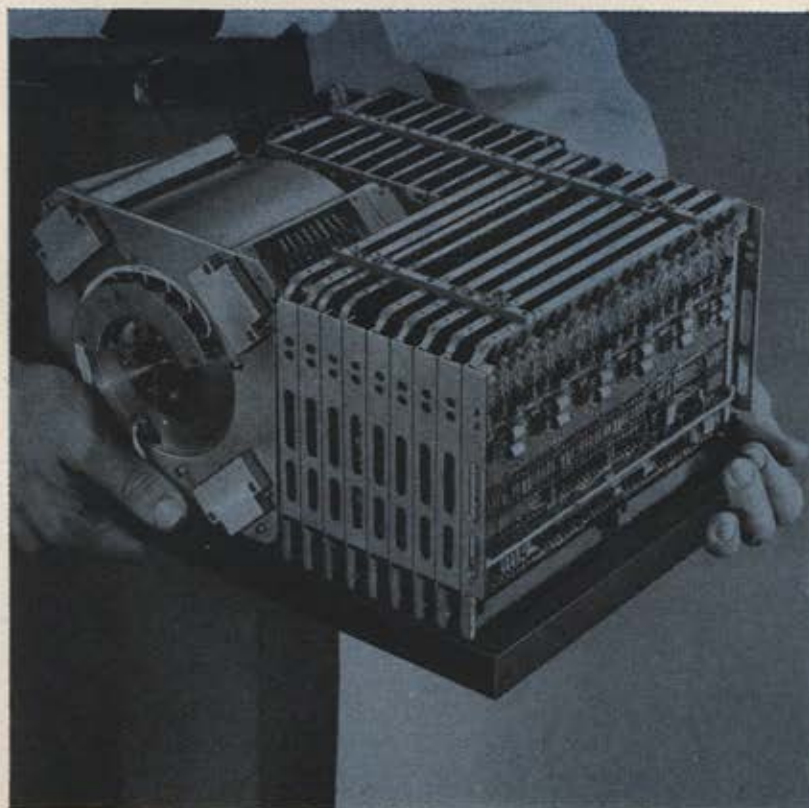
What goes up must fly true. To maintain this condition, Librascope has packaged the rectangular, polar and spherical geometries of flight...in computers easily held in a man's hand or held aloft by an economic expenditure of power...computers unexcelled for 22 years at calculating flight paths, interception courses, fire control trajectories...with answers that come out fast and right. They offer a challenging capability to alert project



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CAN AN AIRBORNE ALERT PREVENT A SPACE-AGE PEARL HARBOR?

Claude Witze

SENIOR EDITOR

WASHINGTON, D. C.

IN ALL OF the storm and fury now raging here on the defense issue, it has not been made clear that the Strategic Air Command's fight for an airborne alert is an act of desperation.

It may be a last-ditch stand for survival of the free world.

At this writing, as generals and politicians haggle over Soviet capabilities and intentions before committees on Capitol Hill, the Secretary of State has announced that Moscow's attitude on the German question is getting tough.

This news is contrary to what the Eisenhower Administration said it expected as a result of the famous Camp David meeting, and it seems to be accepted at the State Department that the basis for the shift may lie in Russia's confidence in its military power. It is being pointed out that a new Berlin crisis about a year and a half from now may demonstrate to the whole world that the balance has shifted to the Kremlin.

In view of these facts it is almost incredible that Gen. Thomas S. Power, SAC Commander in Chief, is being openly discredited—if not insulted—by his political peers. His "parochial" interest, if that, is his interest in preventing another Pearl



Wide World Photos, Inc.

SAC Commander in Chief Gen. Thomas S. Power, left, and Lt. Gen. Bernard A. Schriever, chief of the Air Research and Development Command, laid unpleasant facts before Congress. General Power warned of growing Soviet missile threat, declared that capability for continuing airborne alert was needed to keep SAC a true deterrent. General Schriever stated it's too late to fill the missile gap with missiles, pleaded for stepped-up warning satellite programming.

SPACE-AGE PEARL HARBOR?

CONTINUED

Harbor. And Pearl Harbor, the record will show, came at least in part from a mistaken assessment of *both* Japan's capabilities and intentions.

"In December 1941 few believed that Japan had a *capability* for the Pearl Harbor attack," writes Henry H. Ransom, Harvard University political scientist. "They had it. But even fewer, if any, concluded that Japan had the *intention* of such an attack. The problem then, as now, is a tendency to create policy and plan actions based upon what potential enemies will probably do . . . rather than adequately assessing everything they *can* do."

The feeling of urgency that General Power has put into his plea, admittedly, is based on what the Russians *can* do. There is no argument about SAC's deterrent capability in early 1960. The General himself has said so in public speeches and on the witness stand. He is in agreement with the Administration on this point.

Yet, regardless of degree and regardless of whether the estimates are based on Soviet capability or Soviet intentions, there will be a period, starting in 1961, when our deterrent power, which is SAC, may not be able to hold the peace. It is popularly known as the missile gap, to which should be added in consistent language, a warning gap and an intelligence gap.

General Power is not in a position where he can ignore this future situation. He must attempt to keep our deterrent power a true deterrent, and, if it should fail, it is his responsibility to have retaliatory power that can be used. So far as the missiles are concerned, it is an announced policy of the Administration that this country will not try

to match the Russian effort. This leaves the manned bomber as an essential ingredient of our retaliation as part of the deterrent role it has filled for several years.

Further, as Lt. Gen. Bernard A. Schriever, chief of the Air Research and Development Command, told a Senate committee, it already is too late to reverse the decision and fill the missile gap with missiles. Basically, this is why the airborne alert will be an act of desperation. We *can't* fill the missile gap by ordering more Atlases, as some have suggested, or more Titans. They would not be ready in time to fill the gap. The same can be said for the suggestion of the Navy that more money be pumped now into the Polaris submarine system. Whatever virtues Polaris may add to our deterrent power, they are like those of USAF's Minuteman in that they will come *after* SAC has faced its biggest crisis. If the crisis was to be eliminated by spending more money for deterrent power in the form of ballistic missiles, the inventory should have been ordered one and two years ago, when men like General Schriever were pleading for a bigger investment.

General Power has put emphasis on the significance of this lag, which had its roots in decisions that now cannot be reversed:

"... the ballistic missile offers unique advantages to a potential aggressor who plans a surprise attack and must endeavor to destroy the defender's retaliatory forces before they can be launched against him.

"Hence, there can be little doubt that the Soviets are producing ballistic missiles at the high rate indicated repeatedly by Mr. Khrushchev. It is, therefore, conceivable

that within about two years they will have built up a sufficient stockpile to permit a massive attack on the United States."

This leads to the second gap—a gap in warning. In the time period of which General Power is speaking we will have no active defense against ballistic missiles. Neither will we have a fully operational warning system that will permit SAC to get enough planes off the ground in time to effectively retaliate.

"Until these missile warning systems become reliable," General Power says, "SAC's alert force must be in the position to survive a surprise attack without any warning at all."

In this area, it should be assumed that weaknesses of the warning system will persist until USAF has a working satellite system for detection of ballistic missile launchings. Project Midas, an orbiting infrared sensor that will give up to thirty minutes' warning, is considered within General Schriever's command to be an essential part of our future deterrent strength. The reason: The warning capability of Midas will virtually guarantee the effectiveness of our retaliatory strength, be that in manned bombers or ballistic missiles. Weapons that can't get off the ground have no retaliatory power and lose their effectiveness as deterrents.

It has been pointed out that the Ballistic Missile Early Warning System (BMEWS) is coming but that only the first increment out of three will be ready later this year. Completed, it will provide only a fifteen-minute warning as opposed to the thirty minutes expected from Midas. Hence Midas is our only real hope for solving the critical warning problem.

This satellite, General Schriever says, can become operational within the present "state of the art," including the use of rocket boosters now available. Yet, Midas again will not be ready as soon as it will be needed. Much of the reason is that, by Administration decree, Midas has been sadly lacking in priority and funds. It grew out of an Air Force project that was shifted to the Advanced Research Projects Agency and then back again. Only after it got back to USAF was its priority position improved, and a new decision on funding now must be made. It is commonly assumed that the history of this project accounts in substantial part for General Schriever's outspoken opinion that ARPA is something this nation can live without. Midas is something we *can't* live without.

What we have here called the intelligence gap is another area that some day will be filled by a satellite. Until it is, we must rely on intelligence estimates and their interpretation, be that by generals or politicians, be it based on capabilities or intentions. It would appear from the record that SAC, faced with a decision on measuring the threat to our manned retaliatory force, would be taking an extreme risk if it counted alone on the National Intelligence Estimate. Maj. Gen. J. H. Walsh, USAF Chief of Intelligence, gave the Senate details on why he disagrees with the NIE. The difference arises from information on Red intent, *not* capability.

For the record is not good. It is known that USAF excelled the NIE in its prediction of the first Russian atomic bomb, the first Russian hydrogen bomb, and Russia's rocket capability. There was nothing more obvious when Sputnik was launched than the surprise and consternation of Administration spokesmen as opposed to those on the inside of military research and development activity. It was not General Schriever who called Sputnik a basketball without military significance. Mr. Ransom, quoted earlier, has not gone so far as to say the NIE fell on its face in these matters. Rather, he says, the problem "involved the receptivity of policy-makers and leaders of public opinion to unvarnished intelligence esti-



Substantial number of SAC men, like this B-52 crew, are currently on fifteen-minute ground alert around the globe.

mates." SAC's receptivity in 1960, however "parochial" it may appear, can in this case mean the difference between national survival and the kind of Pearl Harbor that will have violently radioactive ashes.

The satellite that some day will fill the intelligence gap is Samos. It still is in the research and development phase. It will be able, General Schriever says, to "see the preparations under way for a hostile attack, deep inside the borders of any country." Like Midas, it will both protect and implement our military deterrent posture.

Without Samos—and there has been no forecast of when it will be available—the facts at SAC Headquarters, (Continued on following page)

PRESIDENT EISENHOWER ON THE AIRBORNE ALERT

The following exchange took place between Rowland Evans, Jr., of the New York *Herald Tribune*, and Mr. Eisenhower at the President's news conference of February 3:

Q. Mr. President, you mentioned the word "deterrent" in your answer to the last question. Yesterday, Gen.

[Thomas S.] Power said that our deterrent of heavy bombers cannot be properly safeguarded unless it is put on a full air alert. You discussed this with us before, but in view of General Power's testimony yesterday, would you give your view on that question?



A. No, I'm—there are too many of these generals have all sorts of ideas; but I do point this out: I have got the Secretary of Defense, whom I trust, and who I know is honest in his study, analysis,

and conclusion. That is Secretary Gates. And beneath him, assisting him, is the Chairman of the Chiefs of Staff, whom I similarly trust; and the Joint Chiefs of Staff, with those two, are my military advisers. And I have been long enough in the military service that I assure you that I cannot be particularly disturbed because everybody with a parochial viewpoint all over the place comes along and takes and says that the bosses know nothing about it. Now, I don't think anyone's trying to impugn the patriotism and the earnestness and the integrity of the group I have just mentioned. And I think, myself, they are the ablest people we could get. That's the reason they were selected.

Offutt AFB, Neb., are that the command provides about a hundred soft targets which the Russians have to hit if they are not to suffer retaliation. The hits, of course, would have to be made without warning, not a difficult thing to do in the period of peak danger. The Soviets would have to destroy the manned bomber force, which will be the backbone of our deterrent force until that time, at least four years away, when missiles will carry a substantial part of the load. This also will not be difficult so long as we keep the planes on the ground.

Experts quoted by General Power say it would take an average of three missiles, in their current state of development, "to give an aggressor a mathematical probability of ninety-five percent that he can destroy one given soft target, some 5,000 miles away." Hence, the General's postulation in a speech before the Economic Club of New York that Russia, with a force of 300 ballistic missiles—half ICBMs and half IRBMs—could wipe out our entire nuclear strike capability in thirty minutes.

As SAC's top commander, the General later told a Senate committee he *must assume* that the Russians, with a *capability* of building 300 long-range missiles, have the *intention* to use them. Put in reverse, he cannot afford to assume otherwise. This is the background of his potential

Authorizations that are not pushed through this year will prolong the warning and intelligence gaps, and there will be a parallel situation in years to come when it will be too late, just as it is too late today to buy ICBMs from the existing production lines. General Schriever's plea for the highest priority for Midas and Samos, like General Power's plea for an airborne alert, may be a plea for national survival. Looking ahead, General Schriever told a House committee recently: "The opportunities of maintaining and strengthening our deterrent posture lie principally with space vehicles. . . ."

Nobody, not even General Power, has said there is a crisis here *today*. SAC is the mightiest military force in the world, and its commander, despite the interpretation put on his words in some of the press, did not at any time say or imply that the airborne alert is an *immediate* necessity. He did say SAC "should maintain the highest practical percentage of our heavy force on an airborne alert" *as soon as possible*. The budget now under discussion on Capitol Hill does not meet this requirement.

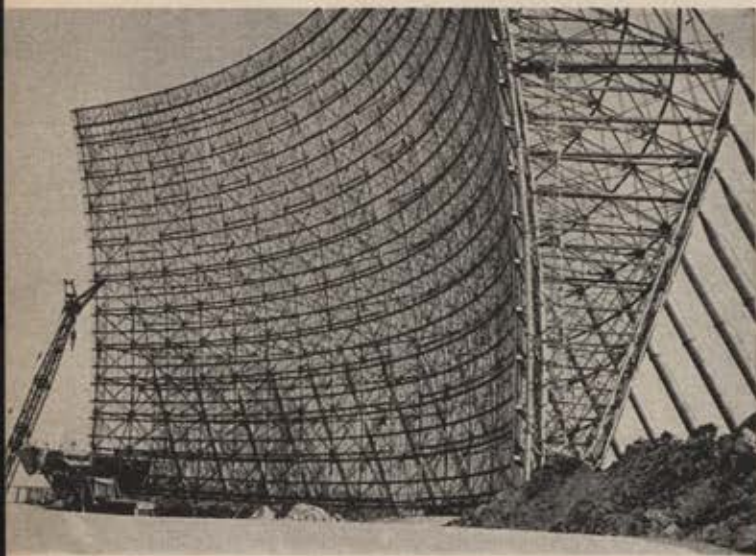
At this point it is essential that the position of Gen. Thomas D. White, USAF Chief of Staff, be made clear. It is on the record with at least three congressional committees that General White agrees with the Power assumption that the peril from ICBMs will be great pending the advent of a competent warning system. General White feels that if we assume (as General Power did) that the Russians will have numerical superiority in long-range missiles (a superiority the US has said it will accept) then a portion of SAC on air alert will become necessary.

Said General White:

"I agree with General Power's hypothetical example of what the enemy could do with as few as about 300 ballistic missiles—that is, have a high probability of destroying 100 sites if they were all soft. Further, I also agree with General Power that the actions which we are now taking, and plan to take in the future . . . will all combine to form the kind of survivable military strength which the Soviets could not attack without receiving unacceptable destruction in return."

General White, in an effort to clarify the issue, has pointed to the difference between an air alert and the capability for an air alert. He gives General Power full support on the requirement for the capability. He has not said he will refuse support of the requirement for an active air alert. What is needed is the capability and sound grounds for setting up the requirement. General Power, as SAC Commander, urged implementation of the air alert "as soon as possible"—which is near mid-1961. General White says "an on-the-shelf capability seemed to me to be superior." But the Chief of Staff also told a Senate inquiry he had tried, in vain, to have General Power's program classified as an item of "extraordinary importance." His purpose: To have it included in the budget above the basic "guideline" set down by the Secretary of Defense. General White, in short, wants an airborne alert, but he can't afford it.

The Chief of Staff, in his discussions with Congress, has put some emphasis on BMEWS, the warning system now under construction that will precede the Midas satellite. BMEWS has not been put into initial action; the first of three units is expected to be operational late this year. It has not been proven, and it is a system that will have some holes in it, enough that it has been described as a "picket fence." It can, under no circumstances, be described as a substitute for the Midas satellite system. Further, the BMEWS radar beams will be directed over the North Pole. In recent weeks the Russians have demon-



Ballistic Missile Early Warning System (BMEWS) will help guard US against attack from over top of the world. But BMEWS, not yet in action, will have limitations. Here, BMEWS radar screen at first such site, Thule, Greenland.

Pearl Harbor, and it will remain a menace until such time as there is a warning system such as Midas and its successors that will be part and parcel of our deterrent strength. Warning must join the weapon system. Until it does, the retaliatory force is not a guaranteed deterrent.

There is a real danger, in this connection, that the near-mania for budget-cutting will menace the Midas and Samos projects. At a recent press conference President Eisenhower mentioned the \$6,690 million appropriated for missiles of all kinds in 1960. His comment: "And this, it seems to me, is getting close to the point where money itself will not bring you any speed, any quicker development." Well, authorizations approved one and two and three years ago would have prevented the missile gap.

strated a capability to fire a reasonably accurate rocket in excess of 7,000 miles. So far, there has been no public discussion of the possibility that the Kremlin—if it wanted to shoot at a US target and felt the BMEWS fence was something of an obstacle—could not utilize a different launching site and evade the BMEWS eye. As ICBM ranges increase, both ours and the Soviets', clearly the satellite surveillance system will become more and more imperative.

In all of the debate it appears at times there is little appreciation of the magnitude of the job of preparing for an airborne alert. Figures on the exact cost and amount of spare parts that would have to be stockpiled are classified. But veteran flyers can get a suggestion of the problem from known information on the program.

The airborne alert is not new to SAC. There were experiments in this area with the old B-36, and there is a continuing Air Alert Indoctrination Program in the command. At least two highly secret exercises have been carried out to assemble data on the manpower, materiel, logistics, communications, and supporting services that will be needed. This program has been under way for about a year and a half, and the procedures, both for the flying and the maintenance, are nearly complete. The Strategic Air Command crews will be fully trained by the fall of 1960.

It has been reported that the indoctrination program already involves an air alert of twelve aircraft, flying various patterns—predominately in the northern part of the hemisphere—around the clock, seven days a week. It is estimated that SAC is prepared to increase this to twenty-four planes next summer and have well over 100 B-52s in the air at all times by mid-1961, which is about when General Power anticipates the air alert will be a crucial matter for America and her allies. That the program is one of desperation, a last-ditch alternative, is indicated by SAC's aircraft inventory. The command has a fleet of bombers and tankers numbering almost 3,000. But fewer than 500 of these, by next year, will be B-52s. If an enemy does attack, hits the 100 SAC ground targets, and only a quarter of the B-52 fleet escapes, the aircraft carnage on the ground still will be staggering. Yet it is not anticipated that all will be lost. SAC anticipates that some part of the ground force will escape, either through misses or warning from the airborne crews.

The planes on airborne alert will have inherent in their load and their crews that flexibility that makes the manned bomber our best retaliatory weapon. Each aircraft will be armed with two Hound Dog GAM-77 air-to-surface missiles with a range of about 500 miles. Each B-52 will carry some combination of types and sizes of bombs, plus decoys and penetration aids. There will be from four to six warheads on each plane. The targets will be military—the enemy's counterforce and his command and control centers. Target information fed to the crew in case of an attack will be good enough to eliminate those bases that already have discharged their warheads and ensure that the B-52s on airborne alert hit enemy installations that still have potency.

On this type of program it will cost about \$560 an hour to operate each B-52 in the air. This assumes twenty-four-hour sorties, and each aircraft would average about 150 hours a month on the patrol. Each crew would fly about four and a half sorties a month, spend another eight or nine hours per sortie preparing for the mission and in post-flight critiques. On top of this each crew should have an eight-hour training flight every two months although much of the routine training exercise can be carried out on the regular airborne alert missions.

So far as manpower is concerned there will be little shift in the aircraft crews. SAC has been manning each



Ground-alert crew of SAC KC-135 Stratotanker, critical component of deterrent force, plays cards during long, tedious hours geared for emergency US hopes never comes.

B-52 with 1.6 crews since the command went on a fifteen-minute ground-alert schedule more than two years ago. About one-third of the total command B-52s, B-47s, and both piston and jet-powered tankers are on constant ground alert at this time. The crewmen, in large part, would welcome a shift to airborne-alert duty.

On the maintenance side, it is clear that SAC will need more men, possibly 15,000, particularly those skilled in electronic and propulsion systems. At the outset, much of this additional burden can be accomplished by contract and fuller utilization of existing Air Materiel Command facilities. As a result of last year's exercises, inspection times on the B-52 have been shifted from fifty to 100 hours for the post-flight and from 300 to 600 hours for periodic overhaul. The new criteria have only slightly increased the man-hours of labor, and SAC reports down time on the aircraft has not been increased at all. There has been no noticeable increase in unscheduled maintenance. The Pratt & Whitney J57 jet engine has proven highly reliable, and the inspection cycle for this unit has been extended from 300 to 400 hours. The only new equipment that will be needed aboard the B-52s for a twenty-four-hour mission is additional food freezer space.

The budget now under consideration on Capitol Hill includes about \$85 million for continued practice of the airborne alert and stockpiling of spare parts. General White has called this an "on-the-shelf capability" for an airborne alert and told a House committee he originally asked for considerably more money to press the program but was overruled. Indications are that the original program called for at least \$600 million, and this presumably is the figure General Power feels is necessary. The lead time required to stock SAC's shelves with necessary spares runs from fourteen to eighteen months. Long lead-time items are electronic equipment and engines. Such items as wheels and tires can be obtained more quickly.

As AIR FORCE/SPACE DIGEST goes to press there is speculation that Congress will upset the Administration defense budget at least to the extent of providing more money for the air-alert program. As usual, funds appropriated may not be spent if they are withheld by the Executive department. Both Chairman Clarence Cannon (D.-Mo.) of the House Appropriations Committee and Chairman George H. Mahon (D.-Tex.) of the House Defense Appropriations Subcommittee have predicted that the \$85 million in the budget will be increased by three or four times before the measure comes out of Congress.

There are optimistic signs at the moment that the spell cast over the last session may be slipping and that Congress will reassert its right to take responsibility for the armed forces. If it does, it will be an indication that SAC's desperate outlook not many months from now is appreciated at least at one end of Pennsylvania Avenue in the nation's capital.—END

THE USSR AND THE NATO POWERS

THE MILITARY BALANCE

The following comparative analysis of the armed forces of the Soviet Union and the NATO powers is from a pamphlet published recently by the Institute for Strategic Studies, London, as "a contribution to the growing concern that is developing throughout the world about the arms race." We are grateful to the Institute for their kind permission for us to reprint this material.—THE EDITORS

PART I • THE SOVIET UNION

Manpower and Potential

SINCE 1955 the Soviets have announced reductions in their armed forces totaling over 2,000,000 men. But it is unlikely that reductions of this magnitude have in fact been carried out. It is estimated that today the Soviet armed forces comprise a total of no less than 3,900,000 men, which means that the reductions effected total approximately 1,100,000, if the estimate of a total of 5,000,000 at the time of Stalin's death is correct.

This figure includes about 2,350,000 men in the Army, 500,000 in the Navy, 700,000 in the Air Force, and 350,000 security, border, and labor troops.

Soviet armed forces during the last few years have undertaken a comprehensive program of adaptation to atomic warfare. As far as new weapons are concerned it must be assumed that the Soviets possess operational quantities of fission and fusion bombs with yields varying from one or several kilotons up to the megaton ranges. In the field of missiles they have now a variety of types in operational quantities; ground-to-ground in the short and medium ranges; ground-to-air; air-to-ground; and air-to-air. They are also capable of waging biological and chemical warfare on a large scale.

The Army

If the Russians have considerably reduced the number of men in uniform, the reductions have been mainly in respect of rear units, headquarters, and auxiliary establishments. It is estimated that there are 2,350,000 men in the Soviet Army, together with a further 350,000 men in internal security and labor battalions. The total number of divisions remains the same, that is to say approximately 175. Far from being reduced it is thought that the effectives of each division have been increased, the infantry division from 11,500 to 13,000 men, the armored division from 12,000 to 13,760, while the mechanized division remains at approximately 16,500 men.

Seventy-five percent of these divisions, of which seventy-five are armored or mechanized and nine airborne, are stationed in the Soviet Union along its Western border and in Eastern Europe. In East Germany there are eight tank divisions, each with 410 tanks and twelve mechanized divisions, each with 260 tanks. Not all these divisions are completely up to strength, but it is officially estimated that they comprise a total of 6,000 tanks. In Hungary and Poland there are seven divisions.

The 175 divisions are augmented by approximately sixty satellite divisions, predominantly of the rifle type, in varying degrees of combat readiness. Finally, it is estimated that the Soviet Union could provide another 125 divisions within thirty days from the date of mobilization and that she has an over-all mobilization potential of 7,000,000 men.

Over the last few years the Soviet Army has undergone a major reorganization in order to deal with the new aspect of war under atomic conditions. Its old equipment has been almost entirely replaced and its mobility, firepower, and flexibility increased. The total tank strength of the Soviet Army is estimated at 20,000 front-line tanks and 15,000 second-line tanks. The new tanks which are being introduced to the Soviet armored divisions are the T-54 medium tank fitted with a 155-mm gun and the fifty-three-ton heavy tank, which mounts a 130-mm gun.

The artillery divisions are equipped with an atomic 203-mm cannon with a range of twelve miles and a heavy 240-mm mortar with a range of twenty miles.

Other elements of the Army characterizing its modernity are airborne forces totaling approximately 100,000 men, and supported by a lift capability that would permit about ten percent of the force to be air dropped or air landed in any single operation.

The Navy

The Red Navy has increased from a total tonnage in 1940 of 600,000 to 1,600,000 tons today, which makes it the most powerful fleet in the world after the United States (4,000,000 tons). The Royal Navy with 750,000 tons ranks third.

The surface ships of the Soviet Navy consist of:

Cruisers	37
Destroyers and frigates	230
Minor craft	2,000

These are distributed more or less equally in the following theaters: the Baltic, the Black Sea, the Arctic, and the Far East.

The cruisers are of three different types:

- Twenty-four *Sverdlov* class, launched between 1951 and 1957, displacement 15,000 tons, speed thirty-four knots, armament twelve 152-mm guns and twenty-eight anti-aircraft guns;

- Five *Tchalov* class, launched between 1948 and 1951, of 11,000 tons displacement, with the same speed and armament as the *Sverdlov*;

- Six *Kirov* class, launched between 1936 and 1945, displacement 8,500 tons, speed thirty knots, armament nine 180-mm guns and twenty anti-aircraft guns.

The greater part of the destroyers are modern, having been constructed since 1950. Their displacement varies from 1,000 to 2,700 tons and their speed from twenty-eight to thirty-eight knots.

The main strength, however, of the Soviet Navy lies in the submarine fleet, which according to Russian figures comprises 450 units, of which ninety-five are based in the Baltic, seventy-five in the Black Sea, 140 in the Arctic, and 140 in the Far East.

Before 1956 this fleet was essentially a coastal fleet and its ships rarely cruised the high seas. Nowadays, however,

Soviet submarines are to be found in all the waters of the world, and long-range cruising has been greatly developed. Soviet submarines have been sighted off the coasts of the United States and Iceland as well as in the Mediterranean. It is considered that the figure of 450 may fall short of reality and that the real total may be somewhere between 500 and 600 submarines.

Of this total it is expected that in the foreseeable future seventy-five percent will consist of ocean-going craft, of which a proportion will be atomic powered. The ocean-going submarines are at present of two types: the W class and the Z class, both of which include missiles among their armament.

- The W class is 245 feet long with a 1,050-ton displacement. It has a speed of sixteen knots on the surface and thirteen knots submerged and a radius of action of 13,000 miles. There are at least 150 of these in service.

- The Z class submarine is 310 feet long with a displacement of 1,850 tons. It is capable of twenty knots on the surface and fifteen knots submerged with a radius of action of 22,000 miles. There are at least seventy-five of these in service and they are being constructed at the rate of twenty per year.

- The K and Q type submarines which were built between 1945 and 1950 are also long-range vessels; their radius of action is about 7,000 miles and their displacement varies from 1,400 to 680 tons.

- In addition there are at least 250 short-range submarines.

- The atom-powered submarines on which work has begun will be larger than the W or Z class types, reaching 3,000 tons or more.

There are no aircraft carriers in the Red Navy, but there is a land-based Fleet Air Arm which comprises 4,000 fighter, reconnaissance, torpedo-carrying aircraft and bombers.

- The torpedo-carrying Ilyushin 28 and Tupolev 14 have ranges of 1,500 to 1,800 miles.

- The Tupolev 16 bomber has a range of 4,300 miles.

The Air Force

During the last ten years there has been a revolutionary change in the Soviet conception and organization of airpower. Hitherto, aircraft had been used primarily as a kind of long-range artillery in support of ground forces. Today the Russians possess an air force comprising 700,000 personnel and over 20,000 operational aircraft organized into five major components, namely: The long-range strategic bomber force, the tactical bomber force, the fighter force, the land-based Fleet Air Arm, and the air transport force.

A vast complex of airfields has been constructed in Soviet territory and numbers now about 1,000. In Eastern Europe, the number of airfields capable of handling modern planes has been tripled. Defensively, apart from the vast increase in the numbers of high-performance fighters, an extensive radar early-warning and control system is in operation and ground-to-air missiles have been installed for air defense in great numbers.

It is estimated that in 1951 only twenty percent of the Soviet fighters were jet powered, and all bombers and ground-attack aircraft were World War II types. Today, all fighters and light bombers are jet propelled; only the obsolescent TU-4s are piston driven and form less than one-third of the strategic bomber force.

The Strategic Bomber Force consists mainly of the following aircraft:

- 200 Tupolev 95 turboprop Bears; range 6,000 miles, bomb load twenty tons, maximum speed 500 miles per hour.

- 500 Myasishchev four-engine jet Bisons; range 6,000 miles, bomb load ten tons, maximum speed 560 miles per hour.

- 500 TU-16 twin-jet engine medium bomber Badgers; range 4,320 miles, speed 620 miles per hour, bomb load four to five tons.

This force is largely based on the Arctic coast where it is supplied by the Air Transport Force. The rate of production of these heavy bombers is between fifteen to twenty per month. Bisons and Badgers have also been adapted as tankers for inflight fueling.

The Tactical Bomber Force consists of about 5,000 aircraft, the most modern of which are the supersonic twin-jet engine light bombers nicknamed the Ilyushin Blowlamp and the Backfin.

The Fighter and Interceptor Force comprises 13,500 planes, all of them jets, the MIG-15, -17, and YAK-25 are subsonic, the MIG-19 and the MIG-21 and Soukhoy are supersonic.

The Land-Based Fleet Air Arm (see above).

The Transport Fleet is highly developed and consists of about 2,000 aircraft, a number of which, such as the TU-104, the TU-104A, the TU-114, and the IL-18 are either turbojet or jet propelled. Other piston-engine types include the twin-engine AN-2, AN-4, AN-8, the four-engine AN-10, the twin-engine IL-14, and the TU-70.

Rockets and Guided Missiles

In the field of missiles the Russians have made notable progress and they have now in operational quantities missiles with nuclear warheads of different types, ground-to-ground in the short and medium ranges, ground-to-air, air-to-ground, and air-to-air. In addition intercontinental and intermediate-range ballistic missiles have been in service since July, 1958.

The principal Soviet missile bases, about 100 in number, are situated along the Baltic coast mainly in northeast Prussia around Koenigsberg, in the area between Lake Ladoga and the White Sea, in the Thuringian Forest in East Germany, southern Ukraine, and the Carpathians. The principal Soviet production centers are situated in the region of Vorkuta near the 65° longitude and 68° latitude and around Tiksi near 125° longitude and 72° latitude. The personnel operating the Soviet missiles have been organized into what is virtually a fourth arm of the services numbering about 200,000 men under the command of an engineer general, who has under his control all factories in which nuclear bombs are manufactured, all testing sites, all factories in which rockets and guided missiles are produced, and rocket and guided missile units.

The following are details of Soviet equipment:

Atomic Artillery:

- Atomic 203-mm cannon mounted on a mobile platform with a range of about fifteen miles.

- Heavy 240-mm mortar with a range of twenty miles.

Ground-to-Ground Ballistic Missiles:

- T-1 is a tactical weapon and is the standard equipment of the tactical units of the Missile Arm. Propelled by one liquid-fuel engine, it has a range of 375 miles and reaches an altitude of 125 miles. Speed 5,000 mph, length about fifty-two feet. It can be fired from a mobile ramp.

- T-2 is the Russian IRBM. It is propelled by two liquid-fuel engines, has a range of over 1,600 miles and reaches an altitude of 260 miles. Speed 5,100 mph, length ninety-one feet.

- T-3 is the Russian ICBM. It is propelled by three liquid-fuel engines, has a range of over 5,000 miles and reaches an altitude of 375 miles. Speed 16,000 mph, length 110 feet.

(Continued on following page)

● T-4 is a two-stage IRBM with a range of 1,000 miles. It has an 1,800-pound atomic warhead.

● T-4a is a boost-glider missile. It carries a 3,100-pound atomic warhead.

● T-5 is a three-stage ballistic missile with a range of 100 miles.

● T-5B and T-5C are smaller versions of the above carried on self-propelled launchers with ranges from eighteen to twenty-five miles.

● T-7a is a guided missile with a range of 100 miles.

Sea-to-Ground Ballistic Missiles:

● Komet. This missile can be fired from surface craft or a submarine whether submerged or not. It is already in service. It is propelled by one solid-fuel engine, has a range of ninety-five miles, and reaches a height of forty-five miles. Speed 3,000 mph, length forty feet. The Komet is relatively cheap to produce and consequently large quantities have been ordered for the Soviet Navy.

● Golem. This weapon is for submarines only but can be fired from the surface. Mass production has already

begun. It is propelled by a liquid-fuel engine. It has a range of 310 miles and rises to an altitude of 137 miles. Speed about 5,500 mph, length fifty feet.

Ground-to-Ground Guided Missiles:

The principal weapon of this type is the J-1 which has two solid-fuel engines. It has a range of 350 miles, rises to an altitude of four miles. Speed 500 mph.

Ground-to-Air Guided Missiles:

● The T-6 is a radar-directed rocket which is already in service and is considered to be highly effective. It is propelled by two main and four auxiliary solid-fuel engines. Its range is twenty to twenty-five miles and it rises to a height of twelve miles. It has a speed of 1,500 mph. (This is similar to the American Nike.)

● The T-7 is a high-altitude guided missile. Inertial guidance.

● The T-8 is an anti-aircraft infrared missile; it has a range of eighteen miles, and speed is over 1,500 mph.

Air-to-Air Missiles include the M-100, length four feet, which has a range of about four miles.



Photo courtesy "USSR" magazine

Soviet armed forces during the annual May Day Parade in Red Square, Moscow. Lenin's tomb is in the left center.

PART II THE NATO POWERS

Allied Command, Europe

Allied Command, Europe stretches from Northern Norway to the Mediterranean. The minimum force requirement for the Central Area is thirty divisions. The Supreme Commander now has at his disposal twenty-one and one-third divisions with the following national composition.

United Kingdom	3	
United States	5	
France	2	(the commitment is four, but two divisions have been withdrawn for use in Algeria. France has promised to return those two when possible)
Germany	7	(the commitment is twelve)
Belgium	2	
Netherlands	2	
Canada	1/3	

(Continued on page 42)

TEN YEARS ago, when the North Atlantic Treaty was signed in Washington, the military position of the Western powers was very weak. Most of the ground forces available were badly equipped and were deployed not for defense but for occupation duties. Less than 1,000 operational aircraft were available in Europe, and only about twenty airfields. Now, as the following facts indicate, the defensive position of the NATO powers in Europe, although in certain respects it leaves much to be desired, has changed out of all recognition. The ground forces in the Central Area have been built up to about two-thirds of the planned goal of thirty divisions, and equipped with nuclear ground-to-ground and ground-to-air missiles. The air forces in Europe of the NATO powers can now muster about 5,000 tactical aircraft (strategic bombers remain under national control) which operate from some 220 operational bases. Joint production in NATO countries of modern weapons such as the Hawk and Sidewinder is about to begin, while a project for a NATO tank is under discussion.

PART III

The State of National Forces

BELGIUM

General Information

Length of military service: twelve months
Total armed forces: 120,000
Defense budget: \$400 million

Army

Two and one-third divisions of which two (one infantry and one armored) are at the disposal of NATO

Navy

Fifty minesweepers

Air Force

Approximately 200 F-84 and F-86 fighters and reconnaissance aircraft

CANADA

General Information

No military service
Total strength armed forces: 120,000
Defense budget: \$1,908 million

Army

Total strength: 48,000
Three brigade groups based in Canada
One brigade group stationed in Europe

Navy

Total strength: 20,250
One aircraft carrier
Two cruisers
Fifty destroyers and frigates
Three submarines

Air Force

Total strength: 52,000
Nine fighter squadrons equipped with the CF-100 integrated in North American Air Defense Command
Eight day-fighter squadrons and four all-weather fighter squadrons in Europe
Four transport squadrons

DENMARK

General Information

Length of military service: sixteen months
Total armed forces: 45,000
Defense budget: \$142 million

Army

One infantry division

Navy

Eighteen destroyers and frigates
Four submarines (two under construction)
Thirty-six minesweepers
Twenty patrol boats

Air Force

Approximately 100 F-84 and F-86 fighters and reconnaissance aircraft

FRANCE

General Information

Length of military service: twenty-eight months
Total armed forces: 1,000,000
Defense budget: \$3,244 million

Army

The greater part of the French Army is engaged in Algeria. Two divisions are at the disposal of NATO

Navy

Four aircraft carriers (plus two aircraft

and one helicopter carriers under construction)

Two battleships

Six cruisers

Ninety-two destroyers and frigates

Eighteen submarines (plus fourteen under construction)

One hundred sixty other craft

Air Force

There are some Mystère 4 and F-86 squadrons in Germany, as well as a larger number (which is classified) of fighter and attack squadrons in metropolitan France

GERMANY

General Information

Length of military service: twelve months
Total armed forces: 206,000 (to be increased to 350,000 in 1963)
Defense budget: \$1,800 million

Army

Seven complete divisions at the disposal of NATO include:

Three motorized infantry divisions

Two armored divisions

One airborne division

One mountain division

(A total of twelve divisions to be reached in 1961 will include a further five infantry divisions-in the process of formation)

Navy

One destroyer (12 plus 6 frigates)

Two submarines (12)

Twelve patrol boats (40)

Forty minesweepers (54)

Air Force

One transport squadron (5)

Five fighter-bomber squadrons (8)

One fighter squadron (10)

One reconnaissance squadron (5)

(The German Air Force at present has about 350 F-84 and F-86 fighters. The goal for 1963 is 1,000 planes.)

Note: Figures in parentheses indicate construction in progress or planned

GREECE

General Information

Length of military service: twenty-four to thirty months according to the arm of the service

Total armed forces: 127,000

Defense budget: \$155 million

Army

One armored division

Eleven infantry divisions

Navy

One cruiser

Eighteen destroyers and frigates

Four submarines

Forty other craft

Air Force

20,000 men. There are twelve squadrons equipped with 400 F-84 and F-86 aircraft.

ITALY

General Information

Length of military service: eighteen months for the Army and Air Force, twenty-four months for the Navy
Total armed forces: 400,000
Defense budget: \$1,000 million

Army

Ten infantry divisions*

Three armored divisions

Five mountain brigades

Navy

Three cruisers (4)

Forty-seven destroyers and frigates (7)

Six submarines (2 under construction)

Air Force

Twenty squadrons including six fighter squadrons equipped with F-84 and F-86 aircraft

Note: Figures in parentheses indicate construction in progress or planned

LUXEMBOURG

General Information

Length of military service: twelve months
Defense budget: \$8.16 million

Army

One brigade

NETHERLANDS

General Information

Length of military service: eighteen months for the Army, twenty-two months for the Navy and Air Force
Total armed forces: 130,000
Defense budget: \$462 million

Army

Two infantry divisions at the disposal of NATO

Navy

One aircraft carrier

Two light cruisers

Thirty-four destroyers and frigates

Ten submarines

Sixty-eight other craft

Air Force

Approximately twelve squadrons equipped with F-84 and F-86 and Super Sabre F-100 aircraft

NORWAY

General Information

Length of military service: sixteen months for the Army, eighteen months for the Navy and Air Force

Total armed forces: 40,000

Defense budget: \$145 million

Army

One division

Navy

Nineteen destroyers and frigates

Five submarines

Twenty other craft

Air Force

Approximately 150 F-84F and F-86F fighters and reconnaissance aircraft
(Continued on following page)

On the northern flank, the Danish commitment is slightly over one division and the Norwegian is one division also.

On the southern flank the forces allocated to NATO comprise twelve divisions from Turkey, five divisions from Greece, and seven from Italy.

Allied Command, Atlantic

Unlike the Supreme Allied Commander Europe, the Supreme Allied Commander Atlantic does not have forces permanently assigned to him in peacetime. The eight maritime powers which form the Atlantic Command maintain control of their naval forces in peacetime, but have earmarked certain of them for SACLANT in the event of war.

Broadly speaking, in wartime SACLANT's dual roles are to strike at enemy naval bases and airfields, and to meet the threat to Allied lines of communication in the Atlantic presented by the Soviet fleet of over 500 submarines.

For the first role, the Supreme Allied Commander Atlantic has a considerable proportion of the American aircraft carriers at his disposal. For the purpose of antisubmarine warfare he has about 450 surface ships and 150 submarines.

The 450 surface ships include:

- About sixteen modern aircraft carriers (five American, six British, three French, one Canadian, and one Dutch) which carry either American S2F or Trackers, British Fairey-Gannets, or French Breguets. In all, NATO antisubmarine carriers could embark between 400 and 500 aircraft and helicopters (the latter are being increasingly used for this purpose) in the Atlantic and the Mediterranean.

- About 440 destroyers and escort types (200 American, seventy-five British, seventy-five French, thirty-seven Canadian, twelve Dutch, twenty Portuguese, and twenty-two Danish and Norwegian. In certain circumstances the Dutch and Norwegian vessels come under Channel Command.) A considerable proportion of these are of World War II construction but many have been modernized and

steady progress is being made in building replacements.

With regard to submarines the trend in most NATO navies has been to change their role from commerce destruction to antisubmarine warfare. Of the 150 available for antisubmarine warfare in the Atlantic, the United States include in their allocation twenty-two built since 1945, of which six are atomic powered. The Royal Navy has forty-two submarines in active service, France about twenty, the Netherlands ten, and Denmark one.

The surface and submarine fleets are supported by long-range patrol aircraft such as American Neptunes and British Shackletons. The most modern aircraft in this category is the Canadian turboprop Argus, which is the military version of the Britannia.

The Channel Command

The role of Channel Command is to exercise maritime control of the English Channel and southern North Sea, to deny it to the enemy, to protect the sea lines of communication, and to support operations conducted by SACLANT and SACEUR. To this end, Channel Command has at its disposal a considerable proportion of the national naval forces of Belgium, France, the Netherlands, and the United Kingdom.

The Nuclear Retaliatory Forces of NATO

These remain under national command and comprise the United States Strategic Air Command, RAF Bomber Command, and the United States Sixth Fleet. Seven IRBM bases in Europe are in operation, under construction, or projected.

Strategic Air Command is divided into the Fifteenth Air Force based in California, the 1st Missile Division also based in California, the Second and Eighth Air Forces based in Louisiana and Massachusetts. The overseas units are the Sixteenth Air Force in Spain, the 7th Air Division in the United Kingdom, and the 3d Air Division based

(Continued on page 45)

THE STATE OF NATIONAL FORCES

CONTINUED

PORTUGAL

General Information

Length of military service: eighteen months to twenty-four months for the Army, thirty-six months for the Air Force, forty-eight months for the Navy
Total armed forces: 79,000
Defense budget: \$89 million

Army

54,000 (one division at the disposal of NATO)

Navy

Sixteen destroyers and frigates
Three submarines
Thirty-three other craft

Air Force

2,500 men. 350 aircraft including a number of F-84G fighter bombers (under National Command)

TURKEY

General Information

Length of military service: twenty-four months for the Army and Air Force, thirty-six months for the Navy
Total armed forces: 500,000
Defense budget: \$510 million

Army

Twenty-two divisions

Navy

One cruiser
Twelve destroyers
Seven submarines
Thirty other craft

Air Force

Approximately 400 jet fighters

UNITED KINGDOM

General Information

Length of military service: twenty-four months (to be abolished by the end of 1962)

Total armed forces: 614,200

Defense budget: \$4,454 million

Army

Total strength, 323,900 men (165,000)
New weapons such as the Corporal ground-to-ground guided missile, and the antiaircraft missile Thunderbird are coming into service

Three divisions in Germany

Navy

Total strength: 105,400 (88,000)
Eight aircraft carriers

Sixteen cruisers

175 destroyers and frigates

Forty-two submarines (one atomic-powered submarine under construction)

228 other craft

Guided missile cruisers under construction will be equipped with the Sea-Slug missile, and other ships will carry the Sea-Cat missile for close air defense. Aircraft carriers are receiving the new Scimitar fighter bomber and Sea-Vixen which will be equipped with the Fire-Streak air-to-air missile.

Air Force

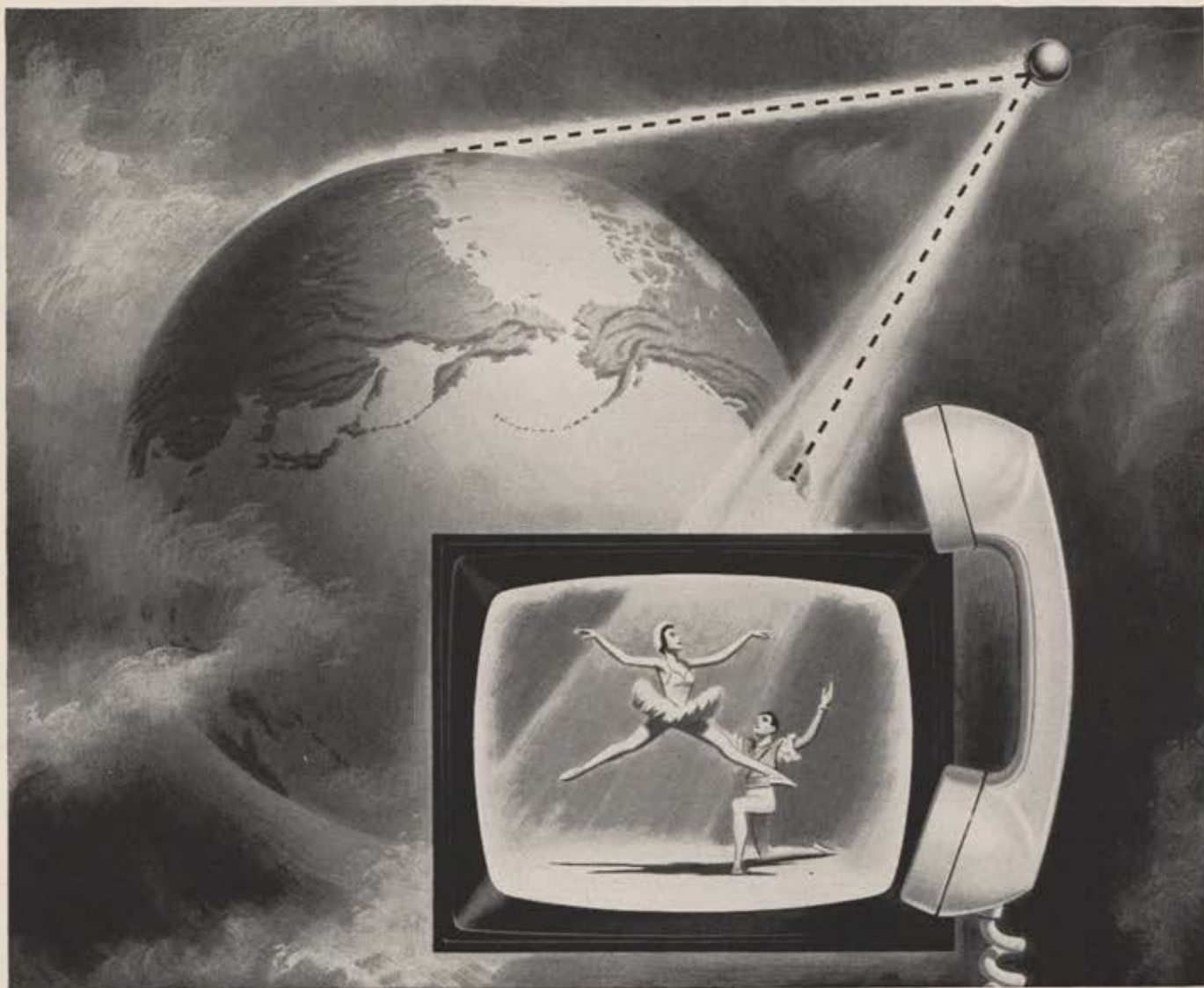
Total active strength: 184,900 (135,000)

The supersonic TSR2 will replace the Canberra for tactical purposes. It will be equipped with nuclear bombs and air-to-air guided missiles.

Fighter Command is being reequipped with supersonic P1 Lightning fighters, carrying the Fire-streak missile and the Bloodhound ground-to-air missile

Note: Figures in brackets indicate total strength in 1962 when national service ends

(Continued on page 45)



The high frequency radio waves that carry telephone and television signals travel in straight lines and refuse to follow the earth's curvature. To overcome this, it may well be practical and economical to send them over long distances by using earth satellites as relay points.

Telephone Calls and TV Shows by Way of Outer Space?



Under construction in foreground is a new antenna which Bell Telephone scientists hope will receive signals reflected from earth satellites during forthcoming tests. Background: a Project Echo transmitting antenna.

Maybe some day you'll get phone calls from Brisbane or Bombay—live TV from Caracas or Copenhagen—via satellites!

Over the years imaginative research has vastly improved your Bell Telephone service.

Now Bell scientists are looking ahead to an extraordinary possibility, until recently only dreamed of: the sending of telephone calls and TV across oceans via earth satellites.

To explore this idea, Bell Telephone Laboratories scientists are presently working hard on the communication phase of Project Echo. This experiment, sponsored by the National Aeronautics and Space Administration, seeks to reflect radio

and voice signals across the U. S. by means of a 100-foot satellite.

Recently these scientists relayed a human voice from New Jersey to California via one familiar satellite, the moon, and also sent a signal several hundred miles by means of an aluminized balloon.

Many features of the telephone service we take for granted today once sounded as improbable as this. But working always on the frontier of science is one of the ways we make that service more convenient, economical and enjoyable for you.

BELL TELEPHONE SYSTEM





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Solenoids, 1000° to 1200°F
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Electric flight control systems
Ground support equipment for missiles and missile launchers
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Direct operation valves to replace pilot operated valves
Transistorized control boxes
Electrical test and checkout equipment
Rocket propulsion systems equipment
Magnetic flutter dampeners and actuators
Transistorized power supplies (DC-DC; DC-AC; AC-DC)
Transistorized 3-phase voltage regulators
Inverters
Converters
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Time delay relays (solid state and conventional)

Write for details



on Guam. Each of these overseas units operates several advance bases. SAC has a total of about seventy bases in the US and overseas.

Strategic Air Command now has about 1,250 B-47 jet-engined medium bombers with a range of 6,000 miles, and a speed of 600 mph, and over 450 B-52 eight-jet-engined heavy bombers with a speed of over 650 mph and a range of 6,000 miles. Both types of aircraft use inflight refueling to extend their range. This is provided by a fleet of 120 KC-135 Stratotankers capable of a speed of 550 mph. New aircraft being developed [include] the supersonic B-58 to replace the B-47. . . .

The 1st Missile Division is responsible for operating the ICBMs Atlas (range 5,500 miles) and Titan (range 5,500 miles), which are based in the United States, and the IRBMs Thor and Jupiter with ranges of 1,500 miles, which are based in Europe. In addition to these weapons there is the Snark, or Intercontinental Cruise Missile, which has a range of 5,000 miles.

RAF Bomber Command is equipped with Vulcan and Victor bombers capable of carrying a nuclear or conventional weapon. The performance of these aircraft compares favorably, as regards speed and altitude, with that of

bomber aircraft in the Soviet and United States Air Forces. They are capable of refueling in flight from Valiant tanker planes. Progress is being made in the development of the propelled standoff bomb, which reduces the vulnerability of aircraft by enabling them to release these weapons a long distance from the target, outside the range of the missile defense system. Meanwhile the development of the Blue Streak ballistic missile (range 2,000 miles) is proceeding and Thor missiles are being deployed for training and operational purposes in England.

The United States Sixth Fleet consists of approximately fifty ships including two or three heavy aircraft carriers, such as the *Forrestal*, escorting destroyers, and submarines. The carriers' armament includes the supersonic Skyray, Skylander, Demon, and Crusader fighters, the Skyhawk transonic light-strike aircraft, and Skywarrior transonic medium bomber.

Seven IRBM bases in Europe are sited in the following countries:

- Four Thor bases in the United Kingdom
- Two Jupiter bases (under construction) in Italy
- One Jupiter base (projected) in Turkey
- Each base has fifteen missiles.—END

THE STATE OF NATIONAL FORCES

CONTINUED

UNITED STATES

General Information

Military service: although there is a form of military service for two years, the majority of men serving in the US forces are volunteers

Total armed forces: 2,435,000

Defense budget: \$44,994 million

Army

Total strength: 850,000

The fourteen divisions of the Army include a Strategic Army Corps consisting of two airborne and two infantry divisions and five divisions in Europe

Missiles

(i) Jupiter—an IRBM liquid-fueled rocket with a range of 1,500 miles and speed between 10,000 and 15,000 mph

(ii) Tactical surface-to-surface short-range missiles include:

Redstone: range 200-500 miles, speed 8,000 mph

Corporal: range 70-100 miles

Sergeant: to replace above, range 70-200 miles, has a self-contained guidance system

Honest John: unguided field artillery missile; range sixteen miles, speed 750 mph

La Crosse: a solid-propellant rocket for use against field fortifications; range twenty miles, speed 1,500 mph

Little John: unguided field artillery light-weight missile, range ten miles, speed supersonic

Dart: antitank rocket; range one-third mile

Pershing: a solid-fuel development of Redstone, range 700 miles plus, speed 8,000 mph

(iii) Surface-to-air missiles:

Nike-Ajax: liquid-powered antiaircraft rocket; range twenty-five miles, speed 1,500-1,800 mph

Nike-Hercules: improved Nike-Ajax with nuclear warhead, range sixty to eighty-five miles, speed 2,700 mph

Nike-Zeus: antimissile missile, range 200 miles, speed 5,000 mph

Hawk: antiaircraft rocket for use against low-flying planes, range twenty-five miles, speed supersonic

Navy

Total strength: 600,000

103 aircraft carriers

Sixty-eight cruisers

421 destroyers

390 escorts, etc.

125 submarines, (including six operative nuclear-powered submarines and twenty-seven projected or under construction)

Missiles

(i) Surface-to-surface missiles:

Polaris: IRBM solid-propellant rocket for shipboard launching, range 1,500 miles, speed 6,000 mph

Regulus I: jet-powered winged missile for ship-based launching, range 500 miles, speed 700 mph

Regulus II: improved version of Regulus I, range 1,000 plus miles, speed 1,000 to 1,200 mph

(ii) Surface-to-air missiles:

Terrier I & II: ship-based solid-propellant AA rocket, range ten to twenty miles, speed 1,800 mph

Tartar: lighter and smaller improved version of the Terrier, range twenty to thirty miles, speed 1,800 mph

Talos: long-range ship-based AA ramjet missile, range sixty-five miles, speed 1,800 mph

(iii) Air-to-air missiles:

Sidewinder: solid rocket with infrared guidance, range six miles, speed 1,800 mph

Sparrow III: range five to eight miles, speed 2,250 mph

Air Force

Total strength: 825,000 divided into 105 Wings. (Each Wing has forty-five aircraft in the case of bombers, and seventy-five in the case of fighter-bombers and fighters.) The equipment of fighter and tactical bomber squadrons includes the F-100 Super Sabre, RF-101 Voodoo, F-102A, F-104 Starfighter, and the most recent F-105 Thunderchief. All of these aircraft are supersonic.

Missiles

(i) Surface-to-surface missiles:

Atlas: ICBM liquid-fueled rocket, range 5,500 miles, speed 15,000 to 20,000 mph

Titan: ICBM liquid-fueled rocket, range and speed same as Atlas

Thor: IRBM liquid-fueled rocket, range 1,500 miles, speed 10,000 mph

Snark: winged missile powered by turbojet, range 5,500 miles, speed 700 mph

Matador: jet-powered winged missile, range 300 to 500 miles, speed 650 mph

Matador-Mace: improved version of above, range 700 to 1,000 miles, speed transonic

(ii) Surface-to-air missiles:

Bomarc: long-range ramjet missile interceptor, range 400 miles, speed 1,600 to 2,000 mph

(iii) Air-to-air missiles:

Genie MB-1: missile with a nuclear warhead carried by fighter-interceptors, range two to four miles, speed supersonic

Marine Corps

Total strength: 160,000

Note: With regard to the figures for naval vessels, these represent the totals that would be available in the event of war. Not all these ships are in commission at present, a considerable number being laid up in reserve.



Are we "hopelessly sentimental" in our nostalgic attachment to the eighteenth-century support of "policy" by which the government finds, trains, and maintains men who are to fight expertly in the nuclear and space age?

MEN AT ARMS?

The Regrettable Story of Our Military Manpower

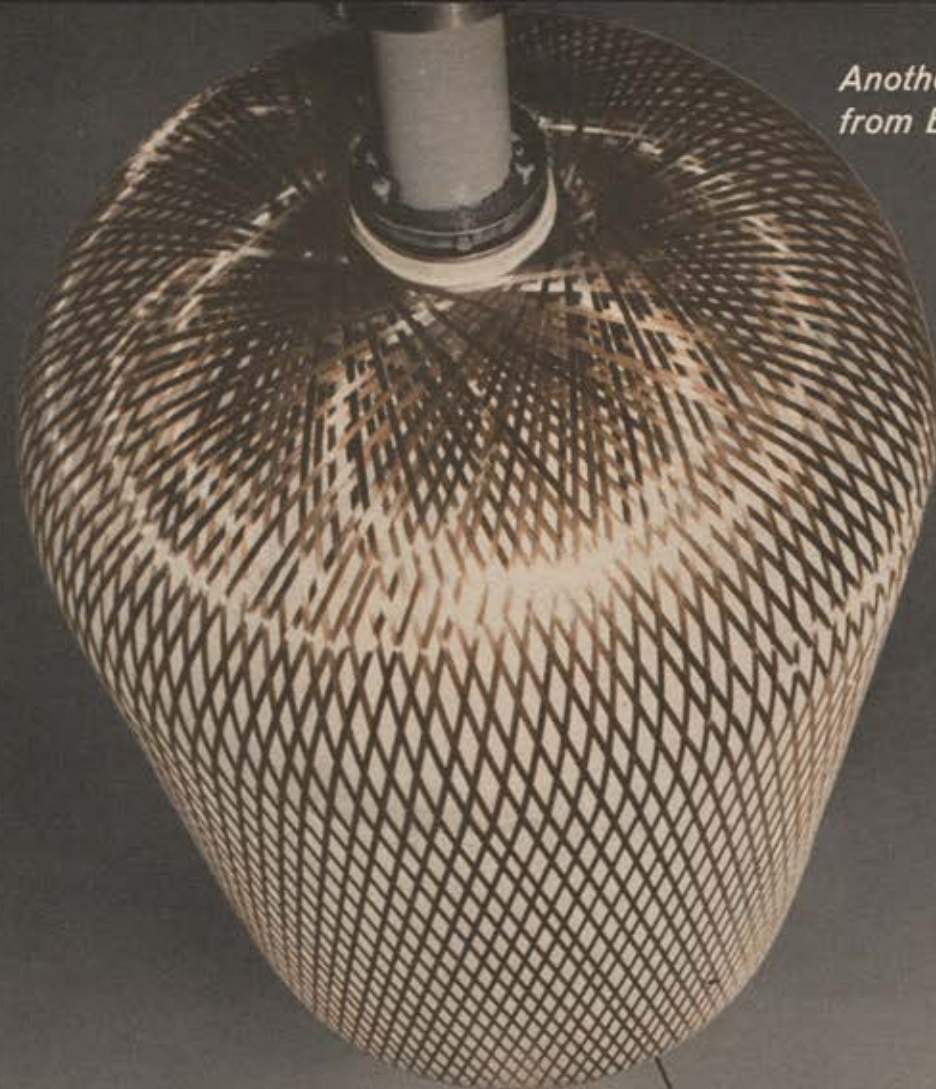
Samuel P. Huntington

REPRINTED FROM COLUMBIA UNIVERSITY FORUM

AMERICANS, someone has said, are ruthlessly practical concerning physical objects and hopelessly sentimental concerning human beings. One would think so, considering the eagerness with which we have pushed the development of new weapons and space missiles and our stolid reluctance to change obsolete policies on military manpower.

Whatever deficiencies there may be in our weapons are deficiencies of implementation, not concept. All things considered, the United States has moved ahead rapidly in its production of new machines of war. But despite constant reiteration of the cliché that "man remains the basic factor in war," manpower policy has only slowly adjusted to the requirements of the cold war. The result has been
(Continued on page 49)

Another space age development
from BENDIX



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make up ribbon wrap.



Ultra high strength wire ribbon being formed into a rocket case on specially designed wrapping machine.

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0442-AC



POGO-HI
(II E3c)



P-107
AIR LAUNCHED



P-106
GROUND LAUNCHED

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To accomplish this requirement at minimum cost, Aeronca has developed two expendable, lightweight, high-performance target systems under the Design-Tool-Produce envelope concept. These proprietary missile programs, the P-106 and P-107, are designed for supersonic performance and accurate scoring at all required altitudes, speeds and ranges. *And their production cost is projected to be substantially less than any current target missile system!*

Another Aeronca-produced missile project is *Pogo-Hi II E3c*. Ground launched to high altitudes, this target utilizes a radar reflective parachute and an infrared emitter package. It is used as "bait" for such current projects as *Nike, Talos, Sidewinder* and *Falcon*.

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curious: intercontinental missiles and thermonuclear bombs tied to the eighteenth- and nineteenth-century ideas and practices by which we find, teach, and maintain people to man them.

The strategy we have adopted in the cold war is fundamentally a dual one of deterrence and containment. To carry out such a strategy, we need: (1) a massive deterrent force, equipped with nuclear weapons, missiles, and long-range jet bombers, protected by an adequate continental defense system, and strong enough to deter a major Soviet attack on the United States or Western Europe; and (2) "brush-fire" war forces either highly mobile or deployed in likely danger spots, and adequate in their strength to deter or quickly repulse local aggressions.

The maintenance of these forces demands three things of our military manpower policy: *First, far more men under arms than we have traditionally maintained in peacetime (though fewer than we have had to mobilize in either of two world wars);* this because of the multiplication of our geographical commitments and the variety of contingencies that we must be prepared to deal with.

Second, the maintenance of these armed forces at a degree of readiness without precedent in our history. In the past, the United States has had months and years to prepare its armies for war. Never again. The reaction time for a retaliatory and air defense force must now be measurable in hours, and soon in minutes. The ability of local war forces to deter an attack or quickly to repulse one requires them to fight or to move at a moment's notice. Consequently, military policy must give first priority to existing ready forces.

Third, a far greater technical competence is required of the men in our armed forces than ever before. In the eighteenth century, virtually every farmer knew how to use a musket, and a group of farmers could easily be transformed on short notice into a company of infantrymen. Today, civilians are much less military, and the military are much more technical. Training a fighting man is an expensive and time-consuming task, requiring months and in some cases years. A trained officer or an enlisted man skilled in a technical specialty represents an investment of thousands of dollars. Once he is trained, the real interest of the government lies in keeping that man in service for as long as he is useful.

If, in the eighteenth century, civilian life prepared men for military service, military service today has the effect of preparing men for civilian careers.

Fulfilling the above three requirements for modern warfare should produce a professional, reasonably sized, combat-ready military force composed of officers and enlisted men skilled in their trade and pursuing military service as a lifetime career; a reduction in the number of short-term and part-time soldiers; a reduction of Reserve forces; less dependence on the draft; and an increase in the status and popular prestige of the military career.

Why have we been unable to accomplish these ends and meet these realistic requirements? To begin with, Americans in and out of government have long cherished the tradition of a small standing army supplemented in emergencies by large numbers of civilians called to the colors. Lacking an aristocratic tradition or threatening neighbors, our American business society has seldom seen much need for professional military men and has attached little value to the military career. Such attitudes are slow to change. They have been concretely reflected in the pay levels and living conditions of the members of the armed services.

The "citizen-soldier" concept has refused to die despite

its lack of relevance to the military needs of the mid-twentieth century. And it has been actively defended in Congress by the potent influence of the National Guard and Reserve organizations. Moreover, when the military dollar must be stretched to the limit, Reserve forces always appear to be much cheaper to maintain than Active forces. The confused picture which we have had of the nature and seriousness of the Russian threat has led us to rely upon temporary expedients, such as the draft, and to postpone facing the question: What sort of military manpower policy is required by the cold war?

Since World War II, our manpower policy has taken two sharp turns and ended nowhere. Here is what happened to universal military training (UMT) and what might be called the "massive Reserve" movements.

In 1945 and 1946, governmental leaders almost unanimously agreed on the desirability of universal military training in peacetime. Previously, there had been no system for training citizen-soldiers. UMT was to make the old—the very old—idea of a small standing army and a large citizen reserve a workable reality. The proposal most commonly supported was for six months' or twelve months' training followed by varying lengths of time spent in the Regular services, the National Guard, or the Reserves. The assumption behind this proposal was not, perhaps, unreasonable in 1946—that any future war would probably be similar to World War II. UMT seemed one way to appreciably shorten the time required for mobilizing and putting into action vast armies of citizen-soldiers.

The struggles over UMT from 1945 through 1952 were an instructive example of the political processes of American democracy. UMT was energetically supported by Presidents Roosevelt and Truman, by the professional military leaders of the Army, by veterans and patriotic groups, and by a fairly consistent sixty to seventy percent majority of the general public (according to public opinion polls). Offhand, it would seem that this combination of Administration, military, and popular approval should have sufficed to see UMT enacted into law. But the opposition, consisting of educational, farm, labor, church, and women's groups was simply too influential in Congress. UMT came close to adoption in 1947 and 1948 and again in 1951 and 1952, but each time this coalition succeeded in defeating it.

Ironically, the nation was prevented from adopting a military manpower policy ill-suited to its needs by a number of civilian groups who were unconcerned with strategy and hostile to military requirements—who were, in some cases, strongly pacifist.

The shift from UMT toward the idea of massive Reserves began in 1952. In July of that year Congress passed the Armed Forces Reserve Act, designed to prevent a repetition of the inequities by which well over a million young men who came of age between 1946 and 1950 had escaped military service entirely while thousands of their older brothers who had served in World War II were recalled to fight in Korea. The act authorized a Ready Reserve of 1,500,000. It presupposed, however, the existence of UMT, which Congress had killed four months earlier. Without UMT, the only major source of men for a trained Reserve remained the veterans of Active service. The 1952 Reserve Act thus solved nothing.

A new Administration and the Korean armistice obviously required a new look at Reserve policy, and in 1953 President Eisenhower asked the National Security Training Commission to study military manpower needs. The Commission's report in December 1953, entitled signifi-

(Continued on following page)

cantly "Twentieth Century Minutemen," was an eloquent restatement of the traditional goal of a large and effective Reserve of citizen-soldiers.

The Commission, made up largely of civilians and headed by Julius Ochs Adler, vice president of the *New York Times*, argued persuasively that our choice was either to maintain large standing forces, exorbitantly expensive and "dangerous to democratic institutions," or to have a small active force supplemented by a large citizen Reserve. Only the latter was in accord with American tradition, the Committee insisted, and emphasized the point with a salvo of quotations from Washington and Jefferson on the virtues of the citizen militia. Our slow and disorderly mobilization in the last three wars was attributed to our not having had an effective Reserve system. In the next war, said the report, with time at a premium, the repetition of previous follies would be disastrous.

Accordingly, the Commission recommended a comprehensive program, the point of which was that eventually all young men not drafted into the Active forces should be required to receive six months' training followed by seven and a half years in the Reserves. In practical effect, of course, this was universal military training—with the emphasis shifted from training to the availability of Reserves.

Throughout 1954, the NSTC report was debated in the Department of Defense. Finally, in December of that year, Secretary Wilson unveiled the Administration's National Reserve Plan, which turned out to incorporate the most important of the NSTC recommendations. The Administration's spokesmen made clear that behind their support of the massive Reserve idea was a desire to reduce military expenditures: Reserves were supposed to be cheaper than Active forces. The costs of one man on active duty, the Administration estimated, equaled the costs of ten Reservists. Simultaneously with the presentation of the National Reserve Plan to Congress, the Administration recommended a military budget which would have cut 350,000 men from the Active forces.

"The strength of the Active forces," Admiral Radford told the Senate Armed Services Committee, "has been determined largely in conjunction with our plans for the Reserve components." And when General Ridgway protested that the cuts left the Army unprepared to carry out its commitments, Secretary Wilson replied blandly that: "Reserves are the key to the solution of the Army's problem. . . . Even if the millions of Reserves or veterans are not properly trained, they could be regrouped or formed into effective Reserves pretty quickly."

Besides tradition and the desire to reduce expenditures, a third influence shaping the Reserve Forces Act was the attitude of Congress. Although the Reserve bill went through a tortuous legislative process and was weakened in many respects, the final law preserved the concept of a large Reserve and the essence of the Administration's plan. Congress has supported the "citizen-soldier" long and faithfully and has been historically sympathetic to the needs of the Reserves. Reserve organizations, such as the National Guard Association and Reserve Officers Association, carry great weight on Capitol Hill. Congressmen cannot afford to forget the interests of the Reservists in their constituencies. As Representative Overton Brooks, the principal congressional sponsor of the Reserve Act, declared, referring to the drill pay received by the members of the Ready Reserve:

"... a large Reserve means more money in the local community—money which is classified as 'spendable.' It is that kind of money . . . which the Reservist is more

inclined to spend freely on the local economy rather than computing it in the over-all family budget. The amount involved is something over \$25,000 per year for every 100-man unit."

The National Guard Association in particular insisted that the Guard must be maintained as part of the nation's "first line of defense." It consistently rejected the idea that the Guard be used for anything but combat—civil defense and home defense had been suggested. When Assistant Secretary of Defense John Hannah had murmured such suggestions in 1954, President Ellard A. Walsh of the NGA immediately replied that if Hannah or "anybody else for that matter believes that the Army National Guard can be built up and maintained by assigning it to a home-guard role in the national defense system, he has never been more mistaken in his life, and the entire National Guard, Army and Air, will resist to the utmost the imposition of any such concept."

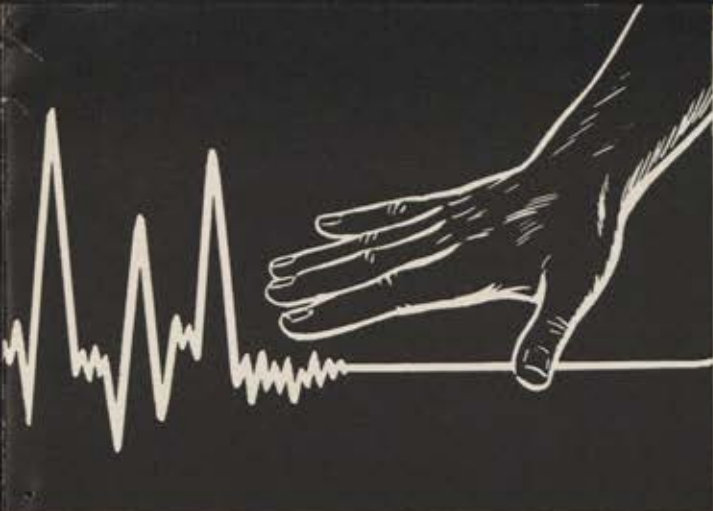
The Guard won its point. The result was the Armed Forces Reserve Act of 1955, which aimed to have a Ready Reserve (weekly drills, two weeks a year on active duty) of 2,900,000 men by 1960. Virtually all of these men were to be in organized units, trained and ready for immediate recall in an emergency. To fill this massive Reserve force, the Act obligated all men who volunteered for or were drafted into the armed services to serve five years in the Active and Ready Reserves: a draftee spending two years on active duty, for instance, would serve three years more in the Ready Reserves. In addition, the Act permitted 100,000 youths each year between the ages of seventeen and eighteen and a half to enlist in a special six months' training program to be followed by seven and a half years in the Ready Reserves. The Act made Ready Reservists who failed to meet their obligations liable to recall to the Active forces and to court-martial.

By 1957, the epic aims of the Reserve Forces Act were still a long way from full realization. But progress toward them had been impressive. A million Reservists were attending weekly drills and summer camps. After a slow start, the six months' training program was being flooded with eager young volunteers. Expenditures on the Reserves, rising steadily from less than half a billion dollars in 1952, had reached about one and a quarter billion dollars. New armories and Reserve training centers were being built rapidly. In the National Guard alone, almost half a million men were organized into an imposing military force including: twenty-one infantry divisions; six armored divisions; nine regimental combat teams; nine armored cavalry regiments; sixty-one field artillery battalions; nineteen armored field artillery battalions; 123 antiaircraft battalions; twenty-five tactical interceptor wings; and two tactical reconnaissance wings.

To these could be added the twenty-five divisions—ten designed for overseas combat—planned for the Army Reserve, the twenty-four troop carrier and fighter-bomber wings at the disposal of the Air Force Reserve, plus the 190,000 participating members of the Navy and Marine Corps Reserves. Compared with their predecessors, the Reserves of 1957 indeed justified the NSTC's boast that they were "a success!"

Only one problem went unanswered. Just what relation did this burgeoning force have to the military requirements of the cold war? True, a small number of National Guard interceptor squadrons and antiaircraft battalions kept on an "alert" status were useful in continental defense, but of what use, exactly, were the infantry and armor divisions? Did a million Reservists help deter Communist aggression

(Continued on page 53)



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MILITARY ELECTRONICS DIVISION

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U R G E N T P R O B L E M S R E L I A B L Y S O L V E D

in the Middle East or Southeast Asia? Were National Guard armories taking funds which might otherwise go into guided missiles?

The unreal character of American Reserve policy was made all too clear by the fact that in 1955, when this country was busy building toward a quota of 2,900,000 participating Ready Reservists and *thirty-seven* Reserve divisions, the British sensibly planned to send only two, instead of eleven, Reserve divisions overseas in the event of an emergency. The other nine were to be reorganized for home defense and civil defense functions. Instead of converting Reserve infantry divisions to armor as we were doing, the British proposed to convert their two and a half Reserve armor divisions to infantry. (What use are tanks in civil defense?)

Instead of encouraging the formation of separate state guards for home defense as we did in 1955, Britain proposed to deactivate her comparable force, the Home Guard, its functions to be taken over by the revamped Reserve divisions. Later, in its 1957 White Paper on Defense, the British government announced the further disbanding of many units of the Royal Auxiliary Air Force and the Royal Navy Volunteer Reserve and its desire to shift its remaining two Territorial Army divisions with overseas missions to home defense duties. These divisions had been earmarked for NATO, but, as the government said, in the event of an attack, they "would not be ready for action on the Continent in less than three months, which in nuclear war would be of little value."

At almost the same time, the Chief of Staff of the United States Army was telling Congress of the Army's plans to ship National Guard divisions to Europe *six months* after the outbreak of war.

In the spring and summer of 1957, just as the Reserve program was hitting its stride, an economy wave engulfed the Defense Department. However dubious its other benefits may have been, it did force a second look at the Reserve buildup. Too late, it was recognized that the Reserves were less a way of saving money than an omnivorous consumer of it. The Reserve campaign was directly affecting the readiness of the Active forces. Speaking of the influx of volunteers into the six months' training program, Secretary of the Army Brucker declared: "This load will overtax the capabilities of the training establishment, which in turn will require that we place an increased training burden upon our strategic Army forces at a sacrifice of over-all combat readiness."

Budgetary reductions plus the post-Sputnik preoccupation with outer space led the Administration to reverse its Reserve policy. Given the popularity of the "citizen-soldier" concept, however, this was easier to announce than to accomplish. In the budget presented to Congress in January 1958, the Administration proposed to reduce the strength of the Army National Guard from 400,000 to 360,000 and to make comparable cuts in the Army Reserve. Within a matter of days the pages of the *Congressional Record* smoked with outraged protests from local Reserve organizations, governors, and congressmen. Overton Brooks's House Subcommittee on Reserve Policy listened to the anguished cries of several governors, and the House adopted a resolution condemning the cuts. The Appropriations Committees were not to be outdone in their devotion to the citizen-soldier, and, finally, in what President Eisenhower described as an "unprecedented" action, Congress wrote mandatory minimum strengths into law: The Army Reserve had to be maintained at 300,000 men and the Army National Guard had to be kept at 400,000.

At the same time, the Administration was backing down on another front. In line with the proposed budgetary cuts in the Reserve and with the desire to streamline the Reserve structure anyway, the Army announced in March of 1958 a plan to eliminate six Guard and four Reserve divisions, reduce and consolidate many smaller units, and change the remaining twenty-seven divisions into "pentomic" units with fewer men and more nuclear weapons. The Guard Association immediately took umbrage, and the Army compromised on a plan which would keep all twenty-seven Guard divisions in existence while reducing the strength of sixteen of them.

The battle over the size and shape of the Reserves was renewed in the Eighty-sixth Congress. The President angrily demanded the repeal of the mandatory minimum strengths for the National Guard and Army Reserves and again recommended cuts in their personnel. The results of his pleas, however, will in all likelihood be very little different from those of 1958.

The point, however, remains what it was. Massive Reserves, like UMT and so much else in our manpower policy, have little place in a world of nuclear retaliation and brush-fire wars. At the same time that the costs of the Reserve program were mounting in 1957, the Administration delayed, for budgetary reasons, acting on the recommendations of the Cordiner Committee for a revised and higher pay scale for the Regular forces. In 1958, this legislation was brought out and approved by Congress. It represents one step—but only a first one—toward the creation of a set of inducements which may eventually enable the services to obtain and to retain, by voluntary means, the men they need. Continued progress toward a nuclear-age force will, however, undoubtedly require the steady reduction of our eighteenth-century citizen-soldier force. The age of the nation-in-arms, of citizen-soldiers, and—hopefully—of total war is over.

Deterrence and containment demand ready professional forces. A thoroughly new approach to the organization of military manpower is in order, one in which Reserves, pay, enlistment and recruitment, and the draft are combined into a twentieth-century manpower policy which is relevant to our current strategic needs.

The *status quo*, no matter how unsatisfactory it is, however, will not be changed easily. Last spring, when Senator Case proposed to establish a Commission on Military Manpower to make a thorough investigation of the entire subject, his colleagues voted him down decisively. Obsolete ideas and vested interests are still entrenched on Capitol Hill. Clearly, the Pentagon will have to assume initiative and the President assume leadership before changes can be made. Manpower policy cannot indefinitely remain out of step with the rest of our military program. Continuation of a policy appropriate to the last war can only enhance the likelihood of a new one.—END

Associate Professor of Government at Columbia University, Samuel Huntington is Associate Director of Columbia's Institute of War and Peace Studies. A frequent writer on military affairs, he is the author of The Soldier and the State: The Theory and Politics of Civil-Military Relations, Harvard University Press, 1957. He holds a doctorate from Harvard, was previously associated with the Brookings Institution and the Harvard Defense Studies Program, and has lectured at the Air War College, the Naval War College, the Army War College, and the Industrial College of the Armed Forces. The above article originally appeared in the spring issue, 1959, of the Columbia University Forum.



A noted sociological analyst—examining the impact of military technology on institutions and populations—finds that the “permanent” threat of war has produced new patterns of organizations among both civilians and the military . . .

MILITARY MISSION:

Key to Military Organization

Morris Janowitz

The complexity of the machinery of warfare and the requirements for technical maintenance tend to weaken the organizational boundary between the military and the nonmilitary, since the maintenance and manning of new weapons require a greater reliance on civilian-oriented technicians. Here USAF technicians tackle a typical maintenance problem on the Atlas ICBM under the supervision of an instructor at Convair's Missile Technicians Maintenance course.

AS A social organization, the contemporary military establishment has for some time tended to display more and more of the characteristics typical of any large-scale nonmilitary bureaucracy. The decreasing difference is a result of continuous technological change which vastly expands the size of the military establishment, increases its interdependence with civilian society, and alters its internal social structure. These technological developments in war-making require more and more professionalization. At the same time, the impact of military technology during the past half-century can be described in a series of propositions about social change. Each of the conditions symbolized by these propositions has had the effect of “civilianizing” military institutions and of blurring the distinction between the civilian and the military.

- An increasing percentage of the national income of a modern nation is spent for the preparation, execution, and repair of the consequences of war. Thus, there is a trend toward total popular involvement in the consequences of war and war policy, since the military establishment is responsible for the distribution of a progressively larger share of the available economic values.

- Military technology both vastly increases the destructiveness of warfare and widens the scope of automation in new weapons. It is commonplace that both of these trends tend to weaken the distinction between military

(Continued on page 57)



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The Army's AN/USD-2 is today's most advanced drone system for gathering information on enemy battlefields. This high-priority Army program is a major part of Aerojet's acquisition of the Rheem Defense and Technical Products Division at Downey, California. Under the cognizance of Aerojet's Aeronautical Division, the SD-2 project is receiving increased emphasis during its advanced system development stages.

Developed for the Army Signal Corps, the SD-2 is launched from a standard Army trailer and flown by remote control to survey enemy positions. Its sensory compartment accommodates photo transmission systems, infrared, radar or other new electronic devices that transmit or bring back data. Outstanding characteristics of the SD-2 are the stable flight platform, sophisticated navigational system and unique parachute recovery, which make it ideal for a variety of military assignments.



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roles and civilian roles as the destructiveness of war has increased. Weapons of mass destruction socialize danger to the point of equalizing the risks of warfare for both soldier and civilian. As long as the armed forces must rely on large numbers of drafted personnel, powerful influences toward civilianization are at work.

- The revolution in military technology means that the military mission of deterring violence becomes more and more central as compared with preparing to apply violence. This shift in mission tends to civilianize military thought and organization as military leaders concern themselves with broad ranges of political, social, and economic policies.

- The previous periodic character of the military establishment (rapid expansion, rapid dismantlement) has given way to a more permanent maintenance or expansion. The permanent character of the military establishment has removed one important source of civilian-military conflict, namely, the civilian tendency to abandon the military establishment after a war. Instead, because of the high rate of technological change, internal conflicts between the military services have been multiplied.

- The complexity of the machinery of warfare and the requirements for research, development, and technical maintenance tend to weaken the organizational boundary between the military and the nonmilitary, since the maintenance and manning of new weapons require a greater reliance on civilian-oriented technicians.

- Given the "permanent" threat of war, it is well recognized that the tasks which military leaders perform tend to widen. Their technological knowledge, their direct and indirect power, and their heightened prestige result in their entrance, of necessity, into arenas that in the recent past have been reserved for civilian and professional politicians. The need that political and civilian leaders have for expert advice from professional soldiers about the strategic implications of technological change serves to mix the roles of the military and the civilian. . . .

These observations do not deny the crucial differences that exist between military and nonmilitary bureaucracies. The goals of an organization supply a meaningful basis for understanding differences in organizational behavior. The military establishment as a social system has unique characteristics because the possibility of hostilities is a permanent reality to its leadership. The fact that thermonuclear weapons alter the role of force in international relations does not deny this proposition. The consequences of preparation for future combat and the results of previous combat pervade the entire organization. The unique character of the military establishments derives from the requirement that its members are specialists in making use of violence and mass destruction. In the language of the soldier, this is recognized on a common-sense basis; military mission is the key to military organization.

Changing technology creates new patterns of combat and thereby modifies organizational behavior and authority in the military establishment. The narrowing distinction between military and nonmilitary bureaucracies can never result in the elimination of fundamental organizational differences. Three pervasive requirements for combat set limits to these civilianized tendencies.

First, while it is true that modern warfare exposes the civilian and the soldier to more equal risks, the distinction between military roles and civilian roles has not been eliminated. Traditional combat-ready military formations need to be maintained for limited warfare. The necessity for naval and air units to carry on the hazardous tasks of continuous and long-range reconnaissance and detection

demand organizational forms that will bear the stamp of conventional formations. In the future, even with fully automated missile systems, conventional units must be maintained as auxiliary forces for delivery of new types of weapons.

More important, no military system can rely on expectation of victory based on the initial exchange of firepower—whatever the form of the initial exchange may be. Subsequent exchanges will involve military personnel—again regardless of their armament—who are prepared to carry on the struggle as soldiers—that is, subject themselves to military authority and to continue to fight. The automation of war civilianizes wide sectors of the military establishment; yet the need to maintain combat readiness and to develop centers of resistance after initial hostilities ensures the continued importance of military organization and authority.

Second, what about the consequences of the increased importance of deterrence as a military mission? Should one not expect that such a shift also would result in civilianizing the military establishment? If the military is forced to think about deterring wars rather than fighting wars, the traditions of the "military mind," based on the inevitability of hostilities, must change and military authority must undergo transformation as well. There can be no doubt that this shift in mission is having important effects on military thought and organization. In fact, military pacifism is a growing and important trend in modern society as the horrors of war force military leaders to concern themselves with the political consequences of violence.

Again, there are limits to the consequences of this civilianizing trend. The role of deterrence is not a uniquely new mission for the military establishment. Historically, the contribution of the military to the balance of power has not been made because of the civilian character of the military establishment. To the contrary, the balance of power formula operates, when it does, because the military establishment is prepared to fight effectively and immediately.

(Continued on following page)



With the increased importance of deterrence as a military mission, the traditions of the "military mind," based on the inevitability of hostilities, must change. The horrors of all-out nuclear war force military leaders to concern themselves more and more with the political consequences of violence. One by-product is increased military diplomacy, typified here by Maj. Gen. Matthew K. Deichmann, representing the PACAF Commander in Chief, taking part in a recent Royal Thai Air Force Day, Bangkok. General Deichmann is presenting a model of the Matador missile to Thai Air Marshal Chalermkiat Vathanangkool.

With the increase in the importance of deterrence, military elites become more and more involved in diplomatic and political warfare, regardless of their preparation for such tasks. Yet the specific and unique contribution of the military to deterrence is the threat of violence which has currency; that is, it can be taken seriously because of the real possibility of violence. Old or new types of weapons do not alter this basic formula. In short, deterrence still requires organization prepared for combat.

Third, the assumption that military institutions, as compared with economic and industrial institutions, are resistant to technological change is considerably undermined as the process of innovation in the military establishment itself has become routinized. Nevertheless, as long as imponderables weigh heavy in estimating military outcomes and as long as the "fighter" spirit is required to face combat, the military rejects the civilian engineer as its professional model. Of course, the engineer is held in high esteem, but the ideal image of the military continues to be the strategic commander, not the military technician. It is the image of a leader, motivated by national patriotism and not by personal monetary gain, who is capable of organizing the talents of specialists for all types of contingencies.

The question of relative resistance to technological innovation by the military, as compared with civilian economic and industrial organization, has produced volumes of historical writing. In his broad historical survey [*War and Human Progress*] John U. Nef argues that military organization and the requirements of war-making were not crucial factors in Western technological development. . . .

In all probability, military organization as late as the middle of the nineteenth century was strongly resistant to technological innovation. Until that time the military establishments of Western Europe were dominated by aristocratic elements that were concerned with a traditional way of life. These elements stood in opposition to social change and technological innovation, and accepted new developments in military organization with great reluctance.

However, in the middle of the twentieth century, military institutions can no longer be thought of as merely reacting to external pressures and resisting technological innovation. For the sociologists studying the military establishments, it is important to emphasize that the armed forces now create their own requirements for technological innovation, which in turn influence industrial organization. The classical view of the military standing in opposition to technological innovation is inapplicable as the present cycle of the arms race converts the armed forces into centers of support for the development of new weapon systems. The military establishment hardly presents the ideal conditions for the professional scientist or the research engineer. Yet military leaders, regardless of the validity of their professional judgments about technological matters, are not characterized by traditional thinking about technological requirements.

Likewise, the procedures of innovation in industry and in the military tend to converge; increasing specialization involves the replacement of individual entrepreneurship by staff work and group research. In the contemporary military establishment with its continuous rotation of persons through official roles, the process of assessment of needs and prospects of technological innovation is as routinized and automatic as in civilian industry.

Leadership based on traditional military customs must share power with experts not only in technical matters but also in matters of organization and human relations. Specific organizational adaptations of the military even

foreshadow developments in civilian society, since the military must press hard for innovation and respond more rapidly to social change. For example, the continued need for retraining personnel from operational to managerial positions and from older to newer techniques has led to a more rational spreading of higher education throughout the career of the military officer, rather than the concentrated dosage typical of the civilian in graduate or professional school.

No bureaucracy ever conforms to the ideal model of the rational organization, and certainly the military establishment cannot be thought of in purely engineering terms. As long as "the battle is the pay off"—as long as there are dangerous and irksome tasks to be performed—an engineering philosophy cannot suffice as the organizational basis of the armed forces. Especially in a free enterprise, profit-motivated society, the military establishment is oriented to duty and honor. S. L. A. Marshall's observations [in his book, *Men Against Fire*] touch directly on this essential theme of military life:

"A note of smugness was not missing from the remark all too frequently heard during World War II: 'We go at this thing just like it was a great engineering job.' What was usually overlooked was that to the men who were present at the pay off, it wasn't an engineering job, and had they gone about their duty in that spirit, there would have been no victory for our side."

In a period of fantastic technological change, military leadership is confronted with an almost perpetual crisis of organization. The sociological analyst is concerned with understanding the organizational consequences of these technological changes. Yet it can be assumed that neither the increased automation of military technology, nor the military shift in mission from war-making to deterrence, nor the decline in the traditional military opposition to innovation can produce a complete civilianization of the military establishment. The structure of military authority—the key to military organization—is an expression of the unique goals of the military, namely, combat and combat preparation.

In terms of manpower, and mass destruction, airpower is the ascendant arm, while ground and seapower remain the essential components of a system of graduated deterrence. The diversification and specialization of military technology lengthens the formal training required to gain mastery of military technology. The temporary citizen-soldier, sailor, and aviator will become less important and a completely professional armed force more vital. The need to fight limited wars or strategic wars instantly, with the available mobilized forces, tends to increase reliance on a professional military establishment. But these contemporary trends do not produce a professional army isolated and remote from civilian society, but a military establishment that is an integral part of the larger society on which its technological resources depend.—END

The foregoing material is reprinted with permission from "Sociology and the Military Establishment," published by the Russell Sage Foundation, New York. The author, Dr. Morris Janowitz, is a professor of sociology at the University of Michigan. His latest book, in which the accompanying article's theme will be expounded, will be published by The Free Press, Chicago, entitled The Professional Soldier: A Social and Political Portrait. Dr. Janowitz is also the author of The Community Press in an Urban Setting, and coauthor of Dynamics of Prejudice as well as Reader in Public Opinion and Communication.

THE SPACE AGE IN PERSPECTIVE



SPACE

DIGEST

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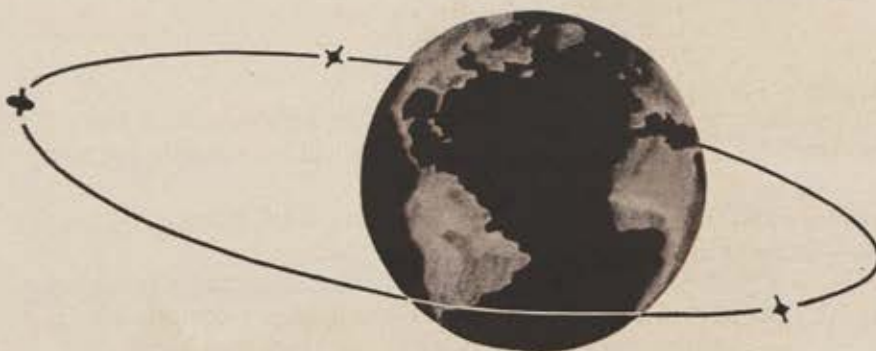
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"The far side of the earth—not the far side of the moon—represents the immediate and appalling threat to peace and freedom . . . the threat of surprise attack."

"Only in space—with our new line of sight—can we employ an electronic alarm system."

Peace on Earth

CONTROLLED from SPACE

JAMES H. STRAUBEL

Publisher, AIR FORCE/SPACE DIGEST

IN THESE waking hours of the Space Age we are fascinated with the new worlds that emerge out of the morning mist.

We plunge into the outer regions—into the unknown—while at our feet is a world that revolves around an axis of age-old problems.

It is a world where people reach high levels of technical achievement, while remaining crude in their relations with one another; of people who seek peace with freedom, but cannot prosper without enforcing rules for law and order.

In our conquest of space, our first goal must be peace with freedom—through control—on Planet Earth.

The great reaches of the universe offer—not only new worlds to conquer—but a new line of sight to scan the earth as never before.

Spaceflight has opened the door to a revolutionary era in electronics and communications. That is the first great discovery of the Space Age.

As a result, space becomes more than a propaganda medium for exploiting national prestige—more than a wilderness to explore for exploration's sake—more than a new arena for military operations.

The so-called "space race" with Russia—more of an Olympics than a race—is a scientific crusade for military, political, cultural, and economic objectives.

To date in the electronic revolution, the marriage of human intelligence and mechanical brains has produced an offspring made for terror and destruction. This

first-born—the big ballistic missile—is as yet the only consistent *user* of space.

What of the countless man-made objects that will *use* space in the months and years to come?

Here we find the great challenge: To use space in the pursuit of goals that will benefit—rather than destroy—all of mankind.

These are goals to be pursued with both hard realism and shining vision.

Man's natural desire to explore the heavens must not compromise his fundamental responsibility to ensure the survival of his species on earth.

Shooting for the moon—like disarmament—must be a means to an end—not an end in itself. It cannot be pursued at the expense of shooting for information on the other side of our own planet.

The far side of the earth—not the far side of the moon—represents the immediate and appalling threat to peace and freedom.

It is the threat of surprise attack.

Our earth-bound and air-bound methods for detecting surprise attack must be continued and improved—but at best these are only expedients. We continue to live under the gun.

Only in space—with our new line of sight—can we employ an electronic alarm system to effectively warn against surprise attack.

The job can be done with our *present* knowledge of electronics—and with our *present* rockets and boosters. We need not wait. The job *can* be done.

In recent weeks the space warning mission has been given new support by government leaders—support that is late but welcome.

Still to come is a broad space program leading to “controlled peace.”

This program would center in advanced space systems for warning, reconnaissance, and communications, backed by a strategic attack system kept modernized at all times.

A space-borne warning patrol would greatly strengthen our ability to deter aggression. However, it could play an even greater role.

It could lead to the establishment of a global warning network for *all* nations, with international direction and participation.

Our strategic attack system—alerted by space warning—would be prepared for fast and commanding action against would-be breakers of the peace.

The next step could well be the pooling of the world's strategic attack forces into an international enforcement agency, geared to the global warning network, directed by the United Nations.

With all the world alerted against aggressive action, the need for huge national attack forces would deteriorate, and voluntary reduction of armaments would be encouraged.

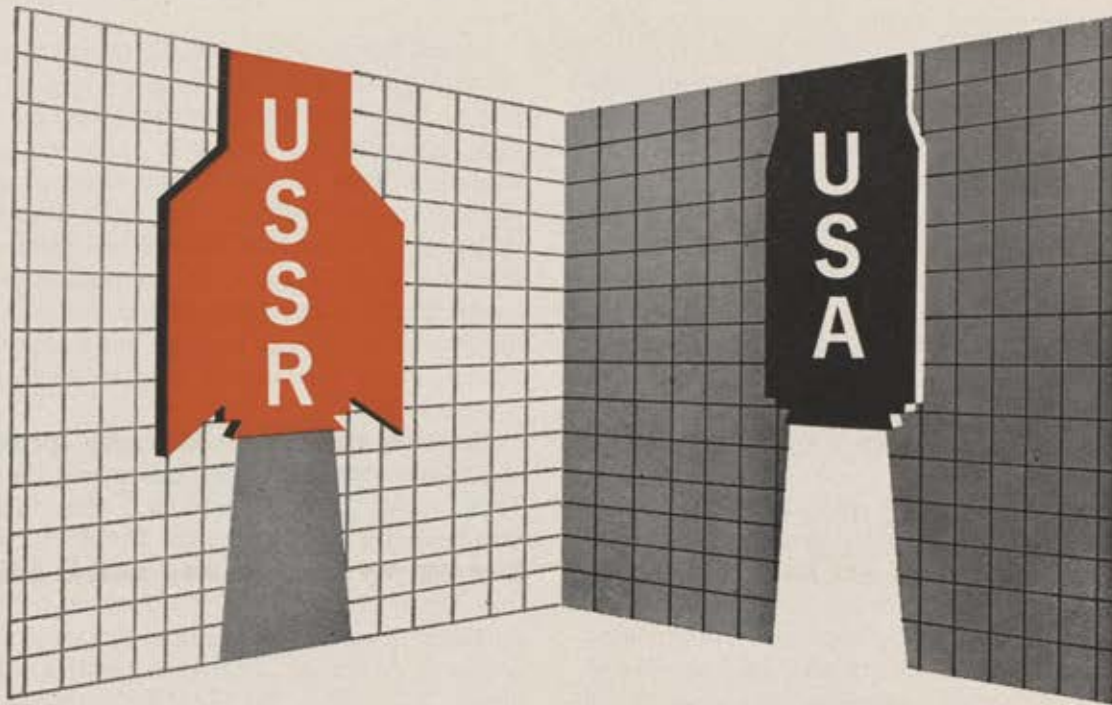
In reducing the threat of surprise attack, the program could eventually justify the curtailment of arms to minimum levels.

This is the great utilitarian mission to be found in space.

We must—while we explore the moon—give this broader mission our highest priority—and full public support.

In the new world of the Space Age, “controlled peace” must be our legacy to future generations.—END

'Our space program has an importance far beyond the field of activity itself, [in] that it bears on almost every aspect of our relations with people of other countries and on their view of us as compared with the USSR'



THE successful launching of Sputnik I created an intensity of reaction throughout the world which has rarely been paralleled by any other single discovery or invention. The public awareness of the first Sputnik was almost universal. People in remote areas of even the most remote countries knew of this sensational event within a few days.

The element of drama was, of course, pronounced. The achievement was generally regarded as opening a new era—the era of space. Most people around the world saw it as such.

Added to this drama was the element of shock. The United States had announced, as early as July 25, 1955, our own earth-satellite program, now known as Vanguard. The developments in our program had been reported from time to time in meticulous detail. On the other hand, a low-keyed Soviet announcement implied that the USSR would probably launch an earth satellite, with no

PROPAGANDA BALANCE SHEET...

THE SPACE RACE, 1960

GEORGE V. ALLEN

Director, US Information Agency

statement as to when but with some details of proposed weight and orbit. The announcement received little attention in the general or even scientific press of the world.

Consequently, those who were interested in impending satellite launchings generally expected the United States to achieve the first—and perhaps the only—results.

The achievement of placing in orbit the first earth satellite, without great advance fanfare, increased the prestige of the Soviet Union tremendously and produced a corresponding loss of United States prestige, due primarily to the contrast. The Soviets were greatly exceeding world expectation of their scientific and technological capacities; we, on the other hand, were falling short of world expectation of us. An important element in underlining this contrast to the rest of the world was the reaction in the United States itself. We ourselves seemed confused, dismayed, and shaken by the developments. Our own domestic debate helped make the Soviet achievement seem even more significant, and tended to put the whole matter into a framework of US-USSR rivalry.

As time passed, highly colored press and radio treatment of space matters gave way to more sophisticated judgments and more balanced reactions. This welcome change was helped greatly by our successes in launching a series of satellites and obtaining information from them, though our payloads were of a lesser magnitude than those of the Soviet Union.

We also began to see editorials abroad which pointed out the difference between "American openness" in letting the world in on our failures as well as our successes, and Soviet failure to announce attempts as well as achievements.

During the eighteen-month period following the first Sputnik, our reports showed that the United States steadily regained prestige. At the same time, the prestige that accompanied Soviet achievements also continued to increase, so our regaining of stature did not approach the commanding position that we had enjoyed before Sputnik I. Furthermore, our failure to equal Soviet accomplishment in the terms the world sees as important—success in placing very large payloads in orbit—made the Soviet program even more impressive.

For a period of many months, the prevailing world opinion seemed to anticipate a kind of seesaw, with first the US and then the Soviet Union accomplishing some noteworthy activity. This was accompanied by some hopeful notes that the US

would overtake the Soviets in payload weight, guidance accuracy, and so on.

Then came the two dramatic and successful Soviet moon shots, followed by the failure of our own. As a consequence of these events, the seesaw seems to have tipped solidly in the Soviet direction, in world opinion. Today, although we continue to see the hope expressed abroad that the US will catch up, we also see growing doubt that this is likely during the next five or even ten years.

Except for the most dramatic of space events, the world press now is less inclined to give startling headlines to every development. At the same time, general world interest in space has grown steadily, in both seriousness and depth of coverage—and along with this has been a surge in interest in all aspects of science and technology. Here the United States has an advantage: the vastly greater accessibility of our research, and our general willingness to share our findings with others. These two factors help to sustain our position.

However, we now see increasing speculative stories on what the Soviet Union will do next. There seems to be a prevailing view that the first spacemen will be from the Soviet Union. We have seen wry comments, some made in America, that Americans, landing on the moon, will find Russians there. In other words, the great expectations of American achievements in space are no longer in evidence. Soviet space leadership has been widely accepted.

The implications of this acceptance are important. The world looks at both America and the Soviet Union with new eyes today.

Probably the most significant result of the Soviet successes is a change in the over-all impression of the people of the world about the Soviet Union. In public opinion parlance, we speak of this as the revised Soviet image. The change goes beyond the field of space technology. It covers all of Soviet science and technology, plus Soviet military power and general standing.

Before Sputnik I, few people of the free world believed the Soviet Union was currently in a position to challenge America in the broad fields of science, technology, and production. Now, the Sputniks and Luniks are taken as evidence that the Soviet Union is able to challenge America successfully in all these fields. . . .

It is hardly an overstatement to say that space has become for many people the primary symbol of world leadership in all areas of science and technology.



Some science and engineering students are being attracted to the Soviet Union for this reason. Soviet technological and cultural exports are getting a better reception around the world. Soviet scientists and technicians are being accorded greater prestige, are speaking with increased authority, and are being listened to more attentively.

One interesting—and perhaps dangerous—effect of Soviet success in space has been the new credibility it has lent to Soviet claims in these other fields. Before Sputnik, most Soviet pronouncements of spectacular achievements were usually dismissed as propaganda. However, since Sputnik, their claims have been much more often believed.

Premier Khrushchev, in a speech at Krasnoyarsk on October 9, 1959, following his return from the US, made this statement: "The Americans now frankly admit their lag behind the Soviet Union in several most important fields. Today, for instance, I read a statement by [retired U. S. Army Maj.] Gen. [John B.] Medaris, [former Commanding General, Army Ordnance

Missile Command]. He says that, should the Soviet Union suspend its space program, the United States would need three to five years to catch up with us or to overtake us. This is a valuable and sensible admission."

The principal danger in the situation seems to me to be the cockiness which these successes have engendered in Soviet officials themselves. If it were a question merely of competition in scientific achievement, no one could properly begrudge the Soviets their magnificent successes, any more than we should begrudge their economic progress. Nor should one begrudge their new-found feeling of self-confidence. Most foreigners who visited America during the first half of the nineteenth century found our self-confidence showing on every side. However, if this new-found Soviet cockiness (arrogance is not too strong a word) translates itself into adventuresomeness in foreign affairs, the world is in for a good deal of trouble.

Even though Soviet officials themselves have generally sought to present their space program as peaceful and scientific, the world public's reaction has been to read into space activities a military implication. . . .

Many people of the world are showing growing concern over the potential military dangers of an unchecked space race, and there is widespread concern over the need for peaceful purposes only.

All space activities are now seen within the framework of Soviet-American competition. Regardless of how Americans feel about it, the world sees the US in a space race with the USSR. Recent British interest in instrumenting an earth satellite is a helpful development. More international activity in space will tend to interest more people in international control. . . .

Our space program has an importance far beyond the field of activity itself, [in] that it bears on almost every aspect of our relations with people of other countries and on their view of us as compared with the USSR. Our space program may be considered as a measure of our vitality and our ability to compete with a formidable rival, and as a criterion of our ability to maintain technological eminence worthy of emulation by other peoples.—END



The above material is excerpted from Mr. Allen's statement during his January 22 appearance before the House Committee on Science and Astronautics.

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good mind
to do it at*



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Currently, Allison researchers, scientists and engineers are working under an Air Force contract to develop this engine for use as an earth satellite power plant. Other potential applications include portable or stand-by power packs.

And this is but one of the many space-age projects we're putting our minds to at Allison. Scientific, engineering and production minds that make up the new look at Allison—minds backed by every resource General Motors possesses.

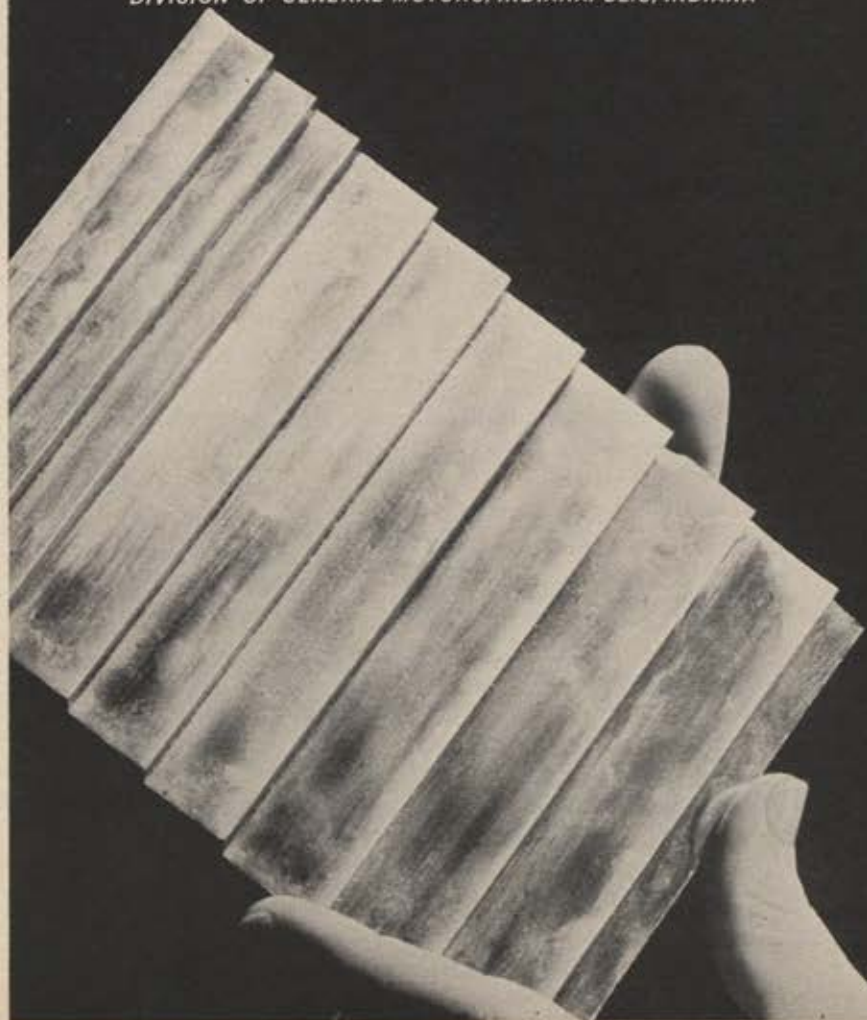
Whether your problem is concerned with the heavens, the earth, or the oceans, Allison has the will and—if it can be solved—the way to solve it. We're doing it for others—we could do it for you.

Illustrated is a segment of a lightweight, highly efficient solar reflector developed by Allison for use with the Stirling-cycle engine.

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The recent meeting of the international Committee for Space Research (COSPAR) at Nice, attended by distinguished scientists from East and West, provided an occasion for some backstage politicking and routine data exchange. Following is an informal report from Robert C. Toth, science writer for the New York Herald Tribune. He covered the meeting for his newspaper . . .

BILLED a bit pretentiously as the First International Space Science Symposium, the COSPAR meeting at Nice, in Southern France, January 11 through 16, was not a vehicle for announcing any outstanding scientific discoveries. To be sure, there were about eighty-five technical reports read to the 250-odd delegates who represented the national science academies of twenty-one nations. US scientists, who presented half of the papers, were fairly unanimous in describing the meeting as very worthwhile. But they were referring to the value of filling in gaps in existing theories and meeting foreign colleagues.

The politics of the meeting was another thing. And the "nonpolitical" nature of COSPAR (formally the Committee for Space Research) made the maneuvering all the more tantalizing. Items:

A French-Italian bloc beat the drums for a nationalistic European space effort, patterned after the atomic energy program called the Amaldi Plan. The British seem to be the most reluctant to get involved, both because of the anticipated costs and because they have all but signed an agreement with NASA to fly three satellites in NASA vehicles.

Italy, too, was dickering to have NASA carry some of its instruments aloft, hedging its bets, as it were, against the Amaldi Plan.

The Soviets, who only a few months earlier finally agreed to become a full member of COSPAR, agreed to extend the practice of telling Western scientists where to look for their space-bound rockets. The Soviets and the US had given such data under the IGY warning system called AGIWARN, although Sputnik and Lunik I data were less than prompt. For Lunik II and III, however, the Soviets did supply data within hours of launching. Now they are formally part of the post-IGY AGIWARN system of COSPAR.

The Soviets, coasting on the anticipated Pacific splashes of their new interplanetary rocket stages,

LETTER from NICE

ROBERT C. TOTH

told COSPAR in a formal report that they will:

- Continue studying "the upper atmosphere of the earth and of circumterrestrial space by means of artificial earth satellites."

- Prepare "for manned flights into outer space with a broad range of biological studies . . . [including] the action of cosmic radiation on living organisms . . ."

- Continue studying the moon.

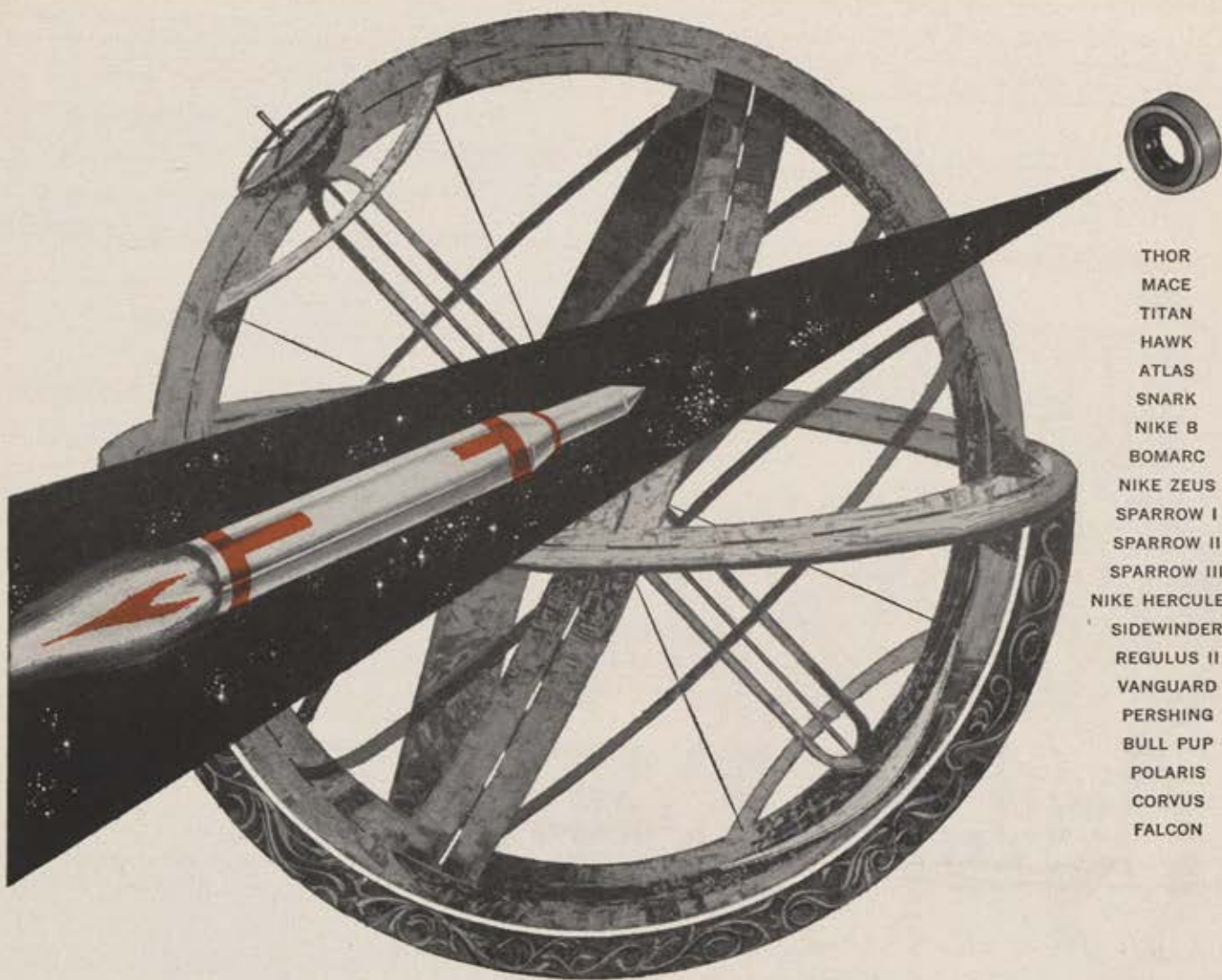
- "On the basis of experiences with rockets sent . . . to Mars and Venus . . . to solve one of the mysteries of the world—the existence of life on other planets."

One more interesting fact was contained in the Soviet document: Although they have slowed up somewhat firing rockets into the high atmosphere, they have far from stopped. They reported: "One hundred and seventy-five investigation rockets were launched in the Soviet Union, 125 [during] IGY and fifty in 1959." Moreover, 158 "meteorological investigation rockets" were sent into the stratosphere during IGY and the International Geophysical Cooperation period of 1959.

In their scientific papers, the Soviets indicated that they have reduced their micrometeorite density estimates drastically since the first announcement of the Sputnik III data.

The rumor among US scientists was that the Soviets had failed to calibrate their micrometeorite instruments *inside* the over-all satellite, and had picked up the clicks of every relay switch in Sputnik III along with legitimate dust impacts. Later, the story went, they counted how many relay clicks would have occurred, and subtracted to get the present data. However, the official Soviet explanation of their new density figures was that Sputnik III ran into a micrometeorite shower at first, which rocketed the density values out of all proportion.

Attempts to clear up this point with a Soviet scientist ran head-on into the language barrier.—END



THOR
MACE
TITAN
HAWK
ATLAS
SNARK
NIKE B
BOMARC
NIKE ZEUS
SPARROW I
SPARROW II
SPARROW III
NIKE HERCULES
SIDEWINDER
REGULUS II
VANGUARD
PERSHING
BULL PUP
POLARIS
CORVUS
FALCON

ND Adds New Dimensions To High Speed Gyro Rotor Bearings!

At speeds up to 24,000 RPM precision rotor bearings in inertial guidance and navigational systems are highly critical components. Early research and development in design and manufacturing at New Departure is solving the problem and thus winning vital roles for N.D. integral rotor bearings in missile projects. For example, "B" Series bearings with separable inner ring developed by N.D. are helping set performance records in such inertial guidance systems as the AChiever.

New Departure is also supplying high-precision rotor bearings for the inertial guidance system in Polaris.

These bearings, through advanced manufacturing techniques, exacting inspections and controlled environmental tests, backed by 50 years of laboratory testing experience, give precision and uniformity far above the most precise industry standards. They promise new performance and *reliability* for the submarine-launched IRBM.

You can look to improved *performance* and *reliability* when you include an N.D. Miniature/Instrument Bearing Specialist in early design level discussions. Call or write Department L.S., New Departure Division, General Motors Corporation, Bristol, Connecticut.

ND
NEW DEPARTURE
MINIATURE & INSTRUMENT BALL BEARINGS
proved reliability you can build around

On both coasts, vital jobs are being done by space-age airmen at two new facilities. In the East, keeping an "inventory" of all vehicles in orbit . . . in the West, the direction of the significant Discoverer program, leading to new space capabilities . . .

USAF SPACE BASES EAST AND WEST



TWO NEW space-age installations—one in Massachusetts, north of Boston, the other in California, south of San Francisco—symbolize the Air Force's continuing contribution to the national space capability.

The new East Coast facility mission is keeping an inventory of all satellite vehicles in orbit, domestic and foreign, while the job of the new West Coast operation is direction of the Discoverer program which is expected to lead to operational capability for "working" satellites. These are the Midas early-warning and Samos reconnaissance satellites that could be the earliest US tools for controlling peace from space (see also pages 61 and 62).

At Laurence G. Hanscom Field, Bedford, Mass. is the Air Force's new National Space Surveillance Control Center, dedicated in February. The Control Center holds a key position in the national space surveillance program, a joint Army-Navy-Air Force effort sponsored by the Department of Defense's Advanced Research Projects Agency with the mission of providing worldwide detection, tracking, and cataloging of all space ve-

in the East...

hicles. The new Air Force Center is expected to carry the major share of the Department of Defense effort.

The new center, manned by a team of military and civilian specialists, is an ultramodern two-story building on the grounds of the Air Force's Command and Control Development Division of Air Research and Development Command at Hanscom Field. On the first floor, a bank of computers keeps tab on all vehicles in orbit, figures predictions of orbits, estimates satellite lifetimes, and provides "fixes" on the position of any satellite at any time.

On the second floor, a crew of specially trained personnel receives reports of satellite sightings via a battery of teletypes and telephones which link the Center to key tracking points that feed in data from radar observation points, telescope sites, and radiometric stations across the world. Exchange of information with the National Aeronautics and Space Administration and other interested agencies is continuous.

Directed by Dr. Harold O. Curtis, the Control Center is an outgrowth of the "Project Space Track" operation which went into business in

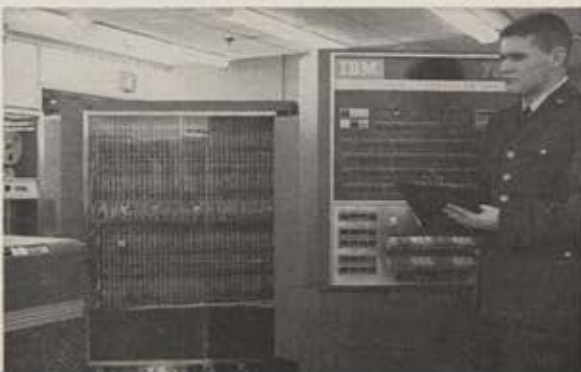


Against a background of twenty-four-hour clocks giving times throughout the world, National Space Surveillance Control Center airman logs in satellite reports. Data is then fed into computers.



Airman at teletype relays message from Surveillance Center to a satellite observation station linked to the network, while his colleague reads a new tracking bulletin prepunched on tape.

Computer at Hanscom, being monitored by the lieutenant, can make up to "2,400,000 decisions" per minute on true-and-false questions. Its job is to check orbit calculations made at the Center.



and in the West...

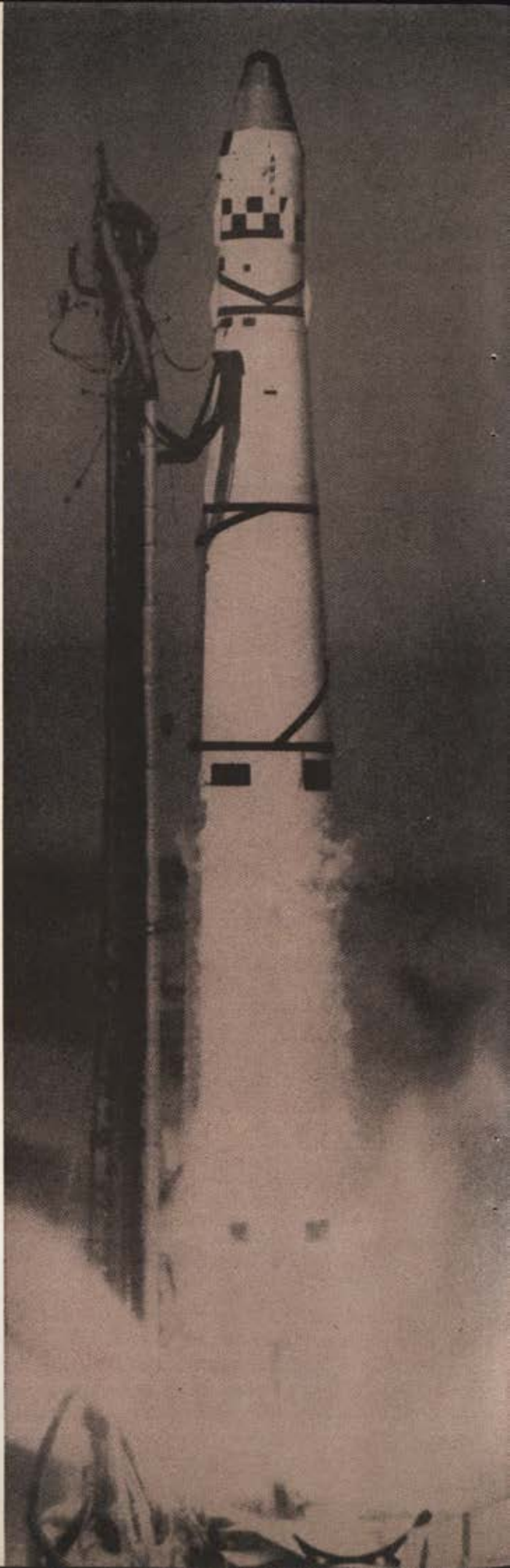
1957 under the aegis of the Geophysics Research Directorate of ARDC. Early in 1959, "Space Track" was expanded under the direction of ARDC's Electronic Support System Project Office (ESSPO). ESSPO, headed by Col. Victor Cherbak, Jr., manages the new center, assigns "customer priorities" for the receipt of information, and maintains liaison with NASA, Army, Navy, North American Air Defense Command, Strategic Air Command, and other agencies here and abroad which receive data.

On the other side of the continent, at Sunnyvale, Calif., south of San Francisco, is the Air Force's new Satellite Test Center, dedicated in late January. The mission of STC is to take over control and direction of the highly fruitful Discoverer development program—prelude to operational capability for Midas and Samos satellites. Discoverer vehicles are made up of a Douglas-built Thor IRBM and a Lockheed Agena satellite. Lockheed is prime and systems contractor for the Discoverer program and for the follow-on Midas and Samos programs.

The new Center is an operating activity of the recently activated 6549th Satellite Test Wing, an element of the Ballistic Missile Development Division of ARDC. The test wing is commanded by Col. Alvan N. Moore. Operation of the center is the joint responsibility of the Test Wing and Lockheed.

Heart of the Center is the Satellite Control Room with its complex of consoles from which activities at the Vandenberg AFB launch site, tracking stations, and the Hawaiian Control Center are directed. The Hawaiian Center, on Oahu, operates a tracking station and directs the C-119

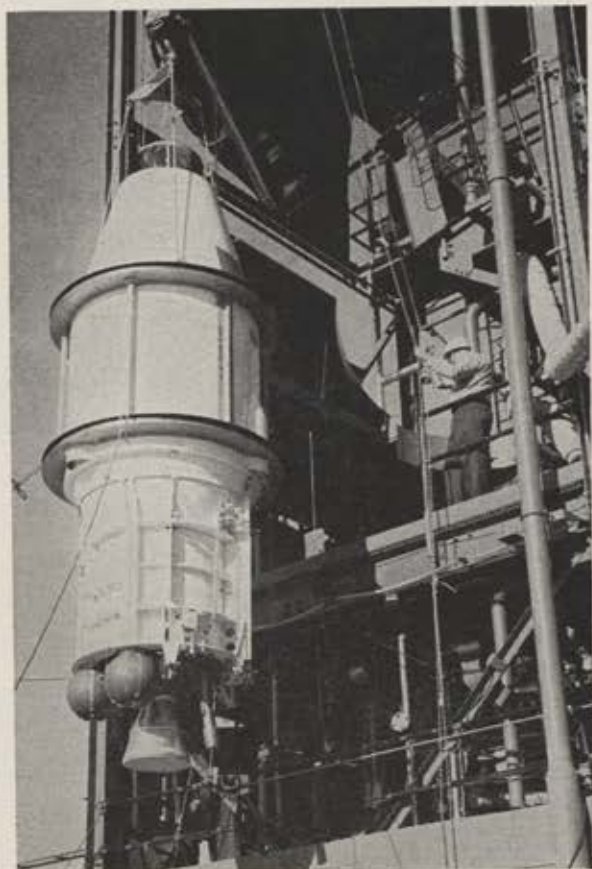
Prelude to "working" satellites—Midas for early warning and Samos for reconnaissance—a Discoverer blasts off from Vandenberg. Discoverer program will be directed from Sunnyvale site.



recovery aircraft squadron that has attempted to snare reentering Discoverer payloads in midair. Aiding Air Force operations are Navy ships with telemetry equipment, destroyers carrying helicopters, and specially trained Navy "frogmen."

The USAF Test Wing, headquarters at nearby Palo Alto, brings under one headquarters for the first time launch, tracking, data acquisition, and recovery functions of a satellite program, encompassing operations that range westward from the New Hampshire site of one of Wing's tracking squadrons to Hawaii.

By midsummer of 1960, according to present plans, additions to the new Sunnyvale facility will, for the first time, give the USAF Test Wing the capability of controlling more than one satellite at a time.—END



Agena satellite that carries Discoverer payloads is hoisted into place on stand for test firing at Santa Cruz, Calif., Lockheed test facility. After rigorous ground checks, Agenas are launched from Vandenberg AFB by USAF's BMDD.

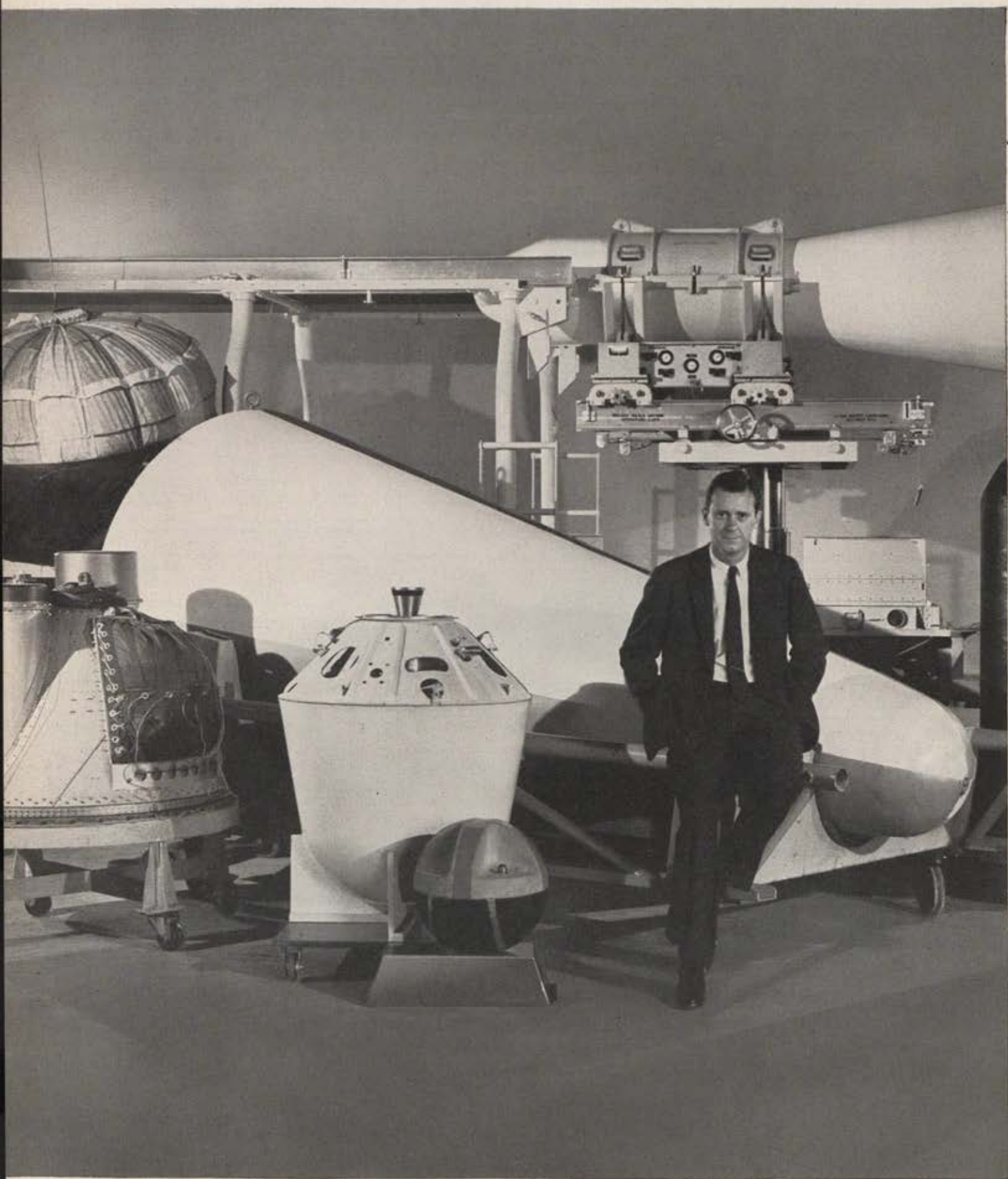


Lockheed's Santa Cruz test facility, seen against rugged wooded mountain area, is remote from new Center. At left, the blockhouse where personnel on scene can handle operations safely.

Air Force test controllers at Satellite Control Center watch the countdown clock during a Discoverer operation, stay in contact with launch site, tracking stations, and air recovery squadron.



*4000 subcontractors are represented
re-entry vehicle "family portrait"*



*in this unique
dramatizing...*

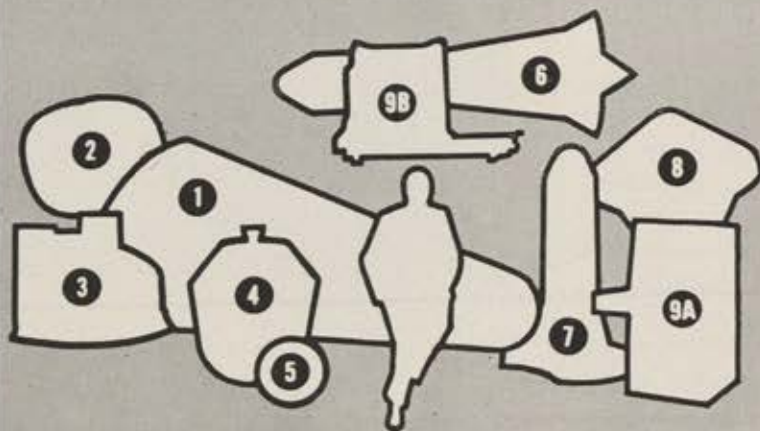
4 years of USAF, G.E., SUBCONTRACTOR re-entry vehicle progress

The key to this progress has been teamwork . . . teamwork between General Electric's Missile and Space Vehicle Department, the Ballistic Missile Division and the Ballistic Missile Center of the United States Air Force and the over 4000 small and large subcontractors alike who have helped MSVD make so many vital contributions to U.S. re-entry vehicle progress.

IN 1959 ALONE, the following figures indicate the emphasis MSVD placed upon this important factor of subcontractor teamwork on Air Force projects.

- Over 35,000 different purchase orders were placed by MSVD on subcontractors in 1959.
- More than 25,000 of these MSVD purchases were made from "small" subcontractor businesses.
- More than \$26,000,000 worth of goods and services were purchased by these 35,000 orders. This amount represented a major portion of the contract dollars received by MSVD.
- And more than \$13,000,000 of this \$26,000,000 went to "small" business firms.

If you'd like more information about G.E.'s Missile and Space Vehicle Department . . . its subcontracting activities, its re-entry vehicle programs or about any of its space technology activities . . . write to Section 160-70, G.E. Missile and Space Vehicle Department, 3198 Chestnut Street, Philadelphia 4, Pa.



Mr. Hilliard W. Paige, General Manager, Missile and Space Vehicle Department with Air Force re-entry vehicles developed by MSVD.

1. RVX-2 Re-entry/Recovery Vehicle, the largest ablation-type re-entry vehicle to travel full ICBM-range and be recovered.
2. Flotation balloon used in recovering USAF-MSVD research re-entry vehicles.
3. Recovery equipment package for RVX-2.
4. Satellite Aeromedical Re-entry/Recovery Vehicle for USAF Discoverer Program.
5. Mark-2 recoverable Data Capsule which flew in Thor re-entry vehicle and returned first films from outer space.
6. Mark-3, an advanced operational-type re-entry vehicle for Atlas.
7. RVX-1, first ablation-type re-entry vehicle to be recovered after full ICBM-range flight.
8. Mark-2, first U.S. operational heat-sink re-entry vehicle now in use on USAF Thor and Atlas missiles.
9. Typical ground support equipment developed by MSVD for USAF use. (A) Mark-2 prelaunch check-out console. (B) Mark-3 missile mating equipment.

MISSILE AND SPACE VEHICLE DEPARTMENT

GENERAL  ELECTRIC

A Department of the Defense Electronics Division

How an Air Force-backed program is leading to a new "miracle"—the building into matter of a number of electronic functions. This new approach could someday make possible the performance by minute pieces of material of electronic jobs that once took yards of circuitry and numbers of conventional components . . .

MOLECULAR ELECTRONICS...

A LITTLE WAY
TO DO
BIG THINGS

A DRAMATIC new Air Force-backed development in electronics—the “growing” of special materials that in fantastically small pieces can do jobs that once took yards of circuitry and masses of components—promises to revolutionize space-age technology.

Called “molecular electronics,” the new development, spearheaded by Westinghouse Corporation under research contracts with the Air Force’s Wright Air Development Division’s Electronic Technology Laboratory at Dayton, Ohio, could make possible in the relatively near future “all-in-one-piece” electronic systems for space vehicles and aircraft. Such systems equipment, miniaturized to a single bit of material, smaller than a dime, would reduce the hundreds of components that now create a reliability nightmare for system designers.

Molecular electronics, as explained by its creators, is a kind of taming of material on the molecular level so that it will perform in a predictable way the electronic functions desired. A deep understanding of the electrical properties of material is, of course, necessary to effect such an apparent miracle. But the way seems to be clear now, according to scientists who have already demonstrated, among other things:

- An amplifier for a high-fidelity phonograph in which what would ordinarily be the preamplifier was about the size of a matchhead and the power amplifier was smaller than a dime.
- A switch device which could be used in com-

puter systems in which the complicated electronic functions that would ordinarily require many transistor tubes were controlled by a central piece of material less than an inch across in size.

● Oscilloscopes, the electronics of which again were handled by an incredibly small single piece of material, performing a multitude of electronic functions all at one time.

Air Force and Westinghouse scientists point out that molecular electronics is not merely a minia-



Smaller than a dime, the little oblong of talented material at right is capable of performing a number of electronic functions that used to require several separate connected components. In the metal itself are several electronic “domains,” each doing the job of an old-fashioned electronic part.



It's hard to believe, but the functions of the conventional amplifier gear on the table are handled by the buttonlike piece of material held between tweezers. Advantages of molecular electronic units are not only in terms of size but of reduction in number of parts, improved reliability.

turizing process. Nor is it, they add, the sandwiching together of minute layers of different materials with known electronic capabilities. Great strides have been made in these methods already, they agree. But molecular electronics is something different. Rather than "putting together" little resistors, capacitors, etc., it is a process of arranging "domains" in *one* piece of material where the functions of these traditional components are performed.

This new approach is now busying other electronics researchers here and abroad who recognize its potential. In fact, some researchers in the field are predicting that a concentrated effort in molecular electronics could offer the US a real "leapfrog" opportunity to surpass the Soviets. Imagine a space vehicle where the small payload area could accommodate scores of instruments each doing different jobs, each controlled by coin-sized "molelectronic" packages, none of the instruments suffering from the curse of circuitry and soldered connections that increase reliability problems by painful orders of magnitude.

How is it done?

In the Westinghouse method, thin strips of germanium are drawn from a molten pool. The specially prepared germanium's electronic properties are known, the material is nearly uniform, and after a process of etching and the like, the final product, at this point, has had built into it the special functions the scientists desire. It is then cut into the needed size.

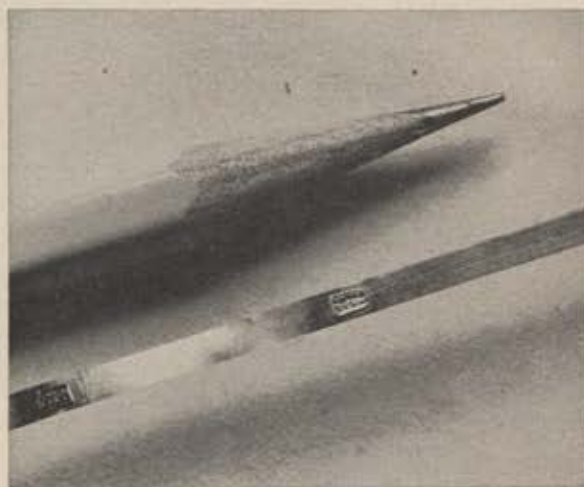
Eventually, it is hoped that even the etching and modifications will be unnecessary and that it will be possible to merely draw the "tamed" material with its built-in electronic talents straight from the molten pool, cool it, and chop it into individual pieces that will be "radio receivers," "amplifiers," and the rest of the bulky, multicomponent workshoes of conventional electronics.

The far-out possibilities are legion. Television sets where the "works" could be held in the palm of your hand, spaceship auxiliary power control systems run by solar radiation . . . and the farthest out of all: a simulation of the electronic activity of human thinking processes so that a computer might truly "think" somewhat as a person does.

Next step in the USAF-Westinghouse program—a molecularized radio receiver feasibility demonstration.

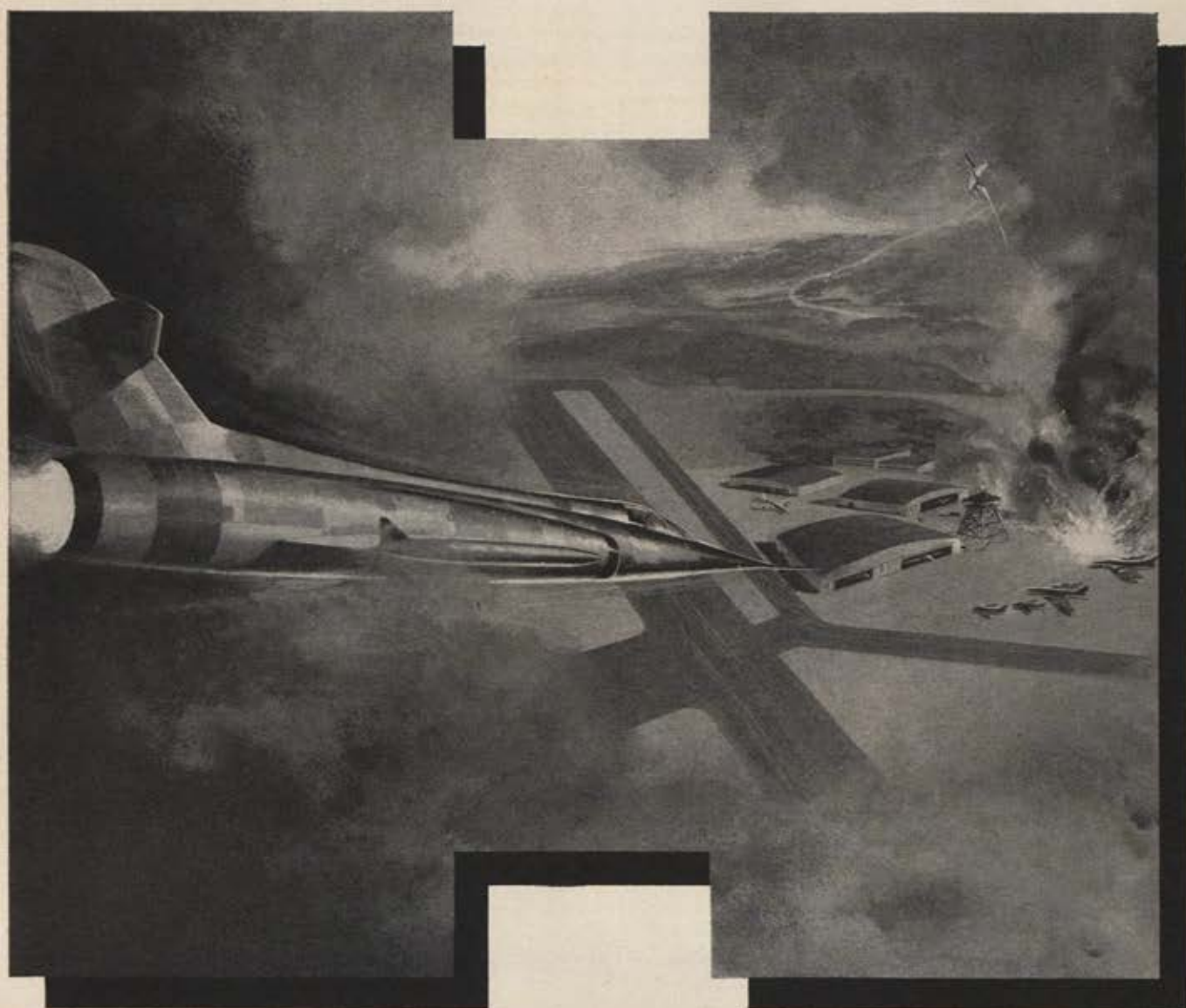
The revolution and changeover won't begin tomorrow, but the day after tomorrow looks like a good bet.

—WILLIAM LEAVITT



"Ribbon" of specially grown germanium, from which molecular electronic units are cut. In present process, the ribbon is specially treated to assure proper combination of capabilities. Developers hope eventually to be able to draw germanium from pool with uniform characteristics.

How to radically increase tactical



mission success

The new Hughes TARAN system is the optimum solution to the all-weather tactical mission problem! Here's what TARAN (Tactical Attack Radar and Navigator) offers:

1. A radar system with several times the azimuth and range resolution of current radars! Result: targets are more easily recognized and identified—terrain features are more readily identified and all-weather, low altitude pilotage is simplified.
2. A unique Navigational Display System which gives precise and continuous position indication and provides for blind pilotage directly to the target.
3. A Terrain Clearance System which provides a continuous display of flight path obstacles—thereby permitting flight at low altitude over all terrain.
4. A unique single channel radar signal processor—providing simplicity, reliability, and easy maintenance.
5. Human-engineered displays and controls for greater safety and ease of operation.
6. Attack modes which can accurately deliver any desired armament.
7. A system which is low in weight and small in volume...and easily maintained in the field.
8. A low initial cost and a low maintenance cost!

Equally important, this system is backed by extensive Hughes experience in developing and manufacturing over 16,000 reliable, high-performance all-weather interceptor systems.

TARAN is now ready to satisfy today's most critical tactical mission requirements! For information please contact: HUGHES, ADVANCED PROGRAM DEVELOPMENT, Culver City, Calif.



The display above furnishes radar information as a navigational check against the moving map display (right). In this way, it is possible to navigate directly to target in all kinds of weather!



The Moving Map Display provides the pilot with continuous position and course information. At each designated check point during the mission, the system automatically checks the map position against the radar display and makes the necessary flight corrections.

Creating a new world with ELECTRONICS

HUGHES

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Speaking of SPACE



The House Goes into Orbit

"This is the first time a presidential campaign has been started in outer space rather than more ordinary atmosphere."

So Rep. James G. Fulton, Republican of Pennsylvania, was moved to comment rather acidly a few days after the opening of current hearings by the House Committee on Science and Astronautics. The committee, headed by Rep. Overton Brooks, Democrat of Louisiana, has been reviewing our national space posture. Although nothing startlingly new has emerged from the testimony thus far, the hearings have underscored the potential of astronautics and missilery as issues in this political year.

The hearings, held in a crowded basement room in the New House Office Building, are providing in microcosm a preview of the debate that could take place between presidential candidates in what looks to be a vigorous campaign ahead. It is still a moot question, to be answered only during the campaign, as to how disturbed the American people really are by the events since the first Sputnik. But there is no doubt that in Washington the battlelines are forming.

Quite evident at the hearings are two extremes of opinion, the first of which might be described as the "say-it-isn't-so" segment and the other as the "we're-in-terrible-shape" segment.

The former, typified most frequently by Representative Fulton, has concentrated on attempts to wheedle from witnesses the view that whatever speed-ups in our space programs have already occurred are about the best we can do and that there is no need to get excited, and certainly no need to question the fallibility of the President's decisions.

The latter view's most vociferous exponent is Rep. Victor Anfuso, Democrat of New York. His principal efforts have been hammerlike attempts to get witnesses to throw up their hands in despair and acknowledge supreme crisis. Neither of these gentlemen has appreciably added

to the quality of the inquiry, since most of their questions to witnesses have stretched into speeches usually ending with the phrase: Don't you agree?

Between the extremes are such members as Chairman Brooks himself; Rep. John McCormack, Democratic Majority Leader, who headed last year's Select Committee; Rep. Walter Riehlman, Republican of New York; Rep. B. F. Sisk, Democrat of California; Rep. James Quigley, Democrat of Pennsylvania; Rep. Emilio Daddario, Democrat of Connecticut; Rep. Ken Hechler, Democrat of West Virginia. In their questioning, for the most part, they have tried to get at the facts from the witnesses. At the same time, they have been noticeably unawed by the "sacredness" of the Administration viewpoint. That space policy is by its very nature partially political is something they obviously believe.

The most dramatic illustration of this viewpoint came during a rather noisy discussion between Representative McCormack and Representative Fulton. Mr. Fulton had made a lengthy remark suggesting that nasty partisanship had no place in the discussion. He was promptly sat on by Mr. McCormack who said quite bluntly that he was tired of being told that anyone who asked any questions about Administration space and military policies was somehow unpatriotic, possibly subversive.

Thus far the witnesses have ranged from Livingston Merchant, Under Secretary of State for Political Affairs and his colleague, George V. Allen, Director of the US Information Agency (see page 63), on the diplomatic and propaganda end of the spectrum, to top-level representatives from the Department of Defense, the National Aeronautics and Space Administration, the Advanced Research Projects Agency, and the Air Force. Navy and Army witnesses were due to be heard as this was written, and there is a good chance that a selection of civilian scientists in and out of government will take the stand, too.

To the frustration of the "say-it-isn't-so" segment of the committee membership, which has

daily appealed to witnesses for assurances that all is well or soon will be, there has been a fair unanimity among witnesses that past errors and present hesitations continue to menace our world position.

The opening witness, giving the State Department viewpoint, was Under Secretary Merchant, sitting in for Secretary Herter. He acknowledged that even though many experts feel US science on a broad front has kept pace with the Soviet Union, the spectacular nature of the Reds' space achievements has made the Department's job a tougher one. This admission was strongly seconded by USIA's Director Allen. He said bluntly that space achievements extend far beyond their intrinsic importance when they are examined by the "uncommitted peoples." One could imagine the ripple of irritation the testimony of these two witnesses caused on higher levels.

Mr. Glennan, too, freely acknowledged the fact of the race which his chief continues to deny. Mr. Glennan's statement is worth quoting from:

"It is clear," he said, "that the Soviet Union continues to hold a substantial space lead in the eyes of the world. It is equally clear that this lead is based principally upon [their] possession of one or more reliable launch vehicle systems having perhaps twice the thrust of our own first-stage booster rockets."

Mr. Glennan stressed as the great white hope of the US in the space competition the now-fattened Saturn million-pound-thrust engine cluster which has been in the headlines so much lately. He also told the committee that we should be able to "match their [USSR] present weight-lifting capabilities within the next twelve to eighteen months with the Atlas-Agena B and the Atlas-Centaur systems." Both of these will use the USAF Atlas powerplant consisting of an engine cluster of some 350,000 pounds thrust as first-stage booster and a Centaur second stage using liquid hydrogen as a fuel component. But, he emphasized, the Russians are not going to be sitting on their hands in the meantime.

Dr. Von Braun's appearance as a witness was an impressive display of the strange spell the German-born rocketeer casts on nearly everyone. The morning he arrived, with no prepared statement but a brief film on the wonders to come with the Saturn, the partisan air that had marked the appearances of earlier witnesses faded away. Committee members from both sides of the aisle pressed him for assurances that (1) he was happy about the proposed transfer of him and his team



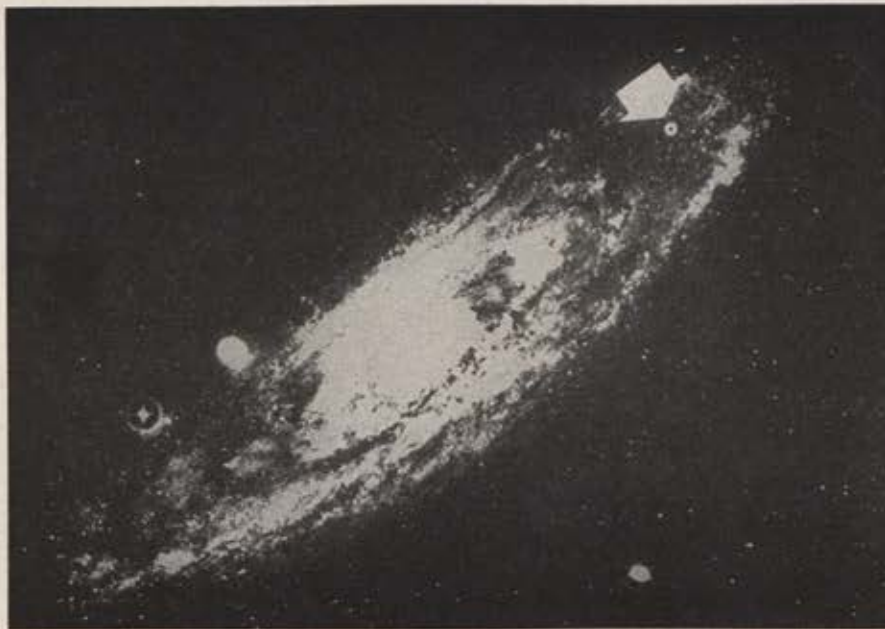
Wide World Photos, Inc.

House Space Committee members get word on Saturn from Dr. Wernher von Braun, left. Viewing Saturn model are Representatives Ken Hechler of West Virginia, Overton Brooks of Louisiana, Victor Anfuso of New York, all Democrats.

from the Army to NASA, (2) that he now had enough money for the Saturn project. He said yes to both questions. He indicated that the augmented FY '61 (more than \$230 million) funding scheduled for the Saturn might speed up its development by a year. And he reported too that he fully approved of the President's action in transferring his team to NASA. This, it will be recalled, is an interesting switch. In November 1958, NASA was demanding Dr. Von Braun and the Army Ballistic Missile Agency, while Dr. Von Braun was issuing veiled threats about leaving his post if the transfer took place. Then, it didn't and he didn't. Now, a little more than a year later, he and ABMA are coming over to NASA, while out of the picture is Maj. Gen. John B. Medaris, the doctor's ex-boss.

The "missile gap" and air alert controversies have also consumed the time of the committee, although some observers have pointed out that these subjects are more properly within the purview of House Armed Services. On these issues, among others, Secretary of Defense Gates, Secretary of the Air Force Sharp, USAF Chief of Staff General White, and General Schriever testified and it was interesting to observe that the closer the witness to the highest level, the more strongly did he support what has been called the "rosy" view of the Administration.

The vital need for strong military space capability was underscored particularly by the testi-



Spaceships traveling at near the speed of light may be demolished by collision with interstellar particles. This "disintegration barrier" (see text) may limit exploration to area comparable to that marked on Andromeda galaxy.

mony of Lt. Gen. Bernard Schriever, Commander of the Air Research and Development Command, and Lt. Gen. Roscoe Wilson, USAF Deputy Chief of Staff for Development. They both stressed the need for space-borne warning systems against surprise attack (see editorial on page 61). Interestingly, the very first witness, the State Department's Mr. Merchant, recognized the need for such systems too.

Despite wrangling that has marred the hearings, there is evidence that the very weight of evidence offered by witnesses has forced *some* action by the Administration—such as the priming of the Saturn project. Also, the pressures have led to public spell-outs of fairly long-range programs of space technology, admittedly tentative and depending on the creation as scheduled of the superthrust engines now envisioned.

Speaking for NASA, Associate Administrator Richard E. Horner outlined a ten-year program, calling for: in 1960, a Mercury Astronaut suborbital flight; in 1961, a lunar impact vehicle and possible Mercury orbital flight; in 1962, Mars or Venus vicinity probes; in

1963, Saturn two-stage flight and a controlled landing of an unmanned vehicle on the moon; in 1964, an orbiting astronomical laboratory, lunar circumnavigation with an unmanned vehicle to return to earth, and unmanned reconnaissance vehicle to Mars or Venus; during 1965-67, programs leading to manned circumlunar flight and a permanent earth-orbiting station; beyond 1970, manned flight to the moon.

And there is little doubt that the President's request for revisions of the Space Act—including the abolition of the National Aeronautics and Space Council, which never really got off the ground, and the elimination of the Civilian-Military Liaison Committee, which was supposed to clear up any differences that developed between NASA and the Department of Defense—are the result of congressional probings.

Possibly the most significant realization that will emerge from this session's studies in Congress is a fuller understanding of the military applications of space technology—and the necessity to go ahead with such applications as rapidly as pos-



SIMULATORS—BASIC TOOLS IN VOUGHT RESEARCH

The Manned Space Flight Simulator Laboratory shown opposite is designed to answer difficult questions posed by manned space flight.

Vought Astronautics has already faced and solved many problems during initial development of the *Dyna-Soar* orbital boost-glide vehicle. Developmental studies and feasibility tests by this division have added up to over two years of pathfinding—particularly in the matters of integrating man and space machine, combatting prolonged high temperatures, and designing reliable crew escape systems.

To determine, for example, what control capability the space pilot must have and what displays he will need, Vought Astronautics constructed a Fixed-Base Simulator which simulates real time from end of boost, throughout orbit, re-entry, hypersonic glide and supersonic approach to a point over destination.

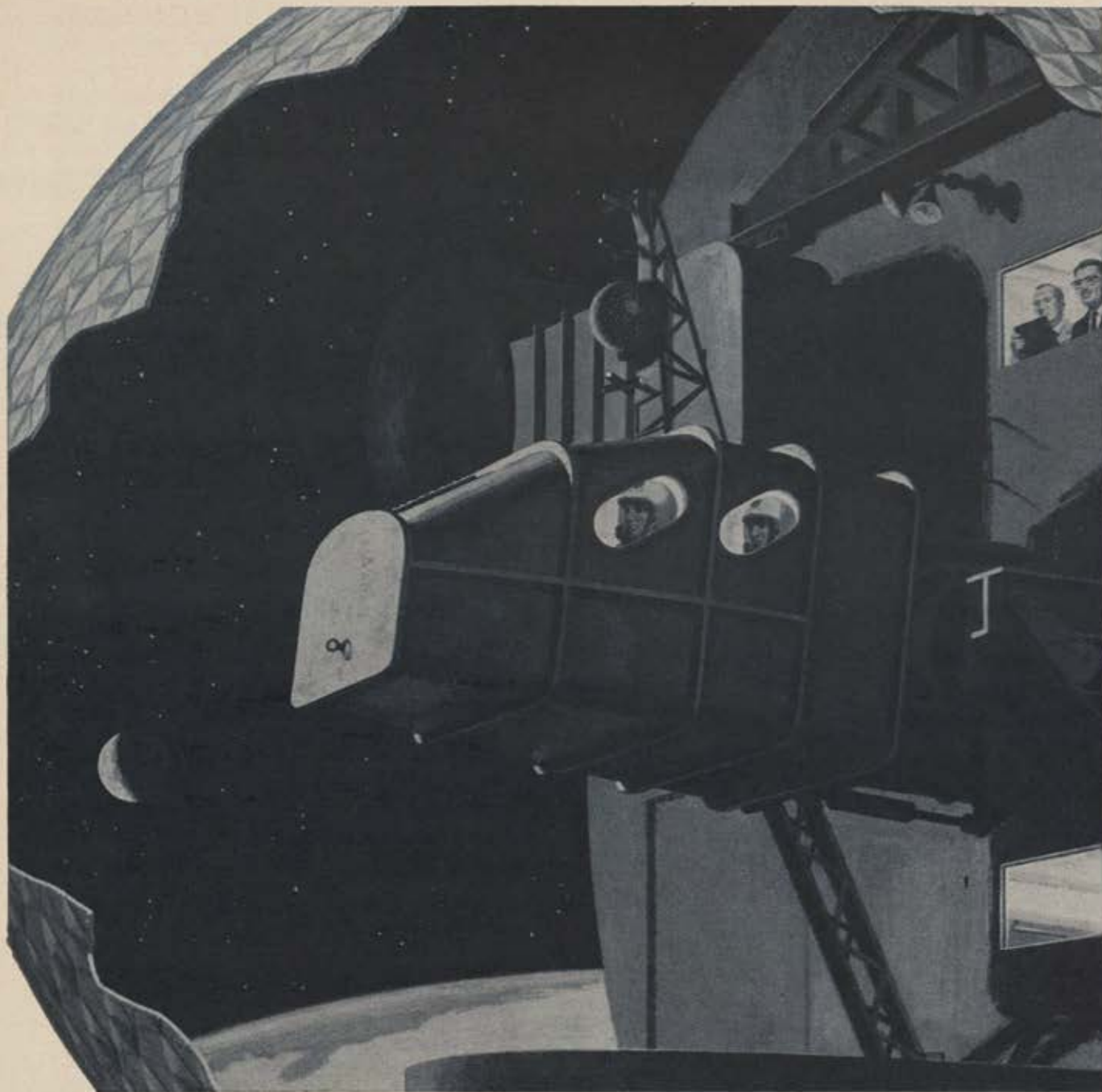
Operated under normal and emergency conditions on more than 200 "flights," this simulator has provided a basis for evaluating pilot ability to fly complete space missions reliably and effectively with manual control.

In the structures design and materials development on the *Dyna-Soar* nose section and escape capsule, Vought Astronautics developed new methods for combatting the extreme heat of the nose cone during re-entry while maintaining the crew compartment at a livable temperature. Related tests in Vought's Re-entry Temperature Simulator have subjected a full-scale nose cap to over 3,000 degrees F. for prolonged periods.

Vought Astronautics' simulator concepts are the vanguard of a new family of research tools—comparable in value to today's wind tunnels and computer laboratories... and aimed at ensuring a place for man in pioneering this new frontier—space.

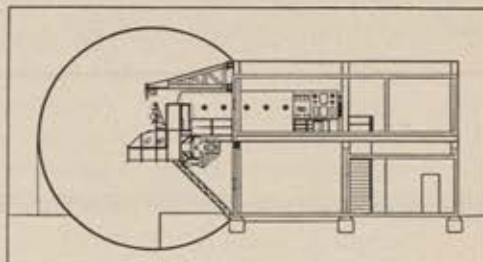
Space is the specialty of Vought Astronautics. Other major interests are being aggressively advanced in the Aeronautics, Electronics, Range Systems and Research Divisions.

CHANCE
VOUGHT
DALLAS, TEXAS



A PLACE TO IRON OUT THE STRESSES OF SPACE

Seventeen different stresses will flay the minds and bodies of the first spacemen. Under the combined attack of acceleration, anxiety, heat and other stresses, how will man perform? The answer won't be known until the problem can be simulated, in all of its parameters. Vought Astronautics — a division of Chance Vought — is preparing the way with design studies of simulators like that illustrated above. Inside the laboratory's mock space vehicle, a man — without leaving the ground — would know the heat, movement, noise — and many psychological effects — of an extra-terrestrial voyage. He would glimpse a dynamic solar system and would experience, altogether, an invaluable preview of combined stresses of space flight. Vought Astronautics can produce and operate such a lab now for the development of spacecraft and the training of pilots.



From active flight instruments, motion, and a planetarium projection — a realistic preview of space flight.



CHANCE
VOUGHT
DALLAS, TEXAS

SPEAKING OF SPACE

sible. The country can ill afford hesitations during this second round of the technological war.

All to the good. But the question remains: How many people in Bridgeport, Conn., or Ashtabula, Ohio, are following this exciting story?

The Disintegration Barrier

While Congress and the Administration worry about the space "here and now," some space scientists are contemplating more exotic questions such as: What might happen to space vehicles traveling at speeds approaching that of light? Dr. Elliot T. Benedikt of the Northrop Corporation believes that man's exploration of the universe may be limited to only the closest stars because of the "disintegration barrier."

To reach galactic neighbors beyond 100 light years (600 trillion miles), in an adult lifetime, a spaceship would have to travel at nearly the speed of light, Dr. Benedikt says. At such incredible speed, he warns, collisions with microscopic interstellar dust could disintegrate the vehicle (see cut on page 82).

International US Space Programs

US willingness to carry other nations' instrumentation aboard American vehicles, spelled out at the recent COSPAR meeting, has resulted in informal agreements with the British on experiments to be performed with British instruments on an American vehicle. The launching vehicle will probably be the four-stage Scout rocket hoped to become operational at NASA this year. The joint US-British experiment will probably occur in late 1961.

Space Quotes

"At the present time, [Project] Mercury is our only program funded and actually under way for putting man into orbit. Considering the number of challenging new techniques which must be mastered to make spaceflight a success, there is question whether the national interest is best served by a single approach to this problem. The only provision against the hazards of 'all eggs in one basket' has been to have backup contracts on those components for Mercury which are most likely to provide trouble.

"There are a number of very promising alternative approaches to putting man in space. By setting a limit on testing these concepts through exclusive adoption of the Mercury approach, the nation is risking the loss of extremely valuable development time. The country cannot support a large number of approaches in competition with all the other demands on fiscal and personnel resources. But at the same time the failure to develop in parallel at least one other man-in-space program could prove to be a costly mistake."

—From the *First Interim Report on Project Mercury*, prepared by the staff of the House Committee on Science and Astronautics. Available from the Government Printing Office, Washington, D. C., price, 40¢.

"We have studies on offensive orbital systems ranging from a low-orbit Dyna-Soar type vehicle to offensive systems dispersed and hidden . . . 1,000 miles or more from the earth . . . systems to inspect satellites and determine their intentions, and space-based ICBM defense systems. . . ."

—From the testimony of Lt. Gen. Roscoe Wilson, Deputy Chief of Staff for Development, USAF, at hearings of the House Committee on Science and Astronautics.

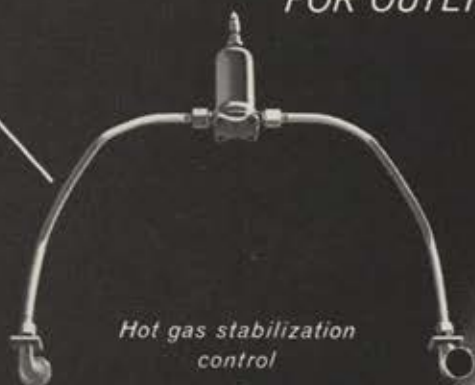
From the Journals . . . and Elsewhere

In *Spaceflight*, magazine of the British Interplanetary Society, January issue, John W. MacVey takes us to Pluto, last known outpost of the solar system, and raises the question of whether there may be a yet-undiscovered planet beyond. . . . The February issue of *USSR*, the English-language magazine distributed in the US, carries an interesting survey article on the history of Russian science as far back as the eighteenth century. . . . Alan Dunn, the *New Yorker* magazine's witty cartoonist, has a new book of space-oriented cartoons, *Is There Intelligent Life on Earth?* (Simon and Schuster, \$3.50), purporting to be a report to the congress of the planet Mars. New world conquered by an old master. . . . And there is, apparently, a mountain lion haunting the Atlas launch pad at Vandenberg. More on that later. As of now, we are informed that no pictures have yet been taken of the space-age feline, but if the beast near the beast does get photographed, you'll see it here.

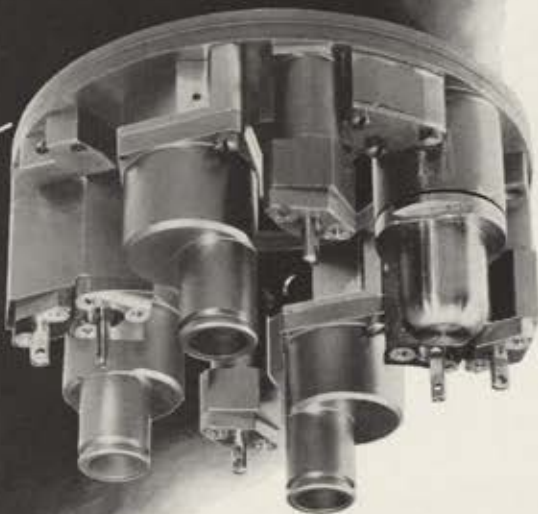
—WILLIAM LEAVITT

Advanced hot gas systems delivered by AiResearch

FOR OUTER SPACE, ATMOSPHERIC
AND UNDERWATER
STEERING



Hot gas stabilization control



Hot gas steering control

AiResearch is now in production on two greatly simplified hot gas steering control systems: a reaction control system for outer space flight stabilization and a hot gas actuator control system for terrestrial steering (in the atmosphere and under water).

Both systems eliminate any need for pumps, heat exchangers, accumulators and other apparatus required in earlier control systems. And both systems utilize hot gas, operating off either the main engine or a separate fuel source.

The gas in the outer space reaction control system is fed into a set of nozzles which imparts spin to the missile to stabilize its flight through space.

In the terrestrial hot gas actuator control system the gas is fed into an on-off controlled linear actuator which moves the fins controlling the missile's attitude in the atmosphere or under water. This system also utilizes a concept developed from the AiResearch hydraulic "printed circuit." This approach eliminates complicated plumbing, thereby decreasing the weight and increasing the reliability of the system.

AiResearch is a pioneer, leading developer and manufacturer of hot gas systems and other nonpropulsive power systems for atmospheric, underwater and outer space missions.

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Automated
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MPTE



The recent demonstration of multi-purpose test equipment (MPTE), developed by RCA under a series of Army Ordnance contracts, highlights *a new dimension in automated multi-use systems support* and culminates a long-term RCA effort in this field. This General Evaluation Equipment is an automated, transistorized, dynamic check-out system. It contains a completely modularized array of electronic and mechanical

evaluation equipment, capable of checking a variety of electromechanical devices, ranging from radar subassemblies to missile guidance computers. MPTE provides the stimuli, programming, control, measurement and test functions for the NIKE AJAX, NIKE HERCULES, LACROSSE, HAWK and CORPORAL missile systems and has been extended to other weapons systems related to our defense efforts.



RADIO CORPORATION of AMERICA

DEFENSE ELECTRONIC PRODUCTS

CAMDEN, NEW JERSEY

The Air Rescue Service has for thirteen years been among the world's leading organizations of lifesavers. Today Rescue is adapting its traditional role to the far-out requirements of the dawning aerospace age so it may continue to serve . . .

Wherever Men Fly

**Brig. Gen. Joseph A.
Cunningham**

COMMANDER
AIR RESCUE SERVICE, MATS



Muddy but unbowed, pilot awaits ARS pickup off coast of Panama.

USAF's Air Rescue Service, one of the components of the Military Air Transport Service (MATS), is perhaps the world's leading organization of lifesavers.

In the past thirteen years, ARS has sought out and rescued more than 7,000 persons from circumstances that would almost certainly otherwise have meant their death. And the total number of people ARS has helped in one way or another during its short but dramatic history runs into many more thousands.

During the Korean War, Air Rescue pilots and their aircraft saved nearly a thousand fighting men from behind enemy lines. In all, the command flew to the rescue of ten times that number of US and United Nations personnel of all services.

Tales of individual heroism on the

part of ARS men fill page after page in the record. I would like to examine a few of these pages, as well as offer a broad-brush report on ARS—an organization with which I am proud to be associated.

First, let us backtrack briefly and begin at the beginning—May 29, 1946—the day USAF's Air Rescue Service came into existence. The Air Force at that time officially recognized the need for a professionally trained group of men whose fundamental responsibility would be to go to the aid of their fellow airmen and others in distress. In World War II we had learned the hard way of the need of such an organization.

The record shows that in the early months of that war we failed to avail ourselves as completely as we might have of the relatively well organized

British air-sea rescue facilities then in existence. As a result there is only one recorded rescue of an American airman during the first six months of World War II Eighth Air Force operations. Then we joined forces with the British and, utilizing the RAF's tested rescue procedures, recovered forty percent of the aircrews downed. Not at all bad, comparatively speaking.

During Korea, however, when Rescue sprang to action—organized and specifically trained to support our combat air forces—about ninety percent of our downed flyers were brought back to fight again.

It was in Korea that ARS came into its own. Under combat conditions the magnificent accomplishments of the 3d Air Rescue Squadron added a new dimension to the concept of rescue.

(Continued on following page)

WHEREVER MEN FLY

Before this time Air Rescue was in its formative stages—techniques were still largely experimental. But these techniques became matters of everyday routine in Korea, where Rescue flew to the aid of 9,680 fighting men, and the service was especially proud that nearly a thousand of these were rescued from behind enemy lines.

To accomplish all this meant the development and standardization of Rescue techniques and their refinement to a high degree of reliability. The helicopter established itself as an invaluable rescue vehicle. Many famous pilots, including the late triple-jet-ace Capt. Joe McConnell, were picked up and brought back to fly and fight again because of Air Rescue's "battle-taxi" service. The high regard in which Rescue's contribution to the United Nations' effort was held is evidenced by the fact that no unit received a higher number of personal citations than the 3d Air Rescue Squadron, whose members garnered more than 1,000 in Korea.

ARS was also responsible, to a large degree, for the remarkably low mortality rate among the UN wounded—a rate about half of that of World War II. Many severely wounded men who could not have survived ground transportation were taken by air from front-line aid stations to hospitals in the rear within minutes after being hurt. Helicopters could accomplish evacuations in less than half an hour, that often would have required a full day of tortuous overland travel by jeep or other means.

During the troubled days of Korea, Rescue continued to operate on a global basis. Wherever Air Force planes flew, the men flying them knew that in time of trouble they could count on Rescue assistance.

Since the founding of ARS, an accurate count of the number of lives actually saved is impossible. Statistics are by no means complete. In some instances, it is not possible to say positively that Rescue saved a man's life, because it is possible that the man might have been able to save himself. However, it can be definitely established that ARS personnel have found and rescued more than 7,000 people from certain death. This is a most conservative statistic and in all probability represents but a fraction of the true total.

Existing records do show that, on search and rescue missions alone, Air Rescuemen have logged some 270,000 hours. These hours do not include escort missions or orbit missions, which Rescue flies every day of the

year just to be on the scene in case trouble should develop. To cite but one example, ARS planes fly escort missions for overseas trips by President Eisenhower and other dignitaries.

The 270,000 hours were flown to seek and save already downed military or civilian flyers, accident victims, or the survivors of natural disasters. The missions were flown not only to aid citizens of the United States but those of practically every other country this side of the Iron Curtain. On many Stateside missions, it should be noted, the Civil Air Patrol (see "Civil Air Patrol—USAF's Junior Partners," February '60) joins ARS as a component of the lifesaving team.

As a result, ARS has directly aided a confirmed total of 27,144 people during the past thirteen years.

One typical mission occurred late in 1954. Four USAF C-119 Flying Boxcars were headed for one of our far northern bases in Greenland, which can only be approached by flying up a treacherous fiord. This particular fiord



ARS flew to the rescue of some 10,000 US and United Nations personnel in the Korean War, nearly a thousand of them behind enemy lines. Here, blades of an ARS 'copter still rotate as critically wounded man is carried to ambulance.

is forty-five miles long, from one to five miles wide, and is lined by mountains ranging up to a mile high. Even on a clear day, the approach is formidable. When the four big Boxcars neared the coast of Greenland, well past their point of no return, they encountered unexpectedly bad weather blocking their approach to the base. Disaster seemed imminent.

A Rescue alert crew scrambled and rendezvoused with the C-119s at the fiord's entrance. Navigating solely by radar, the Rescue aircraft made two runs to the base, escorting two Boxcars on each trip. Of the four crews aboard the C-119s, how many would have survived is anyone's guess, but almost certainly—had it not been for skilled assistance—all four aircraft would have been lost.

For heroic work in the face of natural disasters, Rescue personnel have made headlines repeatedly over the years. Many of these disasters involved citizens of other countries. The exploits of Rescuemen have in these cases developed bonds of friendship that will never be broken. In English and Dutch flood disasters of 1953, Rescue was credited with saving thousands of persons. The exact figure can never be known.

In England, one man alone, A/3C Reis Leming, led twenty-seven people to safety from the flood waters at the risk of his own life. Queen Elizabeth awarded him the George Medal, England's second highest award for gallantry.

In February 1947, Rescue participated in its first major flood action when the Mamore River flooded in Bolivia. Native villages were wiped out in an area of more than a hundred square miles. ARS established an airlift and, under most difficult conditions, carried hundreds to safety. One

C-47 staggered aloft from a primitive airstrip with more than ninety survivors aboard. To be sure, most were children, but this figure still stands as a record for this type of aircraft.

ARS history is crowded with similar achievements. Rescue directed all operations by units of the Defense Department during the two catastrophic floods in New England and the one in California in 1955 and in Alaska in the spring of 1956. Rescue also has led the fight against floods in Japan, Italy, Mexico, Costa Rica, and at home in Kansas and Texas, to mention but a few.

Rescue has been officially praised in the past few years for flying in supplies and medical help and airlifting critically injured survivors to safety following earthquakes in Algeria and

Greece, and in a number of avalanche disasters in Austria, Italy, and Switzerland. In 1951, ARS flew in serum and medical aid to help check the yellow-fever epidemic in tiny Costa Rica. The Republic of Haiti issued a postage stamp honoring the Air Rescue Service for assistance rendered when that area was ravaged by Hurricane Hazel in October of 1954.

Certain accomplishments by ARS personnel have bordered on the legendary, and a list of such exploits for which recognition was forthcoming would be impressively long. To name but a few is to neglect many, but any list would have to include these:

- **February 1951.** The courageous helicopter rescue by Capt. Daniel J. Miller of six wounded and exposed infantrymen trapped behind enemy lines in Korea. Captain Miller made three successive trips behind the lines, landing on a small ridge under deadly enemy fire to effect the rescue. He received the Cheney Award for his "act of valor, extreme fortitude, of self-

Capt. Jack Woodyard flew his rescue plane practically under the guns of the Communist fighter aircraft. He and his crew were decorated for heroism.

- **September 1958.** The saving of forty-eight people from the wrecked Portuguese ship *Arnel*. Capt. Keith Proctor of the 57th Air Rescue Squadron made forty round trips between the *Arnel* and the island of Santa Maria in the Azores to save these Portuguese nationals when their ship ran aground on rocks and shoals in heavy seas. Captain Proctor was awarded the Distinguished Flying Cross; his crew members received Air Medals.

- **June 1959.** The helicopter miracle in the Mediterranean which resulted in the saving of seven Air Force men from a ditched C-47. The seven survivors were picked up from a partially inflated life raft by Capt. Merle A. Clapsaddle flying a Sikorsky H-19. High winds and thirty-foot waves made the men's peril so great that Captain Clapsaddle had but one shot at rescue. When all were aboard, the

real thing—they take their lives in their hands.

One paramedic was compelled by circumstances to jump alone onto a high mountain to aid a man suffering from a broken leg. He treated the man's injury and got him down the mountain to where he could be picked up and taken to a hospital. One aspect of the mission was particularly noteworthy—the jumper had broken a leg in landing on the treacherous terrain.

It takes the best of the species to qualify as pararescuemen. In any other branch of the service the deeds they perform as daily routine would be considered worthy of special commendation. To them it's the life they love, and few would have it any other way.

Radio and TV newsman Eric Sevareid was in a group of survivors saved by jumpers during World War II. Of the men who risked their lives to save his, Mr. Sevareid later wrote, "Gallant is a precious word; they deserve it."

My predecessor, Brig. Gen. Thomas J. DuBose, once said, "To me it has



Rescue at sea. Rescue chopper takes men off grounded tug near Okinawa in 1956. In background is Army tanker.



ARS answers the call regardless of nationality. Above, evacuation of Algerian native in 1954 earthquake.



Somewhere in Korea. Sikorsky H-19 helicopter, Grumman SA-16 amphibian formed spectacular lifesaving team.

sacrifice in a humanitarian interest...."

- **June 1951.** Rescue of a UN fighter pilot at night from a river deep in North Korean territory. In almost total darkness 1st Lt. John J. Najarian landed his amphibian in the water of the Toedong River, hauled the waterlogged survivor aboard, and managed the hazardous takeoff. He was unable to use any lights for fear of providing too good a target for enemy gunners who maintained relentless fire during the entire operation.

- **July 1952.** The rescue of thirty-two people from the storm-tossed Mediterranean by Capt. Kendrick U. Reeves, whose actions also won him the Cheney Award.

- **July 1954.** The rescue of the survivors of the British Cathay-Pacific airliner shot down by the Chinese Reds.

heavily laden chopper struggled sixty miles just above the water to the nearest landfall. They made it with five minutes of fuel remaining in the tanks.

Within the Air Rescue Service there is a unique group of men, an elite corps known as "Paramedics." They are a breed apart and certainly among the best-trained men in the armed forces today. Precision parachutists, highly trained medics, experts on survival under all conditions, these men will jump anywhere any time it is felt there may be a life to be saved. They live to jump; they jump to save lives.

Rescue's paramedics are a tightly knit and quietly proud clan. They have a right to be.

Among them heroism is not uncommon. Every time they step out of an aircraft—in training or when it's the

always been a source of wonder and pride that the most potent and destructive military force ever known should create a special service dedicated to saving life. Its concept is typically American. All over the world Air Rescue affords daily proof that, as Americans, we hold human life to be the most precious commodity on earth. To the people of foreign lands who see Rescue in action, it serves as a constant rebuttal to those who propagandize against us. As an instrument of international good will its value is incalculable."

This observation is still valid, for it is a fact that one of the most important by-products of the ARS mission has been its enormous impact on international relations.

(Continued on following page)



Three of the four planes of today's ARS team, including old SA-16, above, are due to leave the inventory soon.

Below, also leaving ARS in near future, is Sikorsky SH-19 helicopter, veteran of many a valiant rescue.



Above, third of departing trio, is Vertol SH-21 'copter, which can haul up to twenty survivors at a time.

Below, surviving member of current ARS inventory, Douglas SC-54, search and rescue configuration of the C-54.



Hundreds of letters from almost every country this side of the Iron Curtain tell eloquently of services rendered and lives saved by Rescuemen. Wherever Rescue aircraft fly, American prestige increases. Wherever a life has been saved or help made available, the American people have gained friends and stature.

In many areas of the world the gold-banded aircraft of the ARS are the only ones permitted to fly across international borders without prior clearance. In these troubled times, with stress and strife the rule rather than the exception, this simple, unmistakable act of recognition of the good will and humanitarian purposes of the American people is a salutary thing.

Today, ARS is undergoing, along with much of the rest of USAF at the dawn of the aerospace age, a period of transition coupled with budgetary pressure. That amphibious workhorse, the Grumman SA-16 Albatross, and our helicopters, the Sikorsky SH-19 and the Vertol SH-21, are moving out of the inventory. For a time, all ARS units will fly only the time-tested Douglas SC-54 Rescuemaster.

In addition, while retaining its global structure—with units located from Libya to Scotland, Hawaii to Guam to Japan, Labrador to the Azores, Rescue will be cut in size.

Use of only the SC-54 will remove much of our capability to *recover* personnel. We will, however, be able to seek and find, drop pararescuers, survival kits, and apparatus, and direct ships, surface vehicles, or helicopters of other agencies to the scene.

In our future lies possible development of what we call the "mother/daughter concept." We realized some years ago that ideally ARS should have a single aircraft capable of vertical takeoff and landing, with a high-speed potential, a long-range capability, and ability to carry a heavy payload.

In 1957 we proposed the development of a system in which a small VTOL plane would be carried by a relatively large, high-speed, multi-engine conventional aircraft. Together, this mother/daughter team would be

capable of accomplishing just about every sort of rescue in the book. The Lockheed C-130 Hercules looks to be a good nomination for "mother." Several major aircraft companies are working on proposals for "daughter."

While basically a combat organization, whose primary mission is to save USAF personnel in time of war, Rescue has recently been assigned a new area of responsibility which will have considerable significance in the future. This new mission is aerospace recovery. This includes recovery of materiel as well as personnel in support of Air Force aerospace operations. Rescue aircraft are now taking part in the test program for the Mercury man-in-space project.

ARS has played a continuing role in USAF missile and satellite programs. Units maintain standby alert during firing. They have taken part in such efforts as attempting to recover nose cones and capsules from aerospace hardware, which has included USAF's Project Discoverer satellites. ARS renders support to all operations at both the Atlantic and Pacific Missile Ranges as well as at Eglin AFB's Gulf Test Range.

Similarly, Rescue aircraft fly coverage when single-seater, single-engine U-2 research aircraft fly to ultra-high altitudes in a High-Altitude Sample Project (HASP) code-named "crow-flight." Rescue SC-54s have flown more than 10,000 accident-free hours with these U-2 HASP aircraft, many of them over hazardous terrain and under poor conditions.

Thus ARS has adapted its traditional lifesaving role to the new requirements for far-out operations in the aerospace age.

When the manned capsule returning our first Mercury Astronaut from outer-space orbit oscillates gently toward the sea beneath its parachutes, Rescue will be on hand.

And as tomorrow's Air Force moves into space, Rescue will continue to be ready to perform its lifesaving mission in whatever regions men may be flying—in line with a tradition of heroism well established in the past decade and a half.—END



The author, Brig. Gen. Joseph A. Cunningham, assumed his present post as Commander, Air Rescue Service, in August 1959. He served as Vice Commander for the year previous, following completion of a course of studies at the National War College, Washington, D. C. General Cunningham, a graduate of the University of West Virginia, entered the Army Air Corps in 1938. He served in the European theater during World War II.



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fessional partner for prime contractors—bringing important "extras" that help "primes" get contracts and then fulfill those contracts in less time and at lower cost. For complete information on how KNOWMANSHIP is already being efficiently applied in the system areas listed below, call, wire or write us today.



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AMERICA'S job in space is cut out for her. National survival hinges on how well the job is done. This, in essence, is the theme of a closely researched sixty-five-page report on "The Space Problem" by the Research and Development Flight of the 2562d Air Reserve Center, Alameda, Calif.

ARDC handed the Reserve R&D outfit, one of sixty-six such groups throughout the country, the task of verbally exploring space within the framework of a trail-blazing ARDC Reserve training program. The result, typical of the output in the nationwide program, points up the merit of these Reserve R&D activities and is a thoroughly solid document in its own right.

The report contains this warning:

"There can be little doubt that a potential enemy will be found in cislunar space within the next few years. A nation not achieving space control will be subject to the will of the nation that does achieve it. It is imperative for the defense of our way of life that space stations, space mobility, and efficient interception facilities are developed. There is a cogent portent that military advantages may lie within such fantastic schemes as an operational moon base and manned satellites."

Here are its conclusions:

"Our future as a nation depends on whether or not we are militarily prepared in the space age. We should proceed firmly and at sufficient speed to assure a capability which will deter aggression from a potential enemy. Concurrent effort should be made to determine the military portent of the space capability of the USSR. Thus our own program must be consistent with both military preparedness and economic internal tranquillity.

"Rapid advances will be needed in the physical and engineering sciences to assure a technological posture of superiority in space. In mid-1959, the USSR was still accomplishing feats in intraplanetary "basketball" that the US could not match. Solutions to the scientific impasses will come only from a steady, strongly supported, well integrated space program. We urge continuance and acceleration of fundamental and applied programs which will extend our space capability.

"In particular, we recommend:

- "Programs such as Mercury, which will put man into space.

- "Projects aimed at lunar exploration and landing.
- "Erection of a space platform.
- "Development of free and controllable manned satellites.

- "A joint study by appropriate agencies of the Department of Defense to determine the feasibility of a satellite-controlled antisubmarine system. The satellite would receive intelligence from ocean and land detectors. In turn, it could control and unleash antisubmarine and antimissile weapons of the Polaris and Minuteman concepts."

The report contains, in addition to the over-all analysis, sections on earth surveillance from the moon, space navigation, weather survey and control, space survival, propaganda value of a moon base, electromagnetic propagation, and utilization of satellite weapon systems in antisubmarine warfare.

To complete this imposing research project, the twenty-six-member Alameda R&D Flight was divided into four groups, each to examine one facet of the problem—space control, manned satellites, moon bases, space operations.

Individual assignments were turned in to group leaders who consolidated them into four separate reports. These were reviewed, criticized, hashed, rehashed, and then smoothly blended into one report which was presented in prescribed format to ARDC.

The Alameda R&D Flight was well qualified to ponder the space problem. In 1958, the entire Flight attended a course

A Ready Room Feature

A Reserve Flight Examines the Space Problem

America's job in space is cut out for her. National survival hinges on how well—and how quickly—the job is done. These are among the conclusions of a Reserve R&D outfit in a report prepared for ARDC

in space technology sponsored by the University of California. This course was attended by some 5,000 students at five different locations in California.

Space, however, is only one program project area. Electronics, manpower, strategy, and aircraft have been other project topics for the Alamedans and the several thousand other Reservists in the ARDC program nationally.

The Flight was formed in February 1955, with seventeen students. D. O. Horning has been program moderator since the start. Administration of the activity is by CONAC through its Fourth Air Force at Hamilton AFB, Calif. Technical direction and control are maintained with Headquarters ARDC through the office of Col. W. R. Weber, Assistant for Reserve Affairs, Directorate of Personnel.

Classroom instruction has been the focal point of the Alameda program during its five years of existence, as has been the case in Reserve R&D units across the country.

During the first year, each two-and-one-half-hour class comprised a seventy-five-minute lecture by a technical or scientific expert from a West Coast university or from industry; a forty-five-minute presentation and discussion of research administration, with emphasis on the duties of an Air Force project engineer; a thirty-minute period devoted to project activity. For this latter, the class considered the problem, "Our enemy has the ICBM! What do we do now?"

The second year contained the technical lecture and treatment of research administration as before. Project activity featured short talks by individuals on a technical subject of their choice.

The third, fourth, and fifth years were vectored toward space. One result was the ambitious space problem study.

The Flight is now in its sixth year. Personnel changes have been few. Of the original seventeen members, nine remain; almost all who left did so because of departure from the geographical area. Of the charter members, Lt. Col. J. G. Carroll has served the Flight as program coordinator for the past four years.

These Reserve officers represent sixteen universities which have conferred thirty-eight degrees, including nine masters and four Ph.D.s on them. Included are chemists, mathematicians, biologists, civil engineers, aeronautical engineers, mechanical engineers, economists, and psychologists.

This, then, is the ambitious ARDC-Air Force Reserve program—a prime example of the industry, dedication, and brain power that characterizes the nation's Air Reserves.

—END

For the eyes of the Pentomic Army

Advanced Honeywell will guide high-performance

Smallest, lightest unaided inertial system will direct complex flight path over enemy territory for scanning, mapping and pinpointing targets, and return drones to recovery area.

The new theories and techniques of warfare call for missions that can be carried out only by combat surveillance drones that are increasingly sophisticated and recoverable for use again and again.

Under the guidance of the U. S. Army Signal Corps, Honeywell is providing for the newest of these unmanned aircraft the most advanced, versatile and accurate *miniature* inertial guidance system yet developed. The system enables programming to provide surveillance over several areas during each flight, and safe return of the drone to the recovery area.

Although missions include reconnaissance and mapping, the most important is target pinpointing. Here it is necessary that the inertial system of the drone be extremely precise, since the target-position information the drone gathers is utilized by the inertially-guided ballistic missile which is fired on the target. Honeywell achieves such precise performance characteristics through

the use of an advanced miniature integrating gyro and pulse-torqued accelerometer.

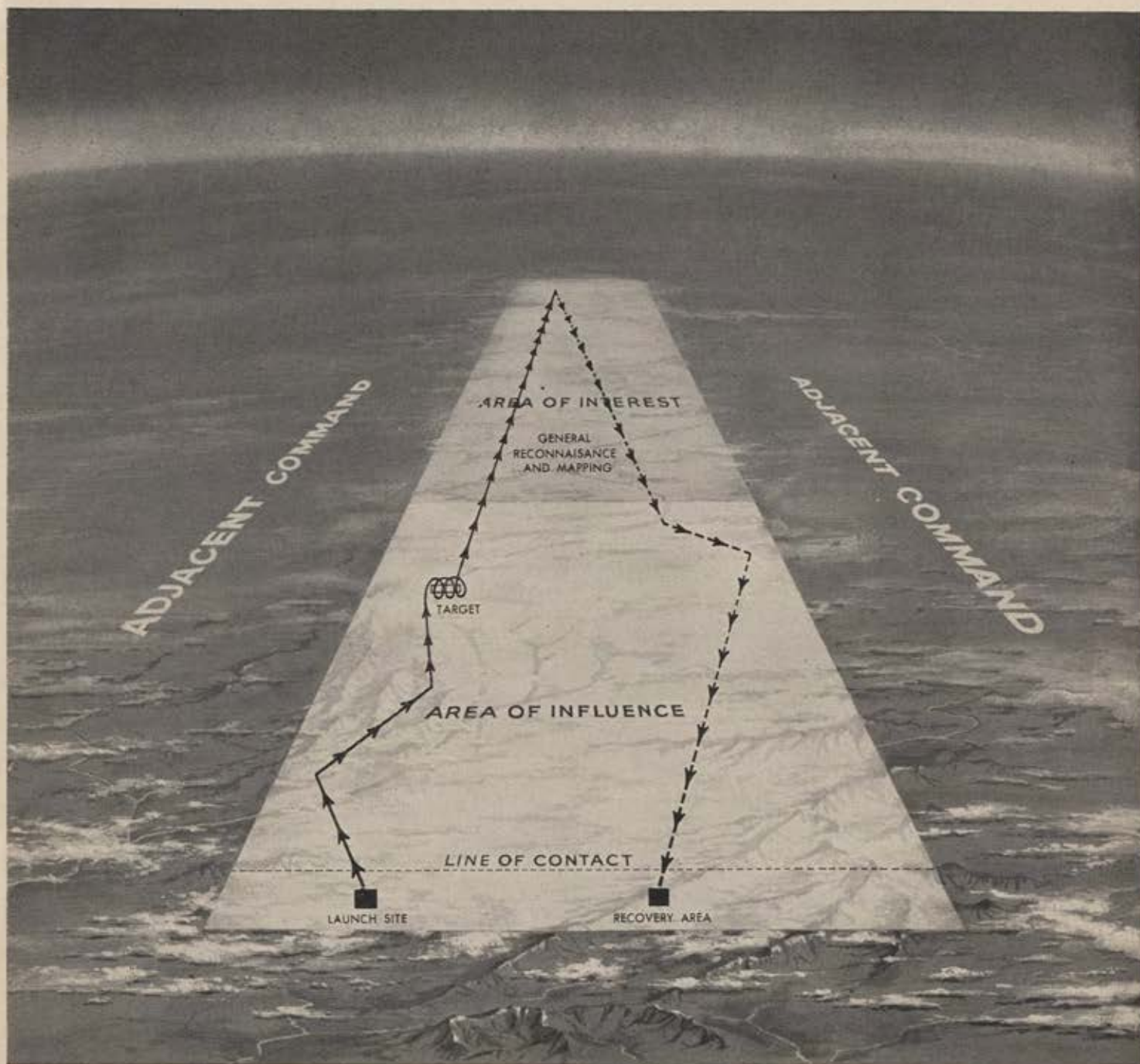
Both vehicles—the AN/USD-5 (Fairchild Engine and Airplane Company) and the AN/USD-4 (Republic Aviation Corporation)—will accomplish separate missions using virtually the same Honeywell inertial guidance equipment. The heart of this system was designed for adaptability to other navigation and stabilization requirements for Army surveillance, as well as to other inertial applications that include developments for the Centaur Space Probe and the Bomarc Interceptor Missile.

Honeywell's program management approach and experience in development and production of similar equipment on several programs results in precise miniature inertial systems for less cost than is customary in the industry. For additional information on Honeywell's background in inertial guidance and navigation, write to Honeywell, Minneapolis 8, Minnesota.

Inertial platform, heart of the inertial guidance system. This platform is the inertial reference and utilizes a highly precise GG8001 Honeywell gyroscope and GG116 pulse-torqued accelerometer.



Miniature Inertial System surveillance drones



Flight path programmed for a typical advanced-drone mission is shown in this diagram. The Honeywell miniature inertial guidance system will direct the aircraft from launch to target and beyond, and back to recovery area without ground commands.

Honeywell



Military Products Group

The READY ROOM

RESERVE AND AIR GUARD NEWS

USAF Outlines New Reserve Forces Plan

The Air Force's new plan for better utilization of the Air Reserve forces was announced early in February by Lewis S. Thompson, Special Assistant to the Secretary of the Air Force for Manpower, Personnel, and Reserve Forces.

Many details are yet to be worked out, but in varying degrees the plan affects all of the 600,000-member Air Reserve force.

This is the plan which began as a concept paper in the Air Staff more than a year ago. It was studied and reworked by the Smith Board last fall, submitted to the Air Reserve Forces Policy Committee late in January, and approved by Air Force Secretary Dudley C. Sharp on February 2.

Key points of the plan, as set forth by Mr. Thompson, are these:



Members of AFA's Air National Guard Council work on the "Report on Military Airlift and the Reserve Forces of the Air Force." The Group includes, from left: Col. Roy E. Cooper, Commander, 153d Fighter Group (AD), ANG, Cheyenne, Wyo.; John Gray, AFA's Administrative Director; Lt. Dale J. Hendry, Hq. 124th Fighter Group (AD), ANG, Boise, Idaho; and Lt. Col. Robert P. Knight, 133d Air Defense Wing, ANG, Minneapolis, Minn. The report, resulting from several months of intensive study by Guard Council members, will be presented to the joint meeting of the ANG Council and the Air Reserve Council in Washington, on March 4 and 5.

- CONAC headquarters will be reduced to less than half of its present 700-man staff. Its three numbered Air Forces—the Fourth, Tenth, and Fourteenth—are being eliminated.

- USAF's gaining commands will assume responsibility for inspection and training of the Air National Guard and the Reserve's fifteen troop carrier wings.

- A new "recovery" mission is being assigned to the Air Force Reserve. Units are to be formed to operate emergency airfields for use if existing Air Force bases are destroyed by enemy attack. These airfields would "recover" US aircraft returning from bombing or intercept missions whose home bases had been rendered unusable.

- In addition, a whole new spectrum of "residual support" missions is being evaluated for possible assignment

to the Reserve forces in order to bolster the Air Force's post-attack recovery capability. Examples are bomb-damage repair, mobile communications, and storage of war-readiness materiel.

- Six Air Reserve division headquarters are to be set up in geographical areas corresponding to the six ZI Army areas to administer the recovery program and to supervise training of individual Reservists. Division staffs will be made up of a nucleus of active Air Force personnel, augmented by Reservists.

Action to implement the new program will begin immediately. Recovery units should be organized and functioning by the end of the calendar year.

The office of the Assistant Chief of Staff for Reserve Forces gains in importance as that of CONAC is reduced. Mr. Thompson has given assurances that the office headed by Maj. Gen. Robert E. L. Eaton will have "the muscle and authority to do the job as it should be done."

While Mr. Thompson indicated that Lt. Gen. William E. Hall will continue as CONAC Commander for the present, it seems unlikely that a three-star commander can be justified after CONAC headquarters is reduced in size and scope of responsibility by the end of the current fiscal year. At that time, too, CONAC is slated to vacate its Mitchel AFB, N.Y., headquarters to move to a more central location. Under consideration are Richards-Gebaur AFB, Mo., Ellington AFB, Tex., and the Air Reserve Records Center in Denver.

For the Air National Guard the only change in the plan is that which gives the gaining commands responsibility for inspection and training. Guard units have maintained a close relationship with gaining commands for some time. The new plan formalizes that relationship. The Air Guard staff under Maj. Gen. Winston P. Wilson in the National Guard Bureau will continue to work with state adjutants general and the Air Staff in administering the Guard's budget, logistics, and personnel.

CONAC will continue to provide administrative, budget, and logistic support for the Air Force Reserve. It will be responsible for recruiting, processing, and assigning AFR personnel. It also will continue to provide training for Reservists who cannot be fitted into units but who are needed to fill war-plan requirements.

For the present, at least, drill-pay spaces for the Reserve forces are unchanged, but Mr. Thompson held out at least the possibility that the addition of the recovery mission may justify drill pay for more Reservists.

The present distribution of drill-pay spaces allots 72,000 to the Air Guard, 28,000 to the Reserve's fifteen troop carrier wings, and 35,000 to top-priority individual Reservist programs. Presumably, these 35,000 spaces will now be allotted to recovery units, and to Reservists manning spaces in the six regional divisions, as well as to mobilization assignee positions. Since there are not enough to go around for all these functions, an appeal to the Department of Defense to increase drill-pay spaces may be justified.

Recovery Missions

As visualized by the Air Force, recovery offers an immediate and vital H-hour mission for qualified Reservists.

The basic objective of the Reserve's recovery mission is, as noted above, to provide facilities for receiving USAF aircraft which cannot return to their home bases. Implicit

in the mission is the ability to provide services and equipment necessary to send these aircraft back into combat as soon as possible.

Thus recovery units could be expected to provide food, shelter, fuel, and weapons, plus maintenance specialists and communications. They might also provide alternate aircrews.

Recovery units should be mobile enough so that after an initial enemy attack they could select the best available emergency airfield in their area where they could immediately set up operations. Such a field might be a major civilian airport, or it might be an abandoned but serviceable airstrip.

The problems of maintaining such a capability are many. Food and shelter could perhaps be arranged on short notice, but fuel and weapons would have to be stockpiled in an accessible location. Communications would be essential, to notify returning aircraft that the field was ready for them, to provide landing aids, and to report and receive instructions for aircrews ready for another mission.

It is contemplated that the recovery function would be short lived and that as soon as individuals manning these units could be spared they would move on to fill mobilization needs at operating USAF installations.

Checking It Out

AFA's Guard and Reserve Councils will meet in Washington March 4-5 to study the new Reserve forces program. The meeting, originally scheduled for late January, was delayed until the program was officially announced.

Meanwhile, the Reserve Officers Association has convened a top-level committee to study the measure.

It is apparent that Reserve forces leaders want to look into it more thoroughly before they buy it.

There was general disappointment that the announcement of the new policy did not carry with it more specific details with respect to the new organizational structure of the Air Reserve forces (including manpower allocations) and a more exacting schedule of implementation.

Some Reserve leaders are frankly uneasy about seeing CONAC's role stripped down. They are of the opinion that unless the Chief of Staff makes it a primary responsibility of a senior commander, you can't have a strong Reserve program. "A general running an operational command won't take time to study Reserve forces capabilities," is the way they put it.

To this the Air Staff could reply that a commander responsible for tactical support or air defense or strategic airlift can be counted on to make the best possible use of all resources—active and reserve—for accomplishment of his mission.

There are reports that the Air Reserve Forces Policy Committee (formerly Section 5 Committee) was unable to reach agreement on the new program in drawing up its recommendations to the Secretary. These reports seem to be borne out by the language of the Secretary's reply to the committee announcing his approval of the plan.

"In reviewing the recommendations of the policy committee," the Secretary wrote, "I gained the impression that basically there was no strong disagreement concerning the concept or the proposed force structure. In fact . . . the committee's concern appeared to be based primarily on the proposed management plan.

"Like the committee, I also had reservations concerning this portion of the plan and, in my reply to the Chief of Staff, set forth certain guidelines that I felt would ensure the proper supervision, control, and manning necessary to the expeditious implementation of the plan.

"I am confident that the major commands concerned will properly recognize their directed responsibilities under the



Winners of the 1959 Fourth Air Force newspaper contest flank Maj. Gen. Sory Smith, Comdr., Fourth AF. At left: Bill Nash, 349th Troop Carrier Wing, holds Convair B-58 model, signifying second-place honors. At right: Capt Tom Lyons, with F-106 model, representing top honors won by Boise, Idaho, Air Reserve Center in command-wide contest.

plan and will effectively carry out their assigned Reserve forces mission. . . ."

CONAC and the Guard Bureau do retain one vital control—money. They will continue to prepare and justify budgets for their respective forces.

Notes from Here and There

A board will convene at the Air Reserve Records Center on May 16-27 to consider some 5,000 eligible Reserve officers for promotion to the grade of colonel. To be eligible, officers must hold a promotion service date as lieutenant colonel on or before June 30, 1955. The board is authorized to approve not more than 300 for promotion. This board will complete action on lieutenant colonels promoted before ROPA went into effect on July 1, 1955. Next year a new promotion plan goes into effect. . . . The Air Guard's flying safety rate of 14.3 for calendar year 1959 was by far the best in its history, dropping from 22.4 in 1958. The rate compares very closely with USAF's rate for the same type aircraft flown by the Guard. Fully a third of the Guard's ninety-two flying squadrons went through the entire year without an accident.

Maj. Gen. W. P. Wilson, Air Guard chief, told the National Security Commission of the American Legion that in his "personal opinion" the Air Guard is destined to acquire both air defense and air offense missile units, such as the Bomarc and Titan. . . . The Department of Defense is setting up firm criteria to determine what federal employees can hold Ready Reserve slots. Key federal employees will have to give up Reserve assignments.

All Air Force Reserve flying activities at Long Beach Municipal Airport will be transferred to March AFB, Calif., in October 1960, it has been announced. Six Air Reserve flying units with some 2,000 Reservists and approximately 300 civilian employees will be affected by the transfer. Improved training facilities with closer proximity to Regular Air Force activities and substantial monetary savings are expected from the transfer. The move is also part of Air Force plans to locate Air Reserve activities on Regular Air Force installations whenever possible.

The six Reserve flying units to be transferred are: 452d Troop Carrier Wing and three subordinate squadrons, plus the 8499th Navigator Training Squadron, and the 303d Air Rescue Squadron.—END



SQUADRON OF THE MONTH

Erie, Pa., Squadron, Cited for

effectively promoting the objectives of the Air Force Association through a series of highly successful programs, all the more impressive since the Squadron has been formed less than a year.

AFA's Aerospace Education Council (*see cut*) composed of leading educators from across the country, held its first meeting of the year at Air University, Maxwell AFB, Ala., January 21 to 23. The group received a briefing on the Air University's Astronautics Orientation Course, then met in private session for a day to map plans for the coming year. Maj. Gen. Ralph P. Swofford, Jr., Vice Commander of Air University, gave a reception for the group.

Chairman of the council is University of Nebraska professor Frank E. Sorenson. Other members include Irby Carruth, Austin, Tex., school superintendent; Robert E. Hald, South Dakota Education Association executive secretary; James G. Harlow, Dean, University of Oklahoma; Calvin H. Reed, University of Nevada professor; William A. Shannon, executive director of the National School Boards Association; and Hubert Wheeler, Commissioner of Education for the state of Missouri. All but Mr. Carruth and Mr. Wheeler attended this Air University meeting. Also present were council consultants including Donald F. Kline of the F. E. Compton publishing company, Chicago; Wayne O. Reed, Deputy Commissioner, US Office of Education; Austin McCaffrey, American Textbook Publisher Institute, New York; Merlyn McLaughlin, President, Des Moines College of Osteopathic Medicine and Surgery; and Mrs. Karen Timmons, assistant to Dr. Sorenson. Representing AFA at the meeting were James H. Straubel, Executive Director of Air Force Association, and myself.

Ralph V. Whitener, AFA's Convention and Exhibits Director since 1952 and prior to that its first Organization Director, has become eastern manager of Andrews, Bartlett and Associates. His company, to which he moved on the first of the year, has worked with AFA on the Aerospace Panorama at each National Convention since 1956.

Ralph's AFA history goes back to 1947 when he formed the Squadron in Beckley, W. Va. This soon became one of the top units in the country. In 1948 he was brought to Washington to take over the fast-growing field organization program. His work at National Conventions and through the years quickly won him a spot close to the hearts of everyone in AFA.

With his departure, Convention Manager Bill Belanger and Exhibit Manager Bob Strobell take on additional responsibilities. Ralph himself will maintain a consultant status with AFA and can be expected to work

closely with the Association on future Convention activities.

At a farewell get-together for Ralph on December 30, he received a certificate of appreciation signed by all past presidents and board chairmen of AFA (*see cut*). We join Ralph's legion of friends in wishing him the best of luck in his new endeavor.

We've just completed compiling the results of squadron membership drives in 1959.

Leading the pack again this year, as it has for six straight years, is the Ak-Sar-Ben Squadron of Omaha, Neb., with 2,148 memberships obtained. Second and third spots went to the Mitchel and Metropolitan Squadrons of New York with 473 and 411, respectively. Lincoln, Neb., came in fourth with 399, and San Francisco, always among the leaders, chipped in with 369. The next five slots belonged to St. Louis (281), Philadelphia (251), Pittsburgh (205), Miami (204), and Pasadena (198). We are proud to salute these squadrons as the "Top Ten" in this regard.

Full details of the membership compilation will go out to squadrons in the near future.

AFA's Orange County, Calif., Squadron has built an educational meeting around North American's X-15 aerospace test vehicle. Speaker at the January 22 meeting was R. L. "Bud" Benner, Assistant Project Engineer for the X-15 since the inception of the program in 1955. He spoke on the history and significance of the

(Continued on page 101)



Ralph Whitener, former Convention and Exhibits Director, shown with his certificate of appreciation from AFA.



Members of AFA's Aerospace Education Council gather at Maxwell AFB, Ala., for first meeting of the year. The group's chairman, Frank Sorenson, is at far left, front row.



Miss Jacqueline Cochran is greeted at Broward International Airport, Fla., by, from left: E. B. Twells, A. J. Welling, Col. Dan Pratt, and Col. G. N. Hutchinson.

From the REMINGTON RAND UNIVAC

Military Division

A Demonstration of Capabilities in Specialized Electronic Equipment

Aboard the Convair B-58 Hustler and the Boeing 707, "black boxes" automatically attune HF radio communications to the speed, range and altitude of modern supersonic flight. The Univac Automatic Antenna Couplers are examples of specialized electronic equipment from the Remington Rand Univac Military Division. This equipment, though outside the realm of the large-scale data processing and control systems for which the Division is best known, demonstrates important capabilities.

The Antenna Coupler program is significant to those responsible for defense requirements for two reasons: First because it is an example of airborne equipment which meets severe operational and reliability specifications, and secondly because it demonstrates experience in the development of communications and control devices.

The Univac Automatic Antenna Coupler exhibits characteristics which have become identified with Remington Rand Univac equipment in all fields—compact size, high speed of operation and reliability under extreme environmental stress conditions.



UNIVAC®



The Univac Automatic Antenna Coupler (Series 3200) has been installed in the Boeing 707 aircraft for all major airlines, the USAF KC-135 and the President's airplane, the VC-137. Both of the units shown on this page were developed by the staff which produced the first high altitude antenna coupler.



Originally developed for the Hughes AN/URC air-to-ground communication system, the Univac Automatic Antenna Coupler (Series 3300), has been adopted by Hughes Aircraft Co. for Convair's B-58 "Hustler".



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Control and data systems developed by the Remington Rand Univac Military Division include:

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SEA SURVEILLANCE SYSTEM FOR THE U. S. NAVY

AN/USQ-20 (Advanced Computer for the U. S. Navy)

Additional information describing capabilities and experience or career opportunities may be obtained by writing to Remington Rand Univac at the above address.

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X-15, showed films of the craft in flight, and conducted a lively question-and-answer period.

For the March meeting, the Squadron has scheduled Col. Dean E. Hess, USAF, as speaker. Colonel Hess is Chief of the Air Force's information office in Los Angeles.

Here's the dope on four more AFA Wing Convention dates, cities, hotels if we know them, and the men to contact for further details. We urge all AFAers to attend their Wing Conventions.

California Wing: Miramar Hotel, Santa Monica, April 8-10; Joseph D. Myers, 3727 Centinela Ave. **Utah Wing:** Ben Lomond Hotel, Ogden, May 20-21; William J. Farmer, 1015 Sherwood Dr. **Michigan Wing:** Detroit, June 25-26; Jerome Green, 23090 Parklawn, Oak Park. **New Jersey Wing:** Robert Treat Hotel, Newark, September 17; Italo Quinto, 230 Essex St., Stirling.

Maj. Robert S. Kalweit, Commander, 903d Air Refueling Squadron, SAC, spoke at the January meeting of the Chico, Calif., Squadron, as it continued a lively series of programs designed to help educate the entire community on all phases of airpower. He also showed a color film depicting the operations of jet-powered Boeing KC-135 Stratotankers.

Tom Mason, Chico Squadron Commander, points out that his unit has achieved a great deal of success as a community organization through the inclusion of the entire community in its efforts. The Squadron now lists 140 members on its roster. This meeting, which was typical of its activities, was attended by 135 of them.

President Howard Markey recently notified all AFA units of the names of Air Force Academy Cadets in their areas. The objective is to encourage sponsorship of Cadets as Cadet Members of the Air Force Association. Such sponsorship is not uncommon at present.

Several Board Members, including Bart Leach, a Harvard University Professor, have told us they want to sponsor one or more Cadets. Mitchel, N. Y., Squadron, plans to sponsor every Cadet from its congressional district. Roy Cooper, a member of AFA's Air National Guard Council from Cheyenne, Wyo., where there is no AFA Squadron, has pledged that all twenty-seven Cadets from his state will be sponsored. Numerous other units have planned similar action.

A fine program along these lines took place in Cincinnati at Christmas time. The Squadron ran a Christmas party for five Cadets from the area, their guests, and their parents. Included was a buffet supper, a reception hosted by the Squadron and featuring Brig. Gen. Henry Thorne, Jr., 3500th USAF Recruiting Wing Commander, and a conducted tour (see cut) through the nearby General Electric Flight Propulsion Division Plant. John Repasy, Squadron Commander, and

AFA members Henry Peterson and Ed Hogan were responsible for the program. The five Cadets honored were James Peel, Charles Georgi, William Stackhouse, John Geiger, Jr., and Frederick Hendryx, Jr. During the reception, they received AFA memberships from Squadron Commander Repasy.

CROSS COUNTRY. . . . Logan, Mass., Squadron announces that it is (Continued on following page)



Russ Sherman, J79 assembly general foreman, Production Engine Department, General Electric Co., Cincinnati, explains J79 engine to AF Academy Cadets. At the far left is GE's B. C. Smith, who conducted the tour for the Cadets.



In a switch from their usual lightning-fast, tight diamond formation in F-100 Super Sabres, the Thunderbirds, USAF jet aerobatic team, fly not-so-tight diamond in Cessnas over a reservoir near Ogden, Utah, during local celebration.



Maj. Bob Fitzgerald, Thunderbird leader, explains function of the propeller to teammates Capt. Chuck Maultsby, Capt. Gayle Williams, and Capt. Bob Janca.

establishing an aircraft museum featuring models of all known types of aircraft. The museum will be located in the Headquarters Building of the 102d Tactical Fighter Wing, Massachusetts ANG. **Herb McGuire**, Squadron Commander, is in charge. . . . **Warren E. Alberts**, Chicago, an AFA member for years, has just been elected assistant to **W. A. Patterson**, President of **United Air Lines**. . . . **Irving B. Zeichner**, a former National Officer of AFA, of Atlantic Highlands, N. J., has received a civil rights and civil liberties fellowship from **Brandeis University**, Mass. . . . **Los Angeles Group Commander George Sanchez**, notes that the LA Group, with ten Squadrons, has more units than most AFA wings. . . . Former AFA President **Gill Robb Wilson**, who now lives in Southern

California, will be one of two featured speakers during the **Utah Wing's** annual symposium which will be held March 11-12 in Salt Lake City. The theme will be in the field of education, and we urge everyone who can attend to do so.

Here is this month's list of **selected USAF film releases**. These and others are available to **AIR FORCE/SPACE DIGEST** readers—in and out of uniform—through the **Air Force Film Library Center**, 8900 South Broadway, St. Louis 25, Mo., or **USAF film libraries** around the globe. Requests must include both the Air Force numerical designation and the correct title of the film.

AFNR 47—Air Force News Review No. 47.

SFP 396—Holloman, Frontier of the Future.

SFP 404—How to Live With an Air Force Contract.

SFP 419—USAF Flight Test School.

TF 1-5111—Jungle Survival.

TF 1-5206A—Wind and the Navigator—Wing Theory.

TF 1-5206B—Wind and the Navigator—Preflight Training.

TF 1-5206C—Wind and the Navigator—Inflight Analysis.

TF 1-5209—If I Were You (Human Relations in USAF).

TF 1-5227A—Grid Navigation—Introduction and Theory.

TF 1-5227B—Grid Navigation—Application and Theory.

TF 1-5294—Space Guidance and Control.

—GUS DUDA

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BELLEVUE	\$11-12	\$11-15	\$25		SIR FRANCIS DRAKE	\$11-16	\$13-22	\$35-50	\$51-70
CALIFORNIAN	\$9-11	\$11-14	\$22-25		STEWART	\$9-12	\$9-18	\$25-30	
CANTERBURY	\$10-19	\$10-20	\$25-40		WHITCOMB	\$10-12	\$11-16	\$25-60	\$41-76
CLIFT	\$13-21	\$15-23	\$41-50						
DRAKE WILTSHIRE	\$10-11	\$12-16	\$25-35		MOTEL				
FAIRMONT	SOLD	OUT	SOLD	OUT	CARAVAN	\$18-22	\$18-22		
HUNTINGTON	\$11-16	\$14-25	\$30-50	\$50-75	CONTINENTAL	\$14	\$14-16	\$25-37	
JACK TAR	\$10-16	\$12-22	\$43-45	\$75	HOLIDAY	\$20	\$20	\$30-50	
MARK HOPKINS	SOLD	OUT	SOLD	OUT	MART	\$7-9	\$8-14	\$16-24	
RICHELIEU	\$7-8	\$8-12	\$20-25		TRAVELODGE	\$8	\$10-14		
ST. FRANCIS	\$12-22	\$13-25	\$30-55	\$48-72					

NOTE: A deposit of \$10 per room is required for all arrivals after 5 p.m. All rooms will be assigned according to nearest available rate. Additional hotels and motels not listed above are available at slightly lower rates.

FILL IN, CLIP OUT, AND MAIL TODAY!

MAIL TO: Air Force Association, c/o Convention Bureau
Room 300 Civic Auditorium, San Francisco 2, Calif.

DATE _____

Name _____

Rank, if
Military _____

Firm/Office _____

Mail Address _____

Hotel & Choice—1st _____

2nd _____

3rd _____

Type Room _____

Rate _____

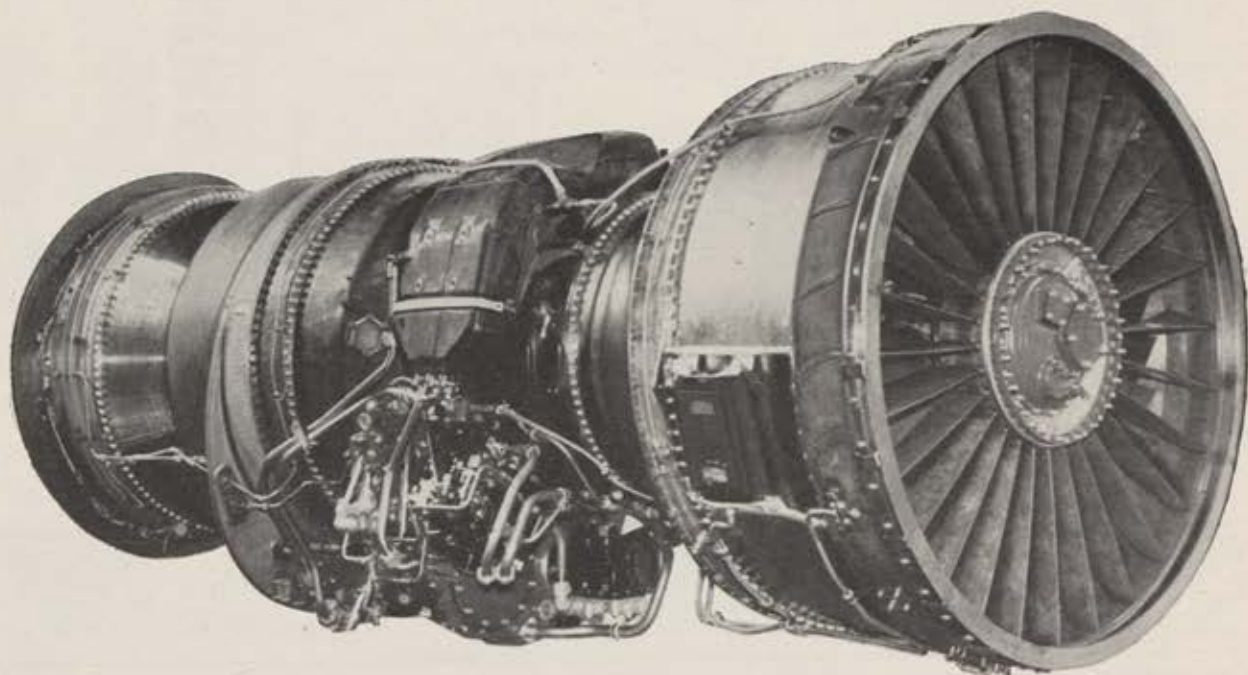
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Arrival—Date _____

Hour _____

Departure Date _____

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PRATT & WHITNEY AIRCRAFT'S NEW JT3D TURBOFAN ENGINE INHERITS THE EXTRAORDINARY RELIABILITY OF ITS PREDECESSOR, THE J-57 TURBOJET, PROVEN IN 6 MILLION HOURS OF FLIGHT. AT THE SAME TIME, IT SETS A NEW HIGH IN THRUST AND A NEW LOW IN FUEL CONSUMPTION.

The new JT3D turbofan has the same basic design as the JT3 (J-57) and JT4 (J-75) turbojets powering 9 out of 10 Boeing 707 and Douglas DC-8 jetliners and many military jet aircraft. Functionally, the difference is the addition of the fan and provision for a secondary flow of air. The reliability has not changed because the basic engine design has not changed. But the addition of the fan has effectively increased the thrust and decreased fuel consumption for greater operating efficiency. It is simply a case of the most reliable jet engine in

its class getting even better.

By comparison with its predecessor, Pratt & Whitney Aircraft's new JT3D turbofan raises take-off thrust by 42%, boosts climb thrust by 23%, and pushes maximum cruise thrust up 13%—all this while cutting down cruise TSFC by 13%.

The JT3D, flying since July, 1959, has met or exceeded all performance guarantees and estimates and has successfully completed its 50-hour military test. Military prototype deliveries have been made. Military production deliveries start in June, commercial in July.

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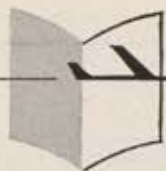
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airman's bookshelf

Blow, General, Blow

The Uncertain Trumpet, by Gen. Maxwell D. Taylor, USA (Ret.), (Harper & Bros., 1960, 203 pp., \$4)

Reviewed by John F. Loosbrock

Old soldiers don't fade away any more. Instead, they make a dramatic exit, racing for the typewriter as soon as they have vanished into the wings. *The Uncertain Trumpet*, General Taylor's literary legacy, fits the pattern, although it is neither as well written nor as persuasive as its predecessors, authored by Generals Ridgway and Gavin.

General Taylor's basic thesis, quite naturally, is the one which he expressed often, and much more convincingly, in his many public statements while Chief of Staff of the United States Army. General Taylor thinks we spend too much money on deterring general war and not enough on preparing for more limited conflicts. Or, to put it another way, he thinks we spend too much money on the Air Force, particularly the Strategic Air Command, and too little on the Army.

His loyalty to the military organization in which he spent thirty-seven years of commissioned service is understandable and forgivable. His lack of understanding of the concept of deterrence is not. He is at his best when he writes of the in-fighting among the Joint Chiefs for larger shares of the military budget and of the tactics of Administration leaders who make it clear that there isn't going to be any more money and that the Chiefs will have to fight it out among themselves.

This reviewer found many points on which he quarrels with the general, both as to the facts and the conclusions drawn therefrom. But the basic fallacy in the book, and, one must conclude, in Army policy, is the confusing of massive retaliation with deterrence, the use of these terms synonymously.

In discussing an Army policy paper which he prepared in 1956, General Taylor points out that the Army considers "deliberate general war as less likely than lesser forms of aggression." From this premise, the paper sets up military priorities as follows:

1. Deterrence of general war.
2. Deterrence of local aggression.
3. Defeat of local aggression.
4. If there's anything left, spend it on forces to fight a general war.

There is actually a fallacy within a fallacy here. First, how can one deter general war with forces at a level below that needed to win should war come? Second, if limited aggression is less likely than general war, does it follow that it is therefore more dangerous? To take a homely example, it is much more likely, statistically, that a child should catch chicken pox than that he should contract polio. Does it follow, then, that inoculation against chicken pox should take a higher priority in disposing of the family medical budget than inoculation against polio?

That's what General Taylor says. But I don't believe he really means it, if he thinks about it. If it were possible to foresee a substantial role for the Army in general war, I think he might rearrange his priorities.

About the reviewer: Mr. Loosbrock is Editor of AIR FORCE Magazine and SPACE DIGEST. His analysis of General Taylor's book is written, not only from this background, but from combat service in the US Army Infantry.

Needed: Space Law

The term "space law" has recently entered our vocabulary. Although man's space activities today reach only the bare fringes of our galaxy, this is a matter of some urgency. Philip C. Jessup and Howard J. Taubenfeld explore the topic in *Controls for Outer Space* (Columbia Univ. Press, \$6).

Recent advances in space science permit nuclear-warheaded ICBMs to be launched in relative secrecy and orbit the earth "until recalled for use against targets on earth," the authors note. Space-orbiting vehicles could jam attack-warning systems, control weather, perform nonpeaceful military reconnaissance. Nuclear detonations in space could disrupt radio contact over certain areas. In short, nonpeaceful uses of space could jeopardize the security of every nation on the globe. When man reaches the moon and the planets, new and dangerous controversies, tensions, and capabilities might arise.

Such is the background for this study. The first two parts of the book analyze 100 years of international agreements pertaining to land and sea

areas. They review deliberations, treaties, and international cooperation in connection with scientific exploration of the Antarctic.

Part III then takes a long look at the short history of space law thought and deliberations. Particular attention is paid the UN's *Ad Hoc* Committee on Peaceful Uses of Outer Space, and the International Committee on Space Research (COSPAR), as well as certain aspects of the International Geophysical Year.

The authors offer four possible patterns for political action:

- Reject all international solutions and let the first occupant of the moon and planets exercise control.
- Form a joint national combination to acquire extraterrestrial space and control it.
- Unilaterally agree to keep new territories demilitarized, permitting free access or registering activities and domains with the UN.

● Effect a world community agreement covering effective occupation of celestial bodies and control of space.

The latter, an international signed pact, is preferable, suggest the authors. They propose that space matters in this case be administered either through a system of trusteeship or directly by the United Nations or a special international body created for the purpose.

Space law will not emerge quickly. It awaits technical, scientific, and political developments, as well as exploration of space itself. A full body of controls could not be devised and implemented at present. But the time is now to take the first steps in its formation—before problems of truly cosmic proportions are with us.

Aerospace Books

Latest to appear in McGraw-Hill's series in civil engineering is a distinguished technical study, *Aerial Photo Interpretation: Principles and Applications*, by Donald R. Lueder (McGraw-Hill, \$17.50). This comprehensive volume, both a manual and encyclopedia on the science and art of interpreting aerial photos, provides practical instruction in recognition and interpretation, and reduction of information thus obtained to a logical, accurate set of conclusions.

(Continued on following page)

Divided into three parts, the volume covers theory and techniques, the physical characteristics and composition of terrain features, and application of photo interpretation in a wide variety of engineering and scientific fields.

While the book is designed and oriented mainly for civilian usage—agriculture, forestry, urban and regional planning, water supply, mineral exploration, etc.—it has tremendous military significance and application as a text reference and study

guide. Recent developments such as photo geological study and color, infrared, and camouflage detection processes are included.

More than half a dozen books have been written about the US Air Force Academy, which is less than that many years old. *The Story of the U. S. Air Force Academy*, by M/Sgt. Lawrence C. Landis, USAF (Rinehart, \$3.95), provides the first full-length nonfiction volume on the subject. Landis, an information specialist, describes the set-

ting of the Academy and traces its history from concept to present. He follows this with a description of the rugged Academy schedule and curriculum, and the chores and entertainment that occupy the remainder of a Cadet's time. The book gives the high school student an intimate picture of what can be expected during four years at the Academy. It then goes on to portray typical junior officer assignments in TAC, SAC, ARDC, ADC, and other AF commands.

Aircraft and Missiles: What They Are, What They Do, How They Work, by D. M. Desoutter (John De Graff, \$7.50), a British book, is primarily designed for the instructor and classroom student of aeronautics and missiles. It provides a reading and study guide for the beginner and the intermediate student. Chapters cover the atmosphere, flight theory and application, fundamentals of speed and temperature on airfoils, supersonics, aircraft and missile propulsion, engines, fuels, structures and materials, types of aircraft, missile design and engineering, aeromedical topics, aerospace research and development, and international aviation records. Aviation organizations, aero-glossary, and aircraft designations add reference value.

On the historical side of aviation, Hendrik de Leeuw's *Conquest of the Air: The History and Future of Aviation* (Vantage Press, \$4.95), is a perplexing, scatter-shot, and sometimes inaccurate attempt to condense the entire story of flight. His treatment of the early periods displays greater perspective than later sections. But even here the account embraces only some well known historical facts and is in no particular historical order. The book in general does not probe for interpretation, meaning, or significance. These factors are especially lacking in the treatment of the modern period.

The portion on modern aviation, from 1939 to the present, consists in the main of a series of essays on the operations and equipment of the major international airlines. On the subject of rockets and missiles, the author reports somewhat enigmatically that Pan American World Airways launches "everything" from Cape Canaveral. A better title for this book might have been "some essays on aviation." As a history, it doesn't get off the ground.

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cedure. His latest, *War for the Moon* (Dutton, \$4.95), is a descriptive essay on the moon and its military value, the US and Russian lunar probes to date, and the R&D behind these moon conquest ventures. Utilizing information from his previous writing on missiles, Caidin again explains the complex business of hardware design, launching, guidance, celestial navigation, and the hazards of space travel. Numerous photos and line drawings are supplemented by forty-five superb Fred Wolff paintings on space vehicles in flight, orbiting of satellites, and the moon's surface. Over-all, the book is par for the popular market.

Some new juvenile space books are well suited for texts and pleasure reading alike. Seventh in a series prepared by the CAP for the Cadet Aviation Education Program is *The Dawning Space Age* (Civil Air Patrol, \$2). It covers the history, development, present status, and future applications of rockets, missiles, and space travel. Specific topics include propulsion and guidance, rocket components, research and development and experimental launching. It is well illustrated with drawings, art, and photos.

For the young adult, Terry Maloney's *The Sky Is Our Window* (Sterling, \$3.95) helps unlock many secrets of the universe. This color-illustrated exposition of the solar system and its place in the cosmos offers a clear, basic course in astronomy and its relation to the forthcoming manned conquest of space.

Youngsters four to twelve years old can find an absorbing exposure to basic astronomy in *The First Book of Astronomy*, by Vivian Grey (Watts, \$1.95). This uniquely illustrated volume shows earth's relationship to the moon, the sun, the stars, and planets. It discusses the universe, galaxies, and phenomena of the sky.

A new adult guide to astronomy is *The Larousse Encyclopedia of Astronomy*, by Lucien Rudauz and G. de Vaucouleurs, translated from the French by John B. Sidgwick and Michael Guest, and revised by Z. Kopal (Putnam's, \$15). This space atlas is organized into four major parts dealing with the universe, our solar system, galaxies, and the astronomical instruments and techniques. For desk, library, or home reference, this one is tops. Maps, sky charts, and photos illustrate the text.

Technical and Reference

Dictionary of Aeronautical Engineering, by J. L. Nayler (Philosophical



AIR FORCE RECRUITERS PUT CESSNA U-3A SUPPORT PROGRAM TO THE TEST. Their work at a small midwestern university done, two Air Force recruiters prepare for take-off—only to find that their battery, beset overnight by sub-zero cold, has gone dead. Course of action: Requisition the nearby Cessna distributor (U-3A supplier) for a new U-3A battery, be airborne by noon. A simple thing. Made possible by a nationwide off-the-shelf support program growing out of Cessna's support of the U-3A's commercial counterpart, Model 310, and conceived by Cessna to do for the Air Force what it would find prohibitive to do itself.

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Library, \$10)—An illustrated reference dictionary of definitions in aerodynamics, engines, electronic and electrical equipment, jet propulsion, missiles, rockets, and satellites.

Advances in Aeronautical Science (2 Vols.) edited by Theodore von Kármán and others (Pergamon, \$30)—International Series on Aeronautical Sciences and Space Flight, #9, covers developments since 1946; trans-super and hypersonic flow; heat transfer and heat resisting materials; navigation; telemetering; boundary layer; VTOL and STOL aircraft; annular wings; human engineering.

Turbulent Flows and Heat Transfer,

edited by C. C. Lin (Princeton Univ. Press, \$15)—Vol. V in series "High Speed Aerodynamics and Jet Propulsion."

AGARD Flight Test Manual (4 Vols.), second edition, edited by Courtland D. Perkins and Enoch J. Durbin (Pergamon, \$15)—Detailed handbook on analysis and testing of aircraft performance, stability, control, and instrumentation.

The Helicopter, by Jacob Shapiro (Macmillan, \$4.50)—Semitechnical account of the helicopter, how it is designed and operated, and the aeronautical theory involved.

(Continued on following page)

Introduction to Rocket Technology, by V. I. Feodosiev and G. B. Siniarev, translated from Russian by S. N. Samburoff (Academic Press, \$9.50)—Designed as course for undergraduate and introductory courses on rocket technology. Covers the field from theory of reactive motion to rocket launch and flight.

Guide to the Space Age, by C. W. and Hazel C. Besserer (Prentice Hall, \$7.50)—Defines over 5,000 words and phrases to make a comprehensive reference of rocket and missile terminology aimed at standardizing language for technical and nontechnical reader. Includes terms on astronautics, astronomy, meteorology, abbreviations, and space jargon.

Encyclopedic Dictionary of Electronics and Nuclear Engineering, by Robert I. Sarbacher (Prentice Hall, \$35)—A giant reference of more than 14,000 entries which defines and explains terms in the related fields of electronics and nuclear engineering. Includes coverage of armed forces definitions, acoustical, chemical, electrical, physical and math-physical

terms and equipment, devices, and systems. Cross-referenced.

Principles of Scientific Research (Pergamon, \$4.50)—Considers development of research process, its relationship with social change; principles of research, types of problems, method of attack, disciplines; and the support available for research.

Dictionary of Atomic Terminology, by Lore Littermeyer (Philosophical Library, \$6)—Terms and phrases defined in English with equivalent German, French, and Italian sections.

Theory of Space, Time, and Gravitation, by V. Fock of the Academy of Sciences, USSR, translated by N. Kemmer, Univ. of Edinburgh (Pergamon)—English translation of this classic Russian work. Covers special and general relativity and contains extensive bibliography.

Introductory Nuclear Theory, by Lewis R. B. Elton (Interscience Publishers)—Discussion of nuclear physics.

Rocket Propulsion, by M. Barrere, A. Jawmotte, B. F. De Veubecke, and J. Vandekerckhove (Van Nostrand, \$26).

Related Reading

A high military official recently said that scientifically and technologically we can now do anything we want to do in the field of weaponry. We are at the crossroads, he continued, where we must turn to the social and the political scientist for guidance.

This cross-pollination of the technical and social sciences has been forced by the realities of the nuclear aerospace age. It reflects in an increasing number of books probing the new interrelationship of technology and human affairs in search for a practical balance of wisdom and weapons. All find base in the complex problems of defense, collective security, and politics, and all seek, in one way or another, an answer to the dilemma of our aerospace-nuclear age. Here are some recent books along these lines.

Organizing Peace in the Nuclear Age (New York Univ. Press, \$3.75) is a report to the Commission to Study the Organization of Peace, headed by Arthur N. Holcombe of Harvard. It

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considers the role of law and politics in organizing peace, recommends points for strengthening the UN and the International Atomic Energy Agency, and claims that greater personal responsibility for state actions must be assumed by the chief executives.

Defense in the Nuclear Age, by Sir Stephen King-Hall (Fellowship Publications, England, \$2.75), suggests the most naive and irrational solution—to unilaterally divest one's national self of nuclear weapons, invite Soviet occupation as preferable to complete nuclear annihilation.

The Soviet Image of Future War, by Raymond L. Garthoff (Public Affairs Press, \$3.25), is a synthesis of his previous studies on the subject, concluding that the USSR will pursue any course that will not jeopardize its survival; and is preparing to fight a long war while manifesting peaceful coexistence.

The Paperbacks

Red Alert by Peter Bryant (Ace, 35¢)—A gripping novel of the men of SAC during the first two hours of World War III.

The Rest Must Die by Richard Foster (Gold Medal, 35¢)—Imaginative, terrifying novel of New York City during A-bomb attack by the Russians. Realistic study of mass hysteria, fear, and mob violence in the subways as the city's superstructure above is destroyed.

Off the Beaten Orbit edited by Judith Merrill (Pyramid Books, 35¢)—A collection of sixteen stories by such science-fiction writers as Ray Bradbury, Ted Sturgeon, Robert Sheckly, and Frederic Brown.

Thunderbolt! by Robert S. Johnson with Martin Caidin (Ballantine, 35¢)—The biography of twenty-eight-kill American ace Bob Johnson and his experience fighting the Luftwaffe in World War II.

Baa, Baa, Black Sheep by Gregory Boyington (Dell, 50¢)—The best-seller autobiography of Marine flyer-ace and Congressional Medal of Honor winner in World War II, Lt. Col. Gregory "Pappy" Boyington.

Bombs in Orbit by J. Sutton (Ace, 35¢)—Dramatic science fiction of a manned satellite destroying three bombs which have been put in orbit by enemy forces.

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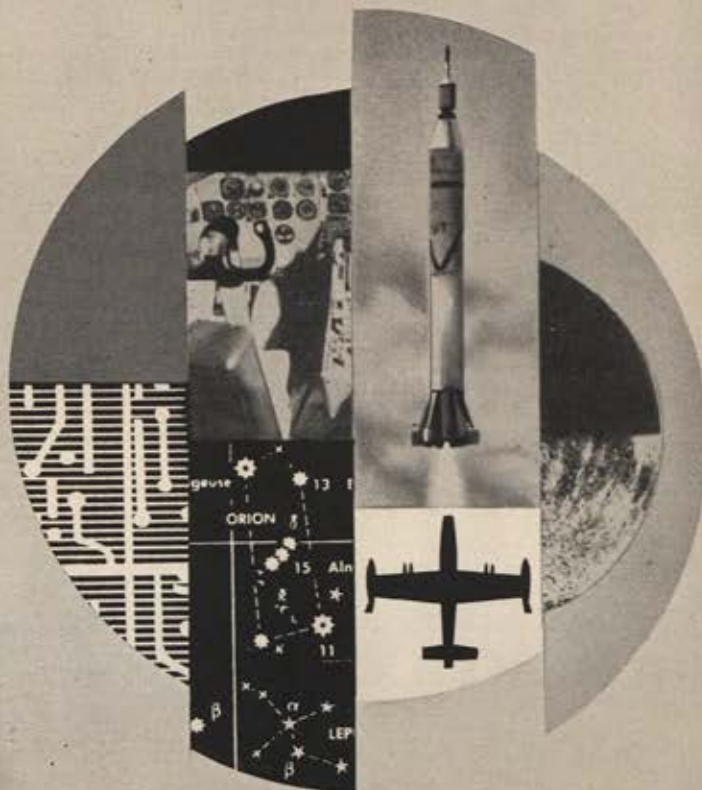


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I've got a secret. I used to write Air Force citations. As a matter of academic interest to veterans, and as a possible reference source for do-it-yourself fans in the service, allow me to share the small stock of wordy wisdom I gathered while I was manning my Pentagon pen.

Shortly after I took up my Washington assignment, a total innocent in the citation field, I noticed that a similarity of line marked most awards. I became conscious of the repetition of such adjectives as "exemplary," "distinguished," "praiseworthy," "immeasurable." A certain felicity of expression was prominent in the citations accompanying the richer plums. Literary zeal and nimbleness of pen evidently had something to do with the rank of the prize.

One day, in recommending a Commendation Ribbon, I made a startling discovery. I blue-penciled the phrase "untiring efforts to expedite" and substituted "utter disregard of personal time and effort." To my amazement, the paper came back authorizing the Legion of Merit, considerably higher in the scale of military medals. My words increased the merit of the recipient—and my work was obviously cut out for me.

From that point on, my career in Air Force letters was at last assured. I began to develop a versatility of phrase that since, in like manner, has weighted martial chests with every metallic decoration short of an iron lung.

One of my early lessons was the discovery that the time-worn phrase "a job well done," although adequate for denoting a capable performance, is banal, and useful only for bestowing faint praise. In the hands of the craftsman, it becomes "a mission pushed to a glorious conclusion." As such, it earns at least a Bronze Star.

Embellishing this even further, one might possibly rate the rare Distinguished Service Medal. Only an unimaginative dullard would proffer a piece of bronze after a man:

"donning the gauntlet of defiance in the face of almost insurmountable obstacles, saw the mission pushed to a glorious conclusion."

Of course, a certain amount of common sense is necessary to avoid triteness, and this is occasionally demanded in the Pentagon. Ordinarily, repetition will never be noticed as the flood of citations rises through the chain of command to the rarefied heights of executive decision. However, one must always be ready with a substitute phrase. It has been my observation that a regular culling of advertisements in magazines and news-

(Continued on following page)

How volleys of verbosity—deftly invented by a vocal
vagabond on voyages of vagaries—can invert
verisimilitude and invest even villains
with veneers of valor . . .



HEROES MADE TO ORDER

Gerald A. Harty

papers will provide abundant new material from which to form persuasive copy.

Seldom does research afford keener intellectual pleasure than the discovery of such useful words of one's craft as, say, "fountainhead," "tenacious," or "estimable." Their rarity in military phraseology adds to their value in citations. It is excellent practice to combine them into stirring sentences, selecting, of course, the more exotic and descriptive verbs as modifiers. These samples are always good: "syncretize," "vouchsafe," "consummate."

A blend of the above selections makes a typical paragraph which is ready for instant use in almost any situation:

"As the fountainhead of a tenacious effort to syncretize the various factions, he vouchsafed

excellent authority for their employment, it is well to recognize that an absurd prejudice exists against pronouns in other than the third person, singular. Any wording that might imply the existence of a contributory party to the cited incident lessens the chances of approval. Unless germane to the issue, nothing must be contained in the citation that could impair the "oneness" of the service described.

As in all trades, a trick, I discovered, was profitable. I observed that certain words, like rabbits, would produce results when mated frequently. "All" and "out"; "unflagging" and "enthusiasm"; "example" and "junior"; these are always reliable. Note how happily they couple in this sentence from my "all-purpose" file:

"His all-out support and unflagging enthusiasm set an inspiring

mit another for a higher award. This time the attempt was in support of a harried Comptroller serving manfully in an office on La Salle Street, Chicago.

"His faith in the fight for freedom and for fatherland never faltered, though Fate had foredestined him for fiduciary functions far from the fighting front."

Success in efforts like these is heartening. Encouraged to the point of recklessness, I experimented with the adroit insertion, now and then, of bits of old English poetry. I was on fairly safe ground here, for in the higher echelons of the Air Force, there exists an affinity for British culture.

Observe the effect in the following admirable lines from Scott used as an introductory testimonial citing a colonel who happened to have missed the shooting war:

"It were, I ween, a bootless task to tell

How here, of yore, in sooth, a foeman fell."

A judicial sprinkling of these, like nutmeg on a toddy, imparts a quaint, old-fashioned flavor to one's prose, making up for want of truth or sense.

Of equal value, are words melodious in sound or poetical in suggestion, like "melancholy," "ultimate," "romance," "magnificence," and so on. Freely used, they throw an aura of glamor over the imagination and lull thought, one of the chief aims of citations nowadays:

"He faced squarely up to the melancholy prospect of ultimate transition from the romance of piloted aircraft to the mechanical magnificence of spaceships."

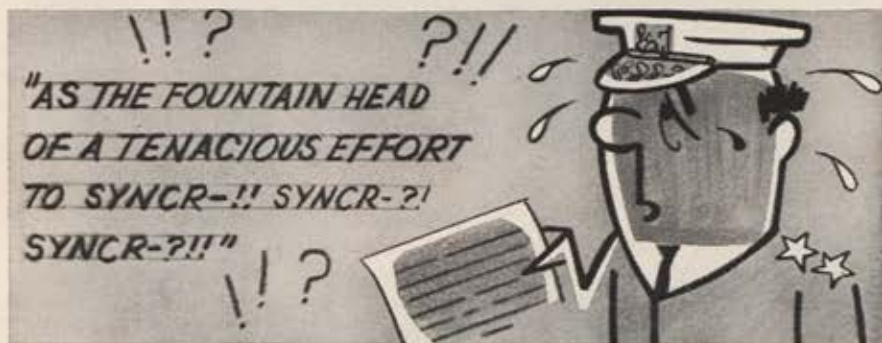
The successful citation, it should be remembered, never calls a spade a spade. A statement of plain fact is objectionable, and one must resort to roundabout expressions. For example, if a man has a hot temper and is known as a slave driver, he is best cited for being:

"fired with a white-hot enthusiasm for the job at hand to the extent of instilling increased zeal and unspoken awe among his associates."

His colleague, the haughty lone wolf, who refuses to mingle with subordinates, can always be written up for his:

"dignified aloofness, marked with the calmness of judicial detachment."

For similar reasons, language which might tend to detract must be scrupulously avoided. This might seem an
(Continued on page 117)



inestimable support in consummating the mission."

(For some reason unknown to me, recurrence of the word, "mission," seems not to violate the rule against too frequent repetition. In the Air Force, the term seems to exert almost a mesmerizing effect. I have even seen documents returned for its inclusion in place of such synonyms as "job," "project," and even "operation." The occasional use of the adjective, as in "assigned mission," is highly recommended.)

Sometimes, by trying too hard, the writer becomes intoxicated with exuberant verbiage. This must be guarded against. Initial attempts, though rarely worthy of being dashed off to higher headquarters, should be sedulously preserved against the day when the creative struggle becomes too much. In this connection, I have found a notebook to be a valuable aid in compiling lists of the more striking adjectives and alluring sentences. Such a file is also helpful when replying to letters of inquiry and for progress reports.

The use of certain words requires a little caution. Though there may be

example for his junior officers and airmen."

Another useful stratagem to the citation writer, as to the poet, is "apt alliteration's artful aid." Here, we string together a number of words beginning with the same letter. More than a few of our modern knights errant in Air Force blue owe the vividness of their tunics to this literary device. For a long time I have made free use of it, and it never fails to arouse enthusiastic approval.

The uninitiated can scarcely imagine the effect of this assonance on reviewing boards. It is wisest never to underestimate its value. It takes an old Pentagon hand to truly appreciate this accolade to a long-suffering contract negotiator overdue for recognition:

"Despite dull tedious duty with defense industry, he dealt a deathblow to the deadlocked draftsmen through his dedicated determination to discharge the decrees of the Defense Department."

Only after that particular recommendation for a Legion of Merit won approval did I summon nerve to sub-

the world's longest screwdriver

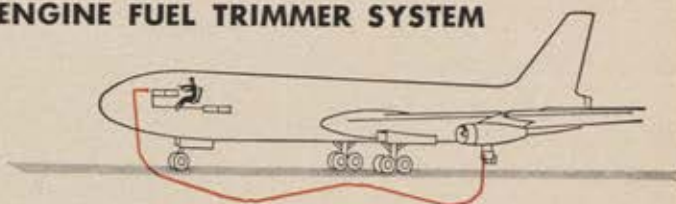
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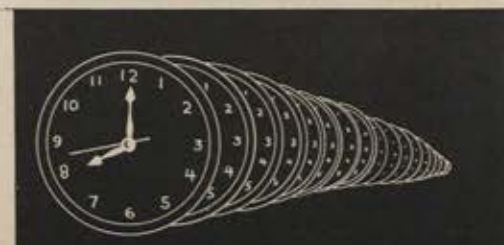
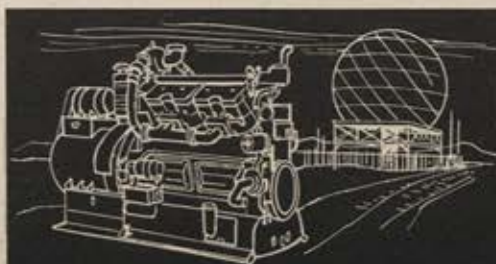


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obvious caution, but occasionally the temptation to record human foibles becomes too much. This is most often apt to happen when the person in line for honors is known to the writer. A little ambiguity will usually save the day.

I was once asked to prepare some words of praise for a commander on the occasion of his retirement. The Old Man had made no more than a dozen visits to his headquarters during his final year and was virtually a stranger to his staff. However, and may the Lord forgive me:

"His complete disregard of duty hours and personal expenditure of time and effort inspired his staff to a more vigorous pursuit of the unit's assigned mission."

The old soldier proudly marched into retirement wearing the Commendation Ribbon. Not much perhaps, after thirty years; but, in this case, overpayment.

This temptation to dabble in the *double-entendre* is a dangerous proceeding, but it produces a heady thrill. Its pursuit should be reserved for the adept practitioner.

There are bound to be disappointments in the work, of course. Occasionally, a recommendation for an award may bounce. Insults like these must be accepted as the ordinary lot of the genius. They usually spur a man on to greater efforts. Perseverance will ultimately win, though it may not deserve, success. This is a theory that I have not yet been able to prove, but the attempt continues.

Recently, I concluded that long service in this field had nurtured some latent envy in my heart. Each time some innovation in technique proved sure, I was tempted to try it on myself. Words that had won awards for others, I felt, could hardly fail for me. I had about decided on a bit of hanky-panky in seeking recognition when I



Readers will recall Gerald Harty's light touch in "Flight of the Blue Beetle," which appeared on these pages in May 1958. A combat veteran of

World War II, he later knew well the world of military public relations in the Pentagon and with SAC, prior to leaving the Air Force in 1958. Now living in Tampa, Fla., Mr. Harty is a free-lance writer. He notifies us that he will be soon off on a trip that will take him to Saudi Arabia.

learned that my chief had entered my name for commendation.

Eagerly, I offered to polish up a phrase or two in the hopes of earning at least a Legion of Merit. The chief demurred but I won my plea, and I gave it all I had. I should have held back on the poetry. I'm afraid it tipped my hand. The papers came back noted, in verse, from the upper realms:

"We must aver that in this fight,
Where every aim is high,
You might have won except, we feel,
Your finger's in the pie!"—END



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As a company of 600 highly-screened and carefully selected employees who in eight years have built a proud national reputation for accomplishment in the solid propellant rocket field, we approach every challenge with five weapons: pioneer intelligence in solid rocket knowledge, common-sense business judgment, enthusiasm, perseverance, and the American concept of private enterprise. Our approach to this competition was no different.



On December 17th, 1959, the Ordnance Ammunition Command of the Department of the Army announced the selection of Grand Central Rocket Co. to establish design criteria for conversion of an existing ordnance line at Kansas Ordnance Plant. If the conversion of this facility is carried to completion, Grand Central Rocket Co. will be the operating contractor.

We are proud of the part which we have been selected to play in this important project, one about which you are going to hear a great deal more.



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- To assist in obtaining and maintaining adequate airpower for national security and world peace.
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*
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1854

... 'Forward the Light Brigade!
Charge for the guns!' he said.
Into the valley of Death
Rode the six hundred.

* ... Was there a man dismay'd?
Not tho' the soldier knew
Someone had blunder'd.
Theirs not to make reply,
Theirs not to reason why,
Theirs but to do or die,
Into the valley of Death
Rode the six hundred.

... Cannon to right of them,
Cannon to left of them,
Cannon behind them
Volley'd and thunder'd;
Storm'd at with shot and shell,
While horse and hero fell,
They that had fought so well
Came thro' the jaws of Death ...
... All that was left of them,
Left of six hundred.

ALFRED LORD TENNYSON



RICHARD CATON WOODVILLE, JR. "Charge of the Light Brigade." Parker Gallery, London

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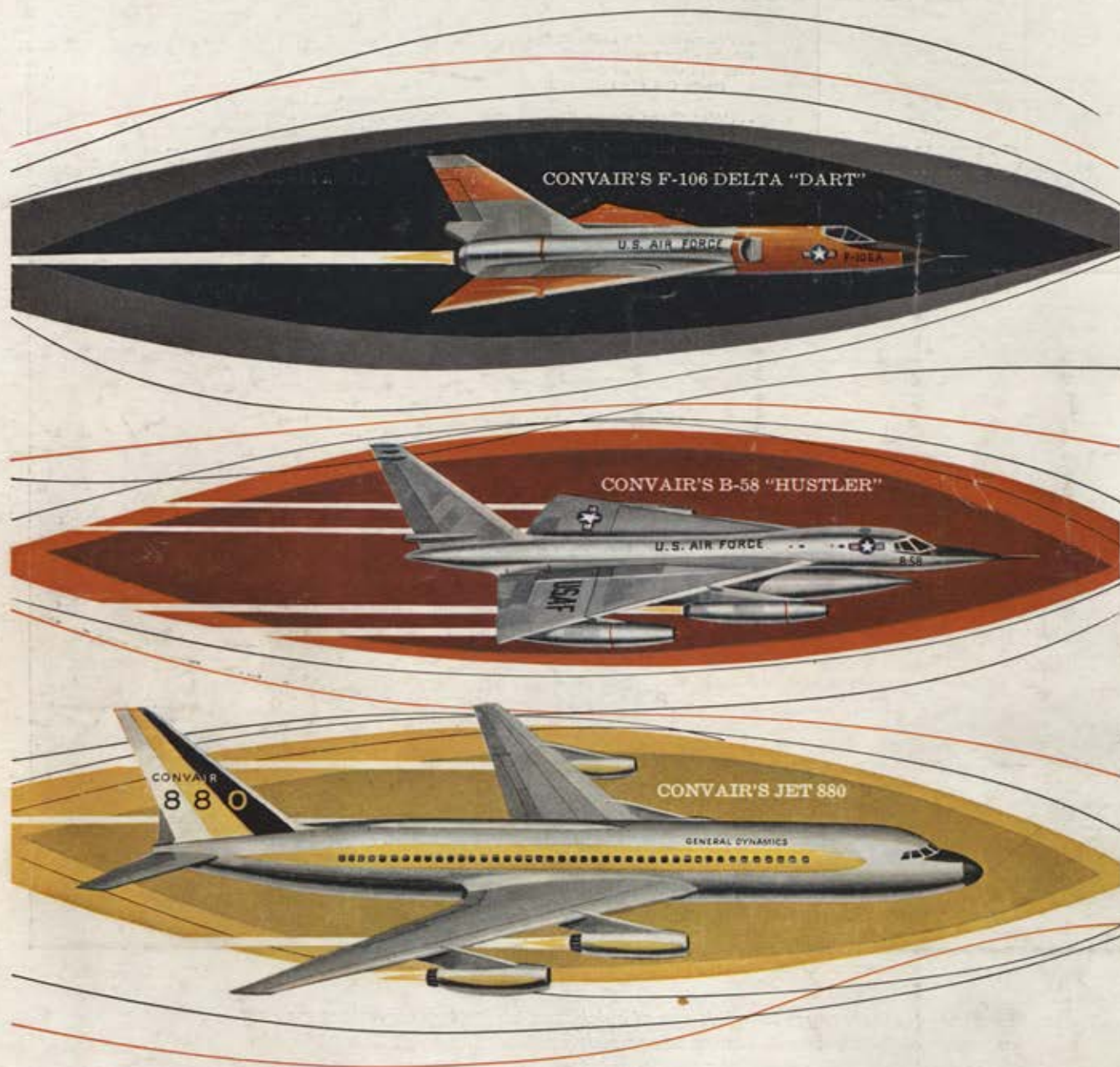
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